Description of document:	Environmental Final Governing Standards for Seven (7) countries in accordance with DoD Instruction 4715.5, Management of Environmental Compliance at Overseas Installations, 2011-2015
Requested date:	August 2015
Released date:	27-October-2015
Posted date:	07-December-2015
Source of document:	Freedom of Information Act Request United States Central Command CCJ6-RDF (FOIA) 7115 South Boundary Boulevard MacDill AFB, FL 33621-5101 Fax: (813) 529-6076 Email: foiaoffice@centcom.mil
Records included:	Kingdom of Bahrain Final Governing Standards, 13 March 2012 Environmental Final Governing Standards for US Forces in Egypt, 5 October 2015 Kuwait Environmental Final Governing Standard, 15 March 2011 Sultanate of Oman Final Governing Standards, 1 December 2012 State of Qatar Final Governing Standards, 1 March 2011 Kingdom of Saudi Arabia Final Governing Standards, 31 March 2014 United Arab Emirates Final Governing Standards, 14 March 2012

UNITED STATES CENTRAL COMMAND
7115 SOUTH BOUNDARY BOULEVARD
MACDILL AIR FORCE BASE, FLORIDA 33621-5101

27 October 2015

In response to your Freedom of Information Act (FOIA) request, the Department of Defense Office of Freedom of Information (OFOI) referred information to U.S. Central Command (USCENTCOM) to review and provide a direct response to you. Your FOIA request sought: (1) a listing of the Final Governing Standards developed in accordance with DoD Instruction 4715.5, Management of Environmental Compliance at Overseas Installations; and, (2) a digital/electronic copy of each Final Governing Standard. Since this response only addresses the documents referred to USCENTCOM, you may need to contact OFOI if you are waiting for additional information.

After a thorough review, I am releasing records in their entirety. There are no fees for processing this request since chargeable cost fell below $15. If you have any questions, please contact the FOIA Requester Service Center at (813) 529-6285, foiaoffice@centcom.mil, and refer to case #15-0195.

Sincerely,

Robert H Bennett

ROBERT H. BENNETT
GS-15, DAFC
Chief, Resources and Analysis Division
C4 Systems Directorate

Enclosures:
1. Kingdom of Bahrain Final Governing Standards
2. Environmental Final Governing Standards for US Forces in Egypt
3. Kuwait Environmental Final Governing Standard
4. Sultanate of Oman Final Governing Standards
5. State of Qatar Final Governing Standards
6. Kingdom of Saudi Arabia Final Governing Standards
7. United Arab Emirates Final Governing Standards

5

KINGDOM OF BAHRAIN
FINAL GOVERNING STANDARDS

13 March 2012

Prepared by
U.S. Navy Central Command
United States Central Command

On behalf of
United States Central Command (USCENTCOM)

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FORWARD

This Department of Defense (DoD) Publication is issued under the authority and requirements of DoD Instruction (DoDI) 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996. This Final Governing Standard (FGS) provides criteria, standards, and management practices for environmental compliance at DoD installations in the Kingdom of Bahrain. The FGS is derived from DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document," dated May 2007.

To produce the FGS for the Kingdom of Bahrain, a comprehensive review of the host nation's environmental regulations was conducted. A review was also conducted of Gulf Cooperation Council (GCC) environmental requirements of which the Kingdom of Bahrain is a party. Furthermore, any treaty, convention, protocols, etc., of which the Kingdom of Bahrain may be a party to, were also reviewed. The regulatory analysis consisted of reviewing each regulation that included an environmental requirement, per the scope of the OEBGD. Thus, the Kingdom of Bahrain's occupational or industrial health and safety regulations were not addressed as they are not part of the 16 OEBGD chapters. Local regulations were not included as part of the regulatory review.

This FGS applies to the Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Command, the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components") operating in the Kingdom of Bahrain.

This FGS is effective immediately and its use is mandatory by the DoD Components, pursuant to DoDI 4715.5. The Heads of the DoD Components may only issue supplementary instructions when deemed necessary to provide for unique requirements within their organizations.

FOR THE COMMANDER:

KARL R. HORST
Major General, U.S. Army
Chief of Staff

METHODOLOGY

Chapters 2-19 of the FGS include scope, definitions and criteria. Appendices and tables are also presented. The applicable Kingdom of Bahrain environmental regulations were compared to the May 2007 Overseas Environmental Baseline Guidance Document (OEBGD), and determinations were made as to whether an environmental regulation of the Kingdom of Bahrain was more or less stringent, equivalent to, or in addition to, the OEBGD standard. The more restrictive and additional standards were adopted in this FGS.

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APPENDICES

TABLES

REFERENCES

Department of Defense

(a) DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996
(b) Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982
(c) Section 7158 of title 42, United States Code
(d) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(e) DoD Instruction 4715.4, "Pollution Prevention," June 18, 1996
(f) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
(g) DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006
(h) Defense Logistics Agency Instruction 4145.11, Army Technical Manual 38-410, Naval Supply Publication 573, Air Force Joint Manual 23-209, and Marine Corps Order 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999
(i) Air Force Interservice Manual 24-204(I), Army Technical Order 3 8-250, Naval Supply Publication 505, Marine Corps Order P4030.19I, and Defense Logistics Agency Instruction 4145.3, Defense Contract Management Agency D1, Ch3.4 (HM24), "Preparing Hazardous Materials for Military Air Shipments," 15 April 2007, Incorporating Change 1, 4 May 2007.
(j) DoD 4160.21 -M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993
(k) DoD Directive 4001.1, "Installation Management," September 4, 1986
(l) Naval Facility Manual of Operation-213, Air Force Regulation 9 1-8, and Army Technical Manual 5-634, "Solid Waste Management," May 1990
(m) DoD 4150.7-M, "DoD Pest Management Training and Certification," April 24, 1997
(n) Military Handbook 1 028/8A, "Design of Pest Management Facilities," November 1, 1991
(o) DoD Instruction 6055.1, "DoD Safety and Occupational Health (SOH) Program," August 19, 1998
(p) DoD Instruction 6055.5, "Industrial Hygiene and Occupational Health," January 10, 1989
(q) Section 2643 of title 15, United States Code
(r) Title 40, Code of Federal Regulations, Part 763, Subpart E, "Asbestos-Containing Materials in Schools," current edition
(s) DoD Instruction 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998

CHAPTER 1

OVERVIEW

1.1 PURPOSE.

The primary purpose of these Final Governing Standards (FGS) is to provide-environmental compliance criteria at United States (U.S.) Department of Defense (DOD) installations in Bahrain. This document implements DOD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," dated 22 April 1996, and is based upon DOD 4715.05-G, "Overseas Environmental Baseline Guidance Document" (OEBGD), dated 1 May 2007.

1.2 APPLICABILITY.

1.2.1. These FGS provide environmental compliance criteria applicable to actions for DOD Components at installations located in the Kingdom of Bahrain.

1.2.2. These FGS represent minimum criteria; DOD Components may impose additional criteria provided those policies and directives do not directly conflict with these FGS.

1.2.3. Activities and installations shall notify the Environmental Executive Agent (EEA), United States Central Command (US

1.2.4. CENTCOM), via the Lead Environmental Component (LEC), Commander Navy Region Europe Africa Southwest Asia (CNREURAFSWA), of any directly conflicting DOD Component policies or directives they discover prior to imposing criteria more protective than provided in these FGS.

1.2.5. DOD Components shall not enter into agreements with Bahrain authorities at any level that establishes a criterion for environmental compliance that contradicts those provided in these FGS without the prior written approval of the LEC.

1.3. EXEMPTIONS.

These FGS do not apply to:

1.3.1. DOD installations that do not have more than *de minimis* potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices, and other similar organizations), or for which the DOD Components exercise control only on a temporary or intermittent basis.

1.3.2. Leased, joint use, and similar facilities to the extent that the DOD does not control the instrumentality or operation that a criterion seeks to regulate.

1.3.3. Operations of U.S. military vessels or the operations of U.S. military aircraft, or off installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when U.S. forces are operating as part of a multi-national force not under full control of the United States. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DOD Directives (DODDs) and DOD Instructions (DODIs), and environmental annexes incorporated into operation plans or operation orders. However, these FGS do apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DOD Components, including management or disposal of off-loaded waste or material.

1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order (E.O.) 12344 "Naval Nuclear Propulsion Program," and conducted pursuant to 42 United States Code (U.S.C.) 7158.

1.3.5. The determination or conduct of remediation to correct environmental problems caused by the Department of Defense's past activities, conducted in accordance with DOD Instruction (DODI) 4715.8, "Environmental Remediation for DOD Activities Overseas.

1.3.6. Environmental analyses conducted under E.O. 12114, "Environmental Effects Abroad of Major Federal Actions."

1.4. DEFINITIONS.

For purposes of these FGS, unless otherwise indicated, the following definitions apply:

1.4.1. Criteria and Management Practices. Particular substantive provisions of the OEBGD that are used by the EEA to develop these FGS.

1.4.2. Existing Facility. Any facility and/or building, source, or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified.

1.4.3. Final Governing Standards. A comprehensive set of country-specific substantive provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice.

1.4.4. New Facility. Any facility and/or building, source, or projects with a construction start date on or after 1 October 1994, or a pre-existing facility that has been substantially modified since 1 October 1994.

1.4.5. Substantial Modification. Any modification to a facility and/or building the cost of which exceeds $1 million, regardless of funding source.

1.5. ADDITIONAL INFORMATION.

1.5.1. The DOD Components shall establish and implement an environmental audit program to ensure that overseas installations assess compliance with these FGS at least once every 3 years at all major installations.

1.5.2. DODI 4715.4, "Pollution Prevention," implements policy, assigns responsibility, and prescribes procedures for implementation of pollution prevention programs throughout the

DOD. As a matter of DOD policy, DODI 4715.4 should be consulted for particular requirements that apply to activities outside the United States. Pollution prevention should be considered in developing the criteria and management practices for these FGS. Where economically advantageous and consistent with mission requirements, pollution prevention shall be the preferred means for attaining compliance with these FGS.

1.5.3. Laboratory analyses necessary to implement these FGS would normally be conducted in a laboratory that has been certified by a U.S. or Bahrain regulatory authority for the applicable test method. In the absence of a certified laboratory, analyses may also be conducted at a laboratory that has an established reliable record of QA compliance with standards for the applicable test method that are generally recognized by appropriate industry or scientific organizations, such as ISO 17025.

1.5.4. These FGS do not create any rights or obligations enforceable against the United States, the DOD, or any of its components, nor does it create any standard of care or practice for individuals. Although these FGS refers to other DODDs and DODIs, it is intended only to coordinate the requirements of those directives as required to implement the policies found in DODI 4715.5. These FGS do not change other DOD or service directives or instructions, or alter DOD or service policies.

1.6. WAIVERS.

1.6.1. If compliance with the FGS at particular installations or facilities would seriously impair operations, adversely affect relations with Bahrain authorities, or require substantial expenditure of funds at an installation that has been identified for closure or at an installation that has been identified for a realignment that would remove the requirement, a DOD Component may ask the EEA, via the LEC, to waive the particular standard. See DOD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations", and USCENTCOM Regulation 200-1, "Protection and Enhancement of Environmental Assets," for complete waiver procedures.

1.7. APPROVALS.

1.7.1. Approval may be required to engage in activities that have the potential to affect the environment in Bahrain. Generally, activities that occur within the confines of the installation and do not affect the environment outside of the installation do not require approval. DoD Components shall not apply for approval directly from Bahrain authorities. DoD Components shall contact the LEC to determine approval requirements and coordinate with Bahrain representatives regarding activities that may require approval as indicated in these FGS. If the installation has a Bahrain Installation Commander (BIC), the U.S. Installation Commander or designated representative shall inform the BIC of activities that may require approval, keeping the LEC informed. If the BIC declines to engage regarding an approval, DOD Components shall contact the LEC to determine approval requirements.

1.7.2. If Bahrain approval specifies a more protective standard than prescribed in the FGS, the standard in the approval shall be the compliance standard. However, if an approval allows a less protective standard, then the FGS will be the compliance standard unless a waiver is obtained (see section 1.6).

1.7.3. Contractors performing work for DOD on DOD installations must comply with all Bahrain laws and regulations including obtaining all necessary licenses and approvals. Contracting services does not absolve DOD Components from compliance with these FGS unless exempted under section 1.3, Exemptions.

1.7.4. Certificates obtained from appropriate Bahrain authorities (e.g., tank tightness testing) do not fall within the definition of an approval process requiring the LEC. Request for services (e.g., inspections) shall be forwarded directly to the appropriate organizations without involving the LEC.

1.8. WORKING WITH THE LEC.

1.8.1. DOD Components shall consult with the LEC when specified in these FGS and when:

1.8.1.1. Significant exceedances of FGS or approval criteria occur

1.8.1.2. Bahrain enforcement action is initiated

1.8.1.3. An issue is raised that has the potential to affect multiple installations or military services

1.8.2. DOD Components shall notify the LEC when specified in these FGS and when:

1.8.2.1. Information is provided to BIC for activities requiring approval governed by these FGS.

1.8.2.2. BIC or other Bahrain official requests information.

1.8.2.3. Any Bahrain official requests access to an installation in order to conduct an environmental inspection.

1.8.3. The LEC, working with the notifying DOD Component, may determine that notification specified in these FGS is no longer required on a case-by-case basis.

1.9. ACCESS TO INSTALLATIONS BY BAHRAIN AUTHORITIES. Inspections and non-routine requests for information by Bahrain authorities shall be coordinated with the BIC (if designated for a facility) or the LEC and reported to the EEA via the Component chain-of-command. To the maximum extent possible, U.S. military personnel, rather than civilian personnel, shall lead the review of DOD Component activities by Bahrain authorities during the inspection.

1.10. LEAD ENVIRONMENTAL COMPONENT.

The LEC for these FGS is the Commander, Navy Region Europe Africa Southwest Asia. Any questions or comments pertaining to these FGS shall be sent to:

Commander, Navy Region Europe Africa Southwest Asia
PSC 817 Box 108
FPO AE 09622
DSN Voice (314) 626-2886
DSN FAX (314) 626-4341
Commercial +39 081-568-2886

Or to the Environmental LEC representative in Bahrain at:

Commander Navy Region Europe Africa Southwest Asia
Detachment Bahrain
Environmental Program
PSC 451 BOX 850
FPO AE 09834-2800
DSN Voice (318) 439-4603
DSN FAX (318) 439-3028
Commercial +973-1-785-4603

CHAPTER 2

AIR EMISSIONS

2.1. SCOPE

This Chapter contains standards for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 15, "Asbestos."

2.2. DEFINITIONS

2.2.1. Coal Refuse. Waste products from coal mining, cleaning, and coal preparation operations (e.g., culm and gob) contain coal, matrix material, clay, and other organic and inorganic material.

2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soil and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, non-boiling solvent to clean the parts are classified as cold cleaning machines.

2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

2.2.4. Controlled Substances. Chemicals (in both mixed and pure form) listed in Table 2.2.

2.2.5. De minimis. This term means that average person would regard an issue to be so minor that it is insignificant.

2.2.5. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

2.2.6. Freeboard Ratio. The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

2.2.7. Hanging Inhalable Particles. Naturally hanging particles resulting from sand storms, forest fires, and volcanic activities, in addition to some industrial activities. They are classified according to size. Those between 0.1μm and 10μm are classified as hanging inhalable particles.

2.2.8. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depleting Substances (ODS).

C2.2.9. Incinerator. Any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

2.2.10. Most Appropriate Available Technique. The best standards, criteria, levels, and means available to prevent or reduce pollution from projects in the country and are defined by a specialized authority.

2.2.11. Motor Vehicle. Any commercially available vehicle that is not adapted to military use that is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to, passenger cars, light duty vehicles, and heavy duty vehicles.

2.2.12. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (MSW) including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

2.2.13. Municipal Solid Waste (MSW). Household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, non-manufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (non-medical), non-manufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

2.2.14. Ozone-Depleting Substances. Those substances listed in Tables 2.2 and 2.3.

2.2.15. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

2.2.16. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

2.2.17. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

2.2.18. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

2.2.19. Stack. Any point in a source covered by criteria contained in 2.3.1., 2.3.2., 2.3.3., 2.3.4., or 2.3.5. designed to emit pollutants.

2.2.20. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

2.2.21. Substantially-Modified. Any modification to a facility/building, the cost of which exceeds 377,100 BD ($1 million), regardless of funding source.

2.2.22. Vapor Cleaning Machine. A batch or in-line solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

2.3. CRITERIA

2.3.1. Steam/Hot Water Generating Units. The following standards apply to units that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994.

2.3.1.1. Air Emission Standards. The following criteria apply to units with a maximum design heat input capacity ≥ 3.0 MW or 10 million Btu/hr.

2.3.1.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards for specific sized units shown in Table 2.1. at all times.

2.3.1.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight %) and higher heating value will be measured and recorded for each new shipment of fuel. Document compliance with the SO_2 limits using the limits in Table 2.1. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for SO_2 and either oxygen (O_2) or carbon dioxide (CO_2). Otherwise SO_2 shall be measured using the fluorescent method, or any other internationally-approved method.

2.3.1.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or nitrogen oxides (NO_X) standards in Table 2.1, must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

2.3.1.2.1. For units with a maximum design heat input capacity > 9 MW (30 million Btu/hr): Opacity, except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

2.3.1.2.2. For fossil fuel fired units with a maximum design heat input capacity > 30 MW (100 million Btu/hr): NO_X and either O_2 or CO_2.

2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration.

2.3.2.1. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Table 2.4. and operating limits in Table 2.5.

2.3.2.2. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table 2.4. and operating limits in Table 2.5.

2.3.2.3. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994 and that burn more than 0.907 tons per day (tpd)) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of startup, shut down, malfunction, or when emergency conditions exist.

2.3.2.4. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

2.3.2.4.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

2.3.2.4.1.1. Unit design: dual chamber.

2.3.2.4.1.2. Minimum temperature in primary chamber: ***760-871°C*** (1400-1600°F).

2.3.2.4.1.3. Minimum temperature in secondary chamber: ***982-1204°C*** (1800-2200°F).

2.3.2.4.1.4. Minimum residence time in the secondary chamber: 2 seconds.

2.3.2.4.1.5. Incinerator operators must be trained in accordance with applicable Service requirements.

2.3.2.4.1.6. Medical waste incinerators shall operate within the emission standards listed on Tables 2.6, 2.7, and 2.8.

2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. Chemicals listed on Table 2.2 shall NOT be used in dry cleaning and vapor degreasing activities.

2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than ***7,571 liters*** (2,000 gallons) per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed. The temperature of the refrigerated condenser must be maintained at ***7.2°C*** (45°F) or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at ***7.2°C*** (45°F) or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that are most appropriate to suit local conditions:

2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm). Control devices/methods must be operated according to manufacturer recommendations.

2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet (ft^2); K = a conversion factor, 425 dscm/(ft^2-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains > 5 % by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents. The use of carbon tetrachloride (CAS No. 56-23-5) in any equipment or appliance is prohibited.

2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 2.54 cm (1-inch) water layer or a freeboard ratio of at least 0.75.

2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

2.3.6. Units Containing ODS. The following criteria apply to direct atmospheric emissions of ODS, hydrofluorocarbons (HFC), and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment. With regard to equipment containing controlled substances (Table 2.2), new equipment shall be prohibited from utilizing controlled substances, while existing equipment containing controlled substances shall comply with the gradual phase-out schedule. Contact the LEC to obtain the phase-out schedule and to obtain approval for laboratory and medical equipment exemptions.

2.3.6.1. Refrigerant Recovery/Recycling. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or Bahraini equivalent.

2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant listed in Tables 2.2 and 2.3 shall not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners. *De minimis* releases associated with good faith attempts to recycle or recover ODS, HFC, and PFC refrigerants listed in ***Table 2.3*** are not subject to this prohibition.

2.3.6.3. Refrigerant Leak Monitoring and Repair. Monitor and repair refrigeration equipment for leakage in accordance with the following criteria and repair, if found to be leaking.

2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing > 22.70 kg (50 pounds) of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 % of the total charge during a 12-month period.

2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing > 22.70 kg (50 pounds) of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35% of the total charge during a 12-month period.

2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing > 22.70 kg (50 pounds) of refrigerant and not covered by subparagraphs 2.3.6.3.1. or 2.3.6.3.2. of this chapter must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 % of the total charge during a 12-month period.

2.3.6.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons listed in Tables 2.2 and 2.3 shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following types of releases of halons listed in Table 2.3:

2.3.6.4.1. *De minimis* releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

2.3.6.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion, or other emergency applications for which the equipment or systems were designed.

2.3.6.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulant agent cannot be used.

2.3.7. Motor Vehicles. These criteria apply to DoD-owned motor vehicles as defined in paragraph 2.2.11.

2.3.7.1. All imported vehicles shall have a catalytic converter or equivalent form of emission control equipment.

2.3.7.2. All vehicles shall be inspected every two years to ensure that no tampering with factory-installed emission control equipment (catalytic converters or equivalent) has occurred.

2.3.7.3. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

2.3.7.4. Particulate emissions from diesel exhaust shall not exceed a concentration of 193 mg/m^3.

2.3.8. Stack Heights. H_g is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures.

2.3.8.1. Stacks shall be designed and constructed to heights at least equal to the largest H_g calculated from either of the following two criteria:

2.3.8.1.1. $H_g = H + 1.5L$, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but not greater than 0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest H_g.

2.3.8.1.2. H_g is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum ground-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40 % in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means not greater than 0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height (H_t) of the feature, not to exceed 3.2 km (2 miles) if such feature achieves a height (H_t) 0.8 km (0.5 mile) from the stack that is at least 40 % of the good engineering practice stack height determined by the formulae provided in 2.3.8.1.1. of this part or 26 meters (85 feet), whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

2.3.9. Emissions Monitoring. The following monitoring requirements shall apply to all installations, including steam/ hot water generating units. These requirements do not apply to motor vehicles.

2.3.9.1. Air emissions monitoring shall be conducted on a quarterly basis and averaged over an 8 hour period. Monitoring can be conducted more frequently if instructed by the LEC.

2.3.9.2. Installations shall submit results of the analyses to the LEC within 15 days of conducting measurements, or as instructed by the LEC.

2.3.9.3. NOx shall be monitored through the chemiluminescent method, or through any other approved method.

2.3.9.4. Particulate matter shall be monitored through the Tapered Element Oscillating Membrane (TEOM) method, or through any other approved method.

2.3.9.5. . Installations releasing pollutants which do not conform to permissible limits may be granted a grace period of ten one month periods. Contact the LEC for grace period determination."

2.3.10. Emissions Reporting. Installations releasing air pollutant emissions to the environment shall maintain data forms for their stacks. Bahrain inspector requests to examine these forms should be coordinated through the LEC. Forms can be obtained through the LEC. Installations should also consult the LEC to determine the period of time the forms should be kept. The forms shall contain the following information:

2.3.10.1. Name of company/ owner of the source of emissions

2.3.10.2. Source of emissions

2.3.10.3. Type of pollutants released

2.3.10.4. Concentration of pollutants

2.3.10.5. Point of emissions

2.3.10.6. Temperature

2.3.10.7. Stack height

2.3.10.8. Stack diameter

2.3.10.9. Location of stack

2.3.10.10. Speed/ velocity

2.3.10.11. Rate of emission

2.3.11. Volatile Organic Compounds. Installations shall establish appropriate cleaning methods, a good maintenance system, and continual inspection and control procedures at points where vapor emissions are likely for any activities utilizing VOCs.

Table 2.1. Emission Standards for Fuel Combustion Sources

Fuel Source	Pollutants	Emission Limits (mg/Nm^3 unless otherwise specified) (for units with size 10 – 100 MMBtu/hr)[1]	Emission Limits (mg/Nm^3 unless otherwise specified) (for units with size >100MMBtu/hr)[1]
All Sources	Visible Emissions	20% Opacity	20% Opacity
	Carbon Monoxide (CO)	100	100
Oil Fuel (liquid)	Nitrogen Oxides (NO_x)	150	150
	Sulfur Dioxide (SO_2)	0.43lb/MMBtu	0.43lb/MMBtu
	Hanging Particles (PM)	100	100 for units with size <50MW or 171MMBtu/hr) 50 (for units with size equal to 50 MW or 171MMBtu/hr) 129 (for units with size >171MMBtu/hr)
Gas Fuel	Nitrogen Oxides (NO_x)	100	100
	Sulfur Dioxide (SO_2)	2.3 lb/MMBtu	2.3 lb/MMBtu
	Hydrogen Sulfide (H_2S)[2]	150ppm or 228mg/Nm^3	150ppm or 228mg/Nm^3
	Hanging Particles (PM)	0.1lb/MMBtu	0.1lb/MMBtu
Coal-Derived Gas Fuel	Nitrogen Oxides (NO_x)	-	645
	Hanging Particles (PM)	50	50
	Sulfur Dioxide (SO_2)	500	500
Solid Fossil Fuel	Nitrogen Oxides (NO_x)	-	852
	Sulfur Dioxide (SO_2)	1460	1460
	Hanging Particles	122	122
Other Solid Fuel	Hanging Particles	0.3 lb/MMBtu	0.2 lb/MMBtu

Notes:

1. Gases shall be under dry conditions, temperature 273K, Pressure 101.325kpa, 15% O_2 reference
2. If the % of H_2S in gas is greater than the standard, SO_2 shall be used to lower this limit.

Table 2.2. Controlled ODS in Bahrain

Groups	Common Product Name	Chemical Formula	Chemical Name Description [1]	CAS No.
Group I (CFCs)	CFC-11 (R11)	$CFCl_3$	Trichlorofluoromethane	75-69-4
	CFC-12 (R12)	CF_2Cl_2	Dichlorodifluoromethane	75-71-8
	CFC-113	$C_2F_3Cl_3$	1,1,2-Trichlorotrifluoroethane	76-13-1
	CFC-114	$C_2F_4Cl_2$	Dichlorotetrafluoroethane	76-14-2
	CFC-115	C_2F_5Cl	Monochloropentafluoroethane	76-15-3
Group II (Halons)	Halon 1211	CF_2BrCl	Bromochlorodifluoromethane	353-59-3
	Halon 1301	CF_3Br	Bromotrifluoromethane	75-63-8
	Halon 2402	$C_2F_4Br_2$	Dibromotetrafluoroethane	124-73-2
Group III Fully Halogenated Compounds	CFC-13	$CClF_3$	Chlorotrifluoromethane	75-72-9
	CFC-111	C_2Cl_5F	Pentachloro-2-fluoroethane	354-56-3
	CFC-112	$C_2Cl_4F_2$	Tetrachlorodifluoroethane	76-12-0
	CFC-211	C_3Cl_7F	Heptachlorofluoropropane	422-78-6
	CFC-212	$C_3F_2Cl_6$	Hexachlorodifluoropropane	3182-26-1
	CFC-213	$C_3Cl_5F_3$	Pentachlorotrifluoropropane	2354-06-5
	CFC-214	$C_3Cl_4F_4$	Tetrachlorotetrafluoropropane	29255-31-0
	CFC-215	$C_3Cl_3F_5$	Trichloropentafluoropropane	4259-43-2
	CFC-216	$C_3F_6Cl_2$	Dichlorohexafluoropropane	661-97-2
	CFC-217	C_3F_7Cl	Chloroheptafluoropropane	422-86-6
Group IV	-	CCl_4	Carbon Tetrachloride	56-23-5
Group V	-	CH_3Br	Methyl Bromide	74-83-9
	-	CH_3CCl_3	Methyl Chloroform	71-55-6
Group VI	-	HBFCs	Hydrobromofluorocarbons	-

Table 2.3. Additional Ozone Depleting Substances Controlled on DoD Installations

Class II			
HCFC – 21	HCFC – 133a	HCFC – 225cb	HCFC – 243
HCFC – 22	HCFC – 141b	HCFC – 226	HCFC – 244
HCFC – 31	HCFC – 142b	HCFC – 231	HCFC – 251
HCFC – 121	HCFC – 151	HCFC – 232	HCFC – 252
HCFC – 122	HCFC – 221	HCFC - 233	HCFC – 253
HCFC – 123	HCFC – 222	HCFC – 234	HCFC – 261
HCFC – 124	HCFC – 223	HCFC – 235	HCFC – 262
HCFC – 131	HCFC – 224	HCFC – 241	HCFC – 271
HCFC – 132b	HCFC – 225ca	HCFC – 242	

Table 2.4. Emission Standards for Incinerators

Pollutant	**Emission Standards**[1]				
Incinerator Type	**Existing MWC units**[2]		**MWC units that begin new construction or undergo substantial modification**[2]		**CISWI units**
Rated Capacity	**35-250 tpd**	**>250 tpd**	**35-250 tpd**	**>250tpd**	**All units**
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm
Opacity	10%		10%		10%
NO_x	N/A	See Note 3	500 ppmv	150 ppmv	388 ppmv
SO_2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv
Dioxins/furans	125 ng/dscm	See Note 4	13 ng/dscm		0.41 ng/dscm
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.47 mg/dscm
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	62 ppmv
Fugitive ash	5% of hourly observation period		5% of hourly observation period		N/A

Notes:

1 Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.

2 Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

3 NO_x limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.

4 Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

Table 2.5. Carbon Monoxide Operating Limits for Incinerators[1]

Incinerator Type	**Existing MWC units[2]**		**MWC units that begin new construction or undergo substantial modification[2]**		**CISWI units**
Rated Capacity	**35-250 tpd**	**>250 tpd**	**35-250 tpd**	**>250tpd**	**All units**
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Fluidized bed, mixed fuel (wood/refuse-derived fuel)	200 ppmv (24-hr avg)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)		100 ppmv (24-hr avg)		
Mass burn rotary waterfall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		
Mass burn waterfall and refractory	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		157 ppmv
Mixed fuel-fired (pulverized coal/refuse-derived fuel)	150 ppmv (4-hr avg)		150 ppmv (4-hr avg)		
Modular starved-air and excess air	50 ppmv (4-hr avg)		50 ppmv (4-hr avg)		
Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel)	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		
Stoker, refuse-derived fuel	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		

Notes:
1. Compliance is determined by continuous emission monitoring systems.
2. Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

Table 2.6. Air Emission Standards for Medical Waste Incinerators with a Capacity > 1 Ton Per Hour

Pollutants	Limits (mg/m^3 unless otherwise specified)
Total Plankton particles [1]	30
Carbon Monoxide [1]	50
Carbon Dioxide [2]	300
Hydrogen Chloride [2]	30
Hydrogen Fluoride [2]	2
Nitric Oxide [2]	350
Organic Compounds[2]	20
Dioxins and Furans (In operating units with design capacity of > 50 kg/hour) [3]	1 ng TEV/m^3 Refer to Table No. 2.8
Cadmium and its compounds (referred to as Cadmium)[3]	0.1
Mercury and its compounds (referred to as Mercury) [3]	0.1
Other heavy metal and their compounds Referred to as Metal [total of each Pb (Lead) As (Arsenic), CR (Chrome)] [3]	0.1

Notes:
[1] Average daily values
[2] Measurement of emissions produced once every 6 months
[3] Measurement of emissions produced once every year
TEV means Total Equivalency Quantity (Toxic Equivalent). See Table 2.8.

Table 2.7. Air Emission Standards for Medical Waste Incinerators with a Capacity < 1 Ton Per Hour

Pollutants	Limits (mg/m^3 unless otherwise specified)
Total Plankton particles[1]	30
Carbon Monoxide[1]	50
Carbon Dioxide[2]	300
Hydrogen Chloride[2]	30
Organic Compounds[2]	20
Dioxins and Furans (In operating units with design capacity of > 50kg/hour)[3]	1 ng TEV/m^3 Refer to Table 2.8
Cadmium and its compounds (referred to as Cadmium)[3]	0.1
Mercury and its compounds (referred to as Mercury)[3]	0.1
Other heavy metal and their compounds Referred to as Metal [total of each Pb (Lead) As (Arsenic), CR (Chrome)] [3]	0.1

Notes:
[1] Average daily values
[2] Measurement of emissions produced once every 6 months
[3] Measurement of emissions produced once every year
TEV means Total Equivalency Quantity (Toxic Equivalent). See Table 2.8.

Table 2.8. Dioxins and Furans

Chemical Substance(s)	Equation Value/ Factor
2, 3, 7, 8, Tetrachlorapitrodioxin	1.0
1, 2, 3, 7, 8, Pentachlorapitrodioxin	0.5
1, 2, 3, 4, 7, 8, Hexachlorapitrodioxin	0.1
1, 2, 3, 7, 8, 9, Hexachlorapitrodioxin	0.1
1, 2, 3, 6, 7, 8, Hexachlorapitrodioxin	0.1
1, 2, 3, 4, 6, 7, 8, Heptachlorapitrodioxin	0.01
Octachlorapitrodioxin	0.001
2, 3, 7, 8, Tetrachlorapitrodioxin Furan	0.1
2, 3, 4, 7, 8, Pentachlorapitrodioxin Furan	0.5
1, 2, 3, 7, 8, Pentachlorapitrodioxin Furan	0.05
1, 2, 3, 4, 7, 8, Hexachlorapitrodioxin Furan	0.1
1, 2, 3, 7, 8, 9, Hexachlorapitrodioxin Furan	0.1
1, 2, 3, 6, 7, 8, Hexachlorapitrodioxin Furan	0.1
2, 3, 4, 6, 7, 8, Hexachlorapitrodioxin Furan	0.1
1, 2, 3, 4, 6, 7, 8, Heptachlorapitrodioxin Furan	0.01
1, 2, 3, 4, 5, 8, 9, Heptachlorapitrodioxin Furan	0.01
Octachlorapitrodioxin Furan	0.001

Notes:
TEV means Total Equivalency Quantity (Toxic Equivalent), being the sum total of the concentrations of each of the dioxin and furan compounds specified in the first column of this table multiplied by their corresponding factor specified in the second column. TEV = Σ (TEF x Concentration) for each type of Dioxin/Furan.
TEV for all dioxins and furans shall not exceed 1ng TEV/m^3.

CHAPTER 3

DRINKING WATER

3.1. SCOPE

This Chapter contains criteria for providing potable water.

3.2. DEFINITIONS

3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater DoD Component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the DoD Component's installations.

3.2.3. Concentration/Time (CT). The product of residual disinfectant concentration, C, in milligrams per liter (mg/L) determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables C3.T11. through C3.T24.

3.2.4. Conventional Treatment. Water treatment, including chemical coagulation, flocculation, sedimentation, and filtration.

3.2.5. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited onto a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.

3.2.6. Direct Filtration. Water treatment, including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

3.2.7. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

3.2.8. DoD Water System. A public or non-public water system.

3.2.9. Emergency Assessment. Evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service caused by natural disasters, accidents, and sabotage.

3.2.10. First Draw Sample. A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.

3.2.11. Haloacetic Acids. The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

3.2.12. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

3.2.13. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

3.2.14. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

3.2.15. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

3.2.16. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

3.2.17. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

3.2.18. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

3.2.19. Potable Water. Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

3.2.20. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

3.2.20.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

3.2.20.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

3.2.20.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least six months per year, but not year round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

3.2.20.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least six months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

3.2.21. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

3.2.22. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (0.37 m/hr (1.2 ft/hr)), resulting in particulate removal by physical and biological mechanisms.

3.2.23. Total Trihalomethanes. The sum of the concentration in milligrams per liter of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

3.2.24. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever the principal function of the well is emplacement of any fluid.

3.2.25. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities, which provide a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

3.3. CRITERIA

3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:

3.3.1.1. Maintain a map/drawing of the complete potable water system.

3.3.1.2. Update the potable water system master plan at least every 5 years.

3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintaining septic systems and onsite treatment units, and by appropriate land use management on DoD installations.

3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years for systems using surface water, and every 5 years for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with HN authorities.

3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, at a minimum, must be disinfected.

3.3.1.6. Maintain a continuous positive pressure of at least 137.9 kPa (20 pounds per square inch (psi)) in the water distribution system.

3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority);

3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing);

3.3.1.7.3. An effective annual water main flushing program;

3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs; and

3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

3.3.1.8. Establish an effective cross connection control and backflow prevention program.

3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption:

3.3.1.10.2. Identification of key personnel;

3.3.1.10.3. Procedures to restore service;

3.3.1.10.4. Procedures to isolate damaged lines;

3.3.1.10.5. Identification of alternative water supplies; and

3.3.1.10.6. Installation public notification procedures.

3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years.

3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least three years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

3.3.1.14. Conduct vulnerability assessments, which include, but are not limited to, a review of:

3.3.1.14.1. Pipes and constructed conveyances, physical barriers, water collection, pretreatment, treatment, storage, and distribution facilities, electronic, computer, or other automated systems utilized by the PWS;

3.3.1.14.2. Use, storage, or handling of various chemicals; and

3.3.1.14.3. Operation and maintenance of the water storage, treatment, and distribution systems.

3.3.2. Regardless of whether a DoD water system produces or purchases water, it will, by independent testing or validated supplier testing, ensure conformance with the following:

3.3.2.1. Total Coliform Bacteria Requirements

3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining ≥ 40 samples a month, and no more than one positive sample per month when a system analyzes < 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms or *E. coli* or any repeat sample is positive for total coliforms.

3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table 3.2., "Total Coliform Monitoring Frequency."

3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection 3.3.3. to:

3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

3.3.2.2. Inorganic Chemical Requirements

3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed for human consumption does not exceed applicable limitations set out in Table 3.3. Except for nitrate, nitrite, and total nitrate/nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For nitrate, nitrite, and total nitrate/nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table 3.4., "Inorganics Monitoring Requirements."

3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph 3.3.3. as soon as possible. If the nitrate, nitrite, or total nitrate and nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test results. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table 3.4., "Inorganics Monitoring Requirements," until remedial actions are completed and authorities determine the system is reliable and consistent.

3.3.2.2.4. The MCL for arsenic applies to CWS and NTNCWS.

3.3.2.3. Fluoride Requirements

3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L, as stated in Table 3.3., "Inorganic Chemical MCLs."

3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample annually at the entry point to the distribution system for surface water systems, and once every three years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table 3.5., "Recommended Fluoride Concentrations at Different Temperatures."

3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph 3.3.3. as soon as possible, but in no case later than 14 days after the violation.

3.3.2.4. Lead and Copper Requirements

3.3.2.4.1. DoD CWS and NTNCWS will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead or copper levels are exceeded in more than 10% of all sampled taps.

3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table 3.6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table 3.6.

3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table 3.6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and host nation) within 60 days and will complete the notification in paragraph 3.3.3. as soon as possible, but in no case later than 14 days after the violation.

3.3.2.5. Synthetic Organics Requirements

3.3.2.5.1. An installation responsible for CWS and NTNCWS will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table 3.7., "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table 3.8., "Synthetic Organic Chemical Monitoring Requirements."

3.3.2.5.3. If a system is out of compliance, the notification set out in paragraph 3.3.3. shall be completed as soon as possible, but in no case later than 14 days after the violation. The installation will immediately begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL, as noted in Table 3.8., "Synthetic Organic Chemical Monitoring Requirements," and will continue until the installation commander determines the system is back in compliance, and all necessary remedial measures have been implemented.

3.3.2.6. Disinfectant/Disinfection Byproducts (DDBP) Requirements

3.3.2.6.1. An installation responsible for a CWS and NTNCWS that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

3.3.2.6.1.1. Ensure that the MCL of 0.08 mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of 1.0 mg/L for chlorite, and the MCL of 0.01 mg/L for bromate are met in drinking water.

3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of 4.0 mg/L for chlorine, the MRDL of 4.0 mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are met in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table 3.9., "Disinfectant/Disinfection Byproducts Monitoring Requirements." Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone are also included in Table 3.9.

3.3.2.6.3. For TTHM and HAA5 a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table 3.9. for chlorine, chloramine, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table 3.9., the installation will accomplish the notification requirements outlined in paragraph 3.3.3. as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

3.3.2.7. Radionuclide Requirements

3.3.2.7.1. An installation responsible for a CWS will test the system for conformance with the applicable radionuclide limits contained in Table 3.10., "Radionuclide MCLs and Monitoring Requirements."

3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table 3.10.

3.3.2.7.3. If the average annual MCL for gross alpha activity for radium is exceeded, the installation will complete the notification according to the procedures in paragraph 3.3.3. within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

3.3.2.8. Surface Water Treatment Requirements. DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table 3.1. If the turbidity readings in Table 3.1. are exceeded, the installation will complete the notification in paragraph 3.3.3. as soon as possible, but in no case later than 14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DDBP requirements (3.3.2.6.), will ensure that protection from microbial pathogens is not compromised.

3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored for total coliforms, at a minimum, and disinfectant residuals periodically.

3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources, including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct and conventional filtration processes. This requirement only applies to DoD PWSs that:

3.3.2.11.1. Use surface water or GWUDISW;

3.3.2.11.2. Use direct or conventional filtration processes; and

3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and host nation) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps being taken to correct the violation, the necessity for seeking an alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.

3.3.3.1. Additional Notification Requirements. The Competent Authority shall be notified, via the LEC, regarding any waterworks to be connected to their supply system five working days prior to any connection.

3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

Table 3.1. Surface Water Treatment Requirements

1. Unfiltered Systems

a. Systems which use unfiltered surface water or GUDISW will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily, and must continue as long as the unfiltered system is in operation. If the total coliforms and/or fecal coliforms exceed 100/100 milliliters (mL) and 20/100 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU).

b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T11. through C3.T24.

c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.

d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made at the same times as total coliforms are sampled.

e. Disinfectant residual of water entering the distribution system cannot be < 0.2 mg/L for greater than four hours.

f. Water in a distribution system with a heterotrophic bacteria concentration ≤ 500/mL measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.

g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

2. Filtered Systems

a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.

b. The turbidity of filtered water will be monitored at least once every four hours. The turbidity of filtered water for direct and conventional filtration systems will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.

c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

*Proper conventional treatment typically removes 2.5-log *Giardia*/ 2.0-log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0-log *Giardia*/ 1.0-log viruses. Slow sand filtration removes typically removes 2.0-log *Giardia*/ 2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.

3. SW or GWUDISW systems will provide at least 99% (2-log) removal of Cryptosporidium. A system is considered to be compliant with the Cryptosporidium removal requirements if:

a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU.

b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs.

c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of Giardia lamblia cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of Cryptosporidium oocysts.

d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1a above to remain unfiltered.

4. Individual Filter Effluent Monitoring. Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for three months in a row (for the same filter), the installation must conduct a self-assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.

5. Covers for Finished Water Storage Facilities. Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table 3.2. Total Coliform Monitoring Frequency

Population Served	Number of Samples [1]	Population Served	Number of Samples [1]
25 to 1,000 [2]	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes:
1. Minimum Number of Routine Samples Per Month

2. A non-community water system using groundwater and serving ≤ 1,000 people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve < 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table 3.3. Inorganic Chemical MCLs

Contaminant	MCL	
Arsenic [1]	0.010	mg/L
Antimony [1]	0.006	mg/L
Asbestos [1]	7 million	fibers/L (longer than 10 um)
Barium	2.0	mg/L
Beryllium [1]	0.004	mg/L
Cadmium [1]	0.005	mg/L
Chromium [1]	0.1	mg/L
Cyanide [1]	0.2	mg/L (as free cyanide)
Fluoride [2]	4.0	mg/L
Mercury [1]	0.002	mg/L
Nickel [1]	0.1	mg/L
Nitrate [3]	10	mg/L (as N)
Nitrite [3]	1	mg/L (as N)
Total Nitrite and Nitrate [3]	10	mg/L (as N)
Selenium [1]	0.05	mg/L
Sodium [4]		
Thallium	0.002	mg/L

Notes:

1. MCLs apply to CWS and NTNCWS.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNCWS, and TNCWS.
4. No MCL established. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis.

Table 3.4. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---
Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos [3]	1 sample every 9 years	1 sample every 9 years	>MCL	Yes
Total Nitrate/Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [6]
Nitrite	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [7]
Corrosivity [8]	Once	Once	---	---

Notes:

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a sanitary survey conducted by the PWS.
4. Any sampling point with an analytical value ≥ 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50% of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country-specific FGS to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Saturation Index.

Table 3.5. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (□F)	**Control Limits (mg/L)**		
	Lower	**Optimum**	**Upper**
50.0 - 53.7	0.9	1.2	1.7
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table 3.6. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	**No. of Sites for Standard Monitoring [1], [2]**	**No. of Sites for Reduced Monitoring [3]**	**No. of Sites for Water Quality Parameters [4]**
>100,000	100	50	25
10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes:

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multi-family residences with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNCWS, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6-month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every three years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table 3.7. Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
Pesticides/PCBs		
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008
Aldicarb sulfoxide	0.004	0.0005
Atrazine	0.003	0.0001
Benzo[a]pyrene	0.0002	
Carbofuran	0.04	0.0009
Chlordane	0.002	0.0002
Dalapon	0.2	
2,4-D	0.07	0.0001
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
Di (2-ethylhexyl) adipate	0.4	
Di (2-ethylhexyl) phthalate	0.006	
Dinoseb	0.007	
Diquat	0.02	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.00001
Glyphosphate	0.7	
Heptachlor	0.0004	0.00004
Heptachlorepoxide	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Lindane	0.0002	0.00002
Methoxychlor	0.04	0.0001
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.0001
Pentachlorophenol	0.001	0.00004
Picloram	0.5	
Simazine	0.004	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Toxaphene	0.003	0.001
2,4,5-TP (Silvex)	0.05	0.0002
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Carbon tetrachloride	0.005	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1,2-Dichloroethylene	0.07	0.0005
trans-1,2-Dichloroethylene	0.1	0.0005
1,1-Dichloroethylene	0.007	0.0005
1,1,1-Trichloroethane	0.20	0.0005
1,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.005	
1,1,2-Trichloroethane	0.005	
1,2,4-Trichloro-benzene	0.07	
1,2-Dichloropropane	0.005	0.0005
Ethylbenzene	0.7	0.0005
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Styrene	0.1	0.0005

Table 3.7. Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	**mg/L**	**Detection limit, mg/L**
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	1.0	0.0005
Vinyl chloride	0.002	0.0005
Xylene (total)	10	0.0005
	Other Organics	
Acrylamide	0.05% dosed at 1 ppm [1]	
Epihydrochlorin	treatment technique 0.01% dosed at 20 ppm [1]	

Note

1. [1] Only applies when adding these polymer flocculants to the treatment process. No sampling is required; the system certifies that dosing is within specified limits.

Table 3.8. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement 1		Trigger for more monitoring [2]	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes [3], [4]
Pesticides/PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit [5]	Yes [4], [6]

Notes:

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNCW, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 quarterly samples for groundwater systems, and at least 4 quarterly samples for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a sanitary survey of the PWS.
5. Detection limits noted in Table C3.T7., or as determined by the best available testing methods.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection: systems >3,300 reduce to a minimum of 2 quarterly samples in one year during each repeat compliance period, or systems <3,300 reduce to a minimum of 1 sample every 3 years.
7. Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table 3.9. Disinfectant/Disinfection Byproducts Monitoring Requirements

Source Water Type	Population Served by System	Analyte & Frequency of Samples	Number of Samples
Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW)	10,000 or more	TTHM & HAA5 – Quarterly[1,2]	4[1,2,3]
SW or GWUDISW	Serving 500 to 9,999	TTHM & HAA5 - Quarterly4	1[5,6]
SW or GWUDISW	499 or less	TTHM & HAA5 - Yearly	1[7,8]
Ground Water (GW)	10,000 or more	TTHM & HAA5 - Quarterly[9]	1[10,11]
GW	9,999 or less	TTHM & HAA5 - Yearly[12]	1[13,14]
		Chlorite - Daily & Monthly[15,16,17,18]	
		Bromate - Monthly[19,20]	
		Chlorine[21,22]	
		Chloramines[23,24]	
		Chlorine Dioxide[25,26,27]	
		TOC[28]	

Notes:

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.
2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least one year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to one sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.
5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to one sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.
6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to one sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.

Table 3.9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HHA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.
10. System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to one sample per three-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A three-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.
17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of one year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least one sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is < 0.05 mg/L based upon monthly measurements for one year.
20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.

22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, three additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take three samples in the distribution system as close as possible to the first customer at intervals of not less than 6 hours.
26. If any daily sample from the distribution system exceeds the MRDL and if one or more of the three samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any two consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following exceedances of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of < 2.0 mg/L for two consecutive years, or < 1.0 mg/L for one year, may reduce TOC and alkalinity to one paired sample per plant per quarter.

Table 3.10. Radionuclide MCLs and Monitoring Requirements

Contaminant	MCL
Gross Alpha[1]	15 pCi/L
Combined Radium-226 and -228	5 pCi/L
Beta Particle and Photon Radioactivity[2]	4 mrem/yr
Uranium	30 μg/L

Notes:

1. Gross alpha activity includes radium-226, but excludes radon and uranium.
2. Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides.

Monitoring Requirements:

All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed if activity is <5 picoCuries per liter (pCi/L). Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the MCL, analysis of a single sample may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Table 3.11. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 0.5°C or Lower*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	23	46	69	91	114	137	27	54	82	109	136	163	33	65	98	130	163	195	40	79	119	158	198	237
0.6	24	47	71	94	118	141	28	56	84	112	140	168	33	67	100	133	167	200	40	80	120	159	199	239
0.8	24	48	73	97	121	145	29	57	86	115	143	172	34	68	103	137	171	205	41	82	123	164	205	246
1	25	49	74	99	123	148	29	59	88	117	147	176	35	70	105	140	175	210	42	84	127	169	211	253
1.2	25	51	76	101	127	152	30	60	90	120	150	180	36	72	108	143	179	215	43	86	130	173	216	259
1.4	26	52	78	103	129	155	31	61	92	123	153	184	37	74	111	147	184	221	44	89	133	177	222	266
1.6	26	52	79	105	131	157	32	63	95	126	158	189	38	75	113	151	188	226	46	91	137	182	228	273
1.8	27	54	81	108	135	162	32	64	97	129	161	193	39	77	116	154	193	231	47	93	140	186	233	279
2	28	55	83	110	138	165	33	66	99	131	164	197	39	79	118	157	197	236	48	95	143	191	238	286
2.2	28	56	85	113	141	169	34	67	101	134	168	201	40	81	121	161	202	242	50	99	149	198	248	297
2.4	29	57	86	115	143	172	34	68	103	137	171	205	41	82	124	165	206	247	50	99	149	199	248	298
2.6	29	58	88	117	146	175	35	70	105	139	174	209	42	84	126	168	210	252	51	101	152	203	253	304
2.8	30	59	89	119	148	178	36	71	107	142	178	213	43	86	129	171	214	257	52	103	155	207	258	310
3	30	60	91	121	151	181	36	72	109	145	181	217	44	87	131	174	218	261	53	105	158	211	263	316

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	46	92	139	185	231	277	55	110	165	219	274	329	65	130	195	260	325	390
0.6	48	95	143	191	238	286	57	114	171	228	285	342	68	136	204	271	339	407
0.8	49	98	148	197	246	295	59	118	177	236	295	354	70	141	211	281	352	422
1	51	101	152	203	253	304	61	122	183	243	304	365	73	146	219	291	364	437
1.2	52	104	157	209	261	313	63	125	188	251	313	376	75	150	226	301	376	451
1.4	54	107	161	214	268	321	65	129	194	258	323	387	77	155	232	309	387	464
1.6	55	110	165	219	274	329	66	132	199	265	331	397	80	159	239	318	398	477
1.8	56	113	169	225	282	338	68	136	204	271	339	407	82	163	245	326	408	489
2	58	115	173	231	288	346	70	139	209	278	348	417	83	167	250	333	417	500
2.2	59	118	177	235	294	353	71	142	213	284	355	426	85	170	256	341	426	511
2.4	60	120	181	241	301	361	73	145	218	290	363	435	87	174	261	348	435	522
2.6	61	123	184	245	307	368	74	148	222	296	370	444	89	178	267	355	444	533
2.8	63	125	188	250	313	375	75	151	226	301	377	452	91	181	272	362	453	543
3	64	127	191	255	318	382	77	153	230	307	383	460	92	184	276	368	460	552

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.12. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 5.0°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7 5 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139	28	55	83	111	138	166
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	114	143	171
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149	30	60	90	119	149	179
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152	31	61	92	122	153	183
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155	31	62	94	125	156	187
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158	32	64	96	128	160	192
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162	33	65	98	131	163	196
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165	33	67	100	133	167	200
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169	34	68	102	136	170	204
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172	35	70	105	139	174	209
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175	36	71	107	142	178	213
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178	36	72	109	145	181	217
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182	37	74	111	147	184	221

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	33	66	99	132	165	198	39	79	118	157	197	236	47	93	140	186	233	279
0.6	34	68	102	136	170	204	41	81	122	163	203	244	49	97	146	194	243	291
0.8	35	70	105	140	175	210	42	84	126	168	210	252	50	100	151	201	251	301
1	36	72	108	144	180	216	43	87	130	173	217	260	52	104	156	208	260	312
1.2	37	74	111	147	184	221	45	89	134	178	223	267	53	107	160	213	267	320
1.4	38	76	114	151	189	227	46	91	137	183	228	274	55	110	165	219	274	329
1.6	39	77	116	155	193	232	47	94	141	187	234	281	56	112	169	225	281	337
1.8	40	79	119	159	198	238	48	96	144	191	239	287	58	115	173	230	288	345
2	41	81	122	162	203	243	49	98	147	196	245	294	59	118	177	235	294	353
2.2	41	83	124	165	207	248	50	100	150	200	250	300	60	120	181	241	301	361
2.4	42	84	127	169	211	253	51	102	153	204	255	306	61	123	184	245	307	368
2.6	43	86	129	172	215	258	52	104	156	208	260	312	63	125	188	250	313	375
2.8	44	88	132	175	219	263	53	106	159	212	265	318	64	127	191	255	318	382
3	45	89	134	179	223	268	54	108	162	216	270	324	65	130	195	259	324	389

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.13. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 10°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104	21	42	63	83	104	125
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107	21	43	64	85	107	128
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112	22	45	67	89	112	134
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114	23	46	69	91	114	137
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116	23	47	70	93	117	140
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	96	120	144
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122	25	49	74	98	123	147
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124	25	50	75	100	125	150
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129	26	52	79	105	131	157
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131	27	53	80	107	133	160
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134	27	54	82	109	136	163
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137	28	55	83	111	138	166

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	35	70	105	139	174	209
0.6	26	51	77	102	128	153	31	61	92	122	153	183	36	73	109	145	182	218
0.8	26	53	79	105	132	158	32	63	95	126	158	189	38	75	113	151	188	226
1	27	54	81	108	135	162	33	65	98	130	163	195	39	78	117	156	195	234
1.2	28	55	83	111	138	166	33	67	100	133	167	200	40	80	120	160	200	240
1.4	28	57	85	113	142	170	34	69	103	137	172	206	41	82	124	165	206	247
1.6	29	58	87	116	145	174	35	70	106	141	176	211	42	84	127	169	211	253
1.8	30	60	90	119	149	179	36	72	108	143	179	215	43	86	130	173	216	259
2	30	61	91	121	152	182	37	74	111	147	184	221	44	88	133	177	221	265
2.2	31	62	93	124	155	186	38	75	113	150	188	225	45	90	136	181	226	271
2.4	32	63	95	127	158	190	38	77	115	153	192	230	46	92	138	184	230	276
2.6	32	65	97	129	162	194	39	78	117	156	195	234	47	94	141	187	234	281
2.8	33	66	99	131	164	197	40	80	120	159	199	239	48	96	144	191	239	287
3	34	67	101	134	168	201	41	81	122	162	203	243	49	97	146	195	243	292

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.14. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 15°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7 5 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	16	25	33	41	49	10	20	30	39	49	59	12	23	35	47	58	70	14	28	42	55	69	83
0.6	8	17	25	33	42	50	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
0.8	9	17	26	35	43	52	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88
1	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75	15	30	45	60	75	90
1.2	9	18	27	36	45	54	11	21	32	43	53	64	13	25	38	51	63	76	15	31	46	61	77	92
1.4	9	18	28	37	46	55	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
1.6	9	19	28	37	47	56	11	22	33	44	55	66	13	26	40	53	66	79	16	32	48	64	80	96
1.8	10	19	29	38	48	57	11	23	34	45	57	68	14	27	41	54	68	81	16	33	49	65	82	98
2	10	19	29	39	48	58	12	23	35	46	58	69	14	28	42	55	69	83	17	33	50	67	83	100
2.2	10	20	30	39	49	59	12	23	35	47	58	70	14	28	43	57	71	85	17	34	51	68	85	102
2.4	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86	18	35	53	70	88	105
2.6	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88	18	36	54	71	89	107
2.8	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89	18	36	55	73	91	109
3	11	21	32	42	53	63	13	25	38	51	63	76	15	30	46	61	76	91	19	37	56	74	93	111

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	17	33	50	66	83	99	20	39	59	79	98	118	23	47	70	93	117	140
0.6	17	34	51	68	85	102	20	41	61	81	102	122	24	49	73	97	122	146
0.8	18	35	53	70	88	105	21	42	63	84	105	126	25	50	76	101	126	151
1	18	36	54	72	90	108	22	43	65	87	108	130	26	52	78	104	130	156
1.2	19	37	56	74	93	111	22	45	67	89	112	134	27	53	80	107	133	160
1.4	19	38	57	76	95	114	23	46	69	91	114	137	28	55	83	110	138	165
1.6	19	39	58	77	97	116	24	47	71	94	118	141	28	56	85	113	141	169
1.8	20	40	60	79	99	119	24	48	72	96	120	144	29	58	87	115	144	173
2	20	41	61	81	102	122	25	49	74	98	123	147	30	59	89	118	148	177
2.2	21	41	62	83	103	124	25	50	75	100	125	150	30	60	91	121	151	181
2.4	21	42	64	85	106	127	26	51	77	102	128	153	31	61	92	123	153	184
2.6	22	43	65	86	108	129	26	52	78	104	130	156	31	63	94	125	157	188
2.8	22	44	66	88	110	132	27	53	80	106	133	159	32	64	96	127	159	191
3	22	45	67	89	112	134	27	54	81	108	135	162	33	65	98	130	163	195

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.15. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 20°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7 5 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54	11	21	32	43	53	64
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57	12	23	35	46	58	69
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58	12	23	35	47	58	70
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59	12	24	36	48	60	72
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61	12	25	37	49	62	74
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62	13	25	38	50	63	75
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63	13	26	39	51	64	77
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66	13	27	40	53	67	80
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67	14	27	41	54	68	81
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68	14	28	42	55	69	83

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	18	35	53	70	88	105
0.6	13	26	39	51	64	77	15	31	46	61	77	92	18	36	55	73	91	109
0.8	13	26	40	53	66	79	16	32	48	63	79	95	19	38	57	75	94	113
1	14	27	41	54	68	81	16	33	49	65	82	98	20	39	59	78	98	117
1.2	14	28	42	55	69	83	17	33	50	67	83	100	20	40	60	80	100	120
1.4	14	28	43	57	71	85	17	34	52	69	86	103	21	41	62	82	103	123
1.6	15	29	44	58	73	87	18	35	53	70	88	105	21	42	63	84	105	126
1.8	15	30	45	59	74	89	18	36	54	72	90	108	22	43	65	86	108	129
2	15	30	46	61	76	91	18	37	55	73	92	110	22	44	66	88	110	132
2.2	16	31	47	62	78	93	19	38	57	75	94	113	23	45	68	90	113	135
2.4	16	32	48	63	79	95	19	38	58	77	96	115	23	46	69	92	115	138
2.6	16	32	49	65	81	97	20	39	59	78	98	117	24	47	71	94	118	141
2.8	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	95	119	143
3	17	34	51	67	84	101	20	41	61	81	102	122	24	49	73	97	122	146

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.16. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 25°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	28	35	42
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39	8	16	24	31	39	47
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40	8	16	24	32	40	48
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41	8	16	25	33	41	49
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41	8	17	25	33	42	50
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42	9	17	26	34	43	51
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43	9	17	26	35	43	52
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44	9	18	27	35	44	53
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45	9	18	27	36	45	54
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46	9	18	28	37	46	55

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	12	23	35	47	58	70
0.6	9	17	26	34	43	51	10	20	31	41	51	61	12	24	37	49	61	73
0.8	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75
1	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
1.2	9	18	28	37	46	55	11	22	34	45	56	67	13	27	40	53	67	80
1.4	10	19	29	38	48	57	12	23	35	46	58	69	14	27	41	55	68	82
1.6	10	19	29	39	48	58	12	23	35	47	58	70	14	28	42	56	70	84
1.8	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
2	10	20	31	41	51	61	12	25	37	49	62	74	15	29	44	59	73	88
2.2	10	21	31	41	52	62	13	25	38	50	63	75	15	30	45	60	75	90
2.4	11	21	32	42	53	63	13	26	39	51	64	77	15	31	46	61	77	92
2.6	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
2.8	11	22	33	44	55	66	13	27	40	53	67	80	16	32	48	64	80	96
3	11	22	34	45	56	67	14	27	41	54	68	81	16	32	49	65	81	97

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.17. CT Values for Inactivation of Viruses by Free Chlorine

	Log Inactivation		Log Inactivation		Log Inactivation	
	2.0 pH		3.0 pH		4.0 pH	
Temperature (C)	**6-9**	**10**	**6-9**	**10**	**6-9**	**10**
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table 3.18. CT Values for Inactivation of *Giardia* Cysts by Chlorine Dioxide

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	10	4.3	4	3.2	2.5	2
1-log	21	8.7	7.7	6.3	5	3.7
1.5-log	32	13	12	10	7.5	5.5
2-log	42	17	15	13	10	7.3
2.5-log	52	22	19	16	13	9
3-log	63	26	23	19	15	11

Table 3.19. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

	Temperature (C)					
Removal	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	8.4	5.6	4.2	2.8	2.1	1.4
3-log	25.6	17.1	12.8	8.6	6.4	4.3
4-log	50.1	33.4	25.1	16.7	12.5	8.4

Table 3.20. CT Values for Inactivation of *Giardia* Cysts by Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	0.48	0.32	0.23	0.16	0.12	0.08
1-log	0.97	0.63	0.48	0.32	0.24	0.16
1.5-log	1.5	0.95	0.72	0.48	0.36	0.24
2-log	1.9	1.3	0.95	0.63	0.48	0.32
2.5-log	2.4	1.6	1.2	0.79	0.60	0.40
3-log	2.9	1.9	1.43	0.95	0.72	0.48

Table 3.21. CT Values for Inactivation of Viruses by Free Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	0.9	0.6	0.5	0.3	0.25	0.15
3-log	1.4	0.9	0.8	0.5	0.4	0.25
4-log	1.8	1.2	1.0	0.6	0.5	0.3

Table 3.22. CT Values for Inactivation of *Giardia* Cysts by Chloramine pH 6-9

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	635	365	310	250	185	125
1-log	1,270	735	615	500	370	250
1.5-log	1,900	1,100	930	750	550	375
2-log	2,535	1,470	1,230	1,000	735	500
2.5-log	3,170	1,830	1,540	1,250	915	625
3-log	3,800	2,200	1,850	1,500	1,100	750

Table 3.23. CT Values for Inactivation of Viruses by Chloramine

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	1,243	857	643	428	321	214
3-log	2,063	1,423	1,067	712	534	356
4-log	2,883	1,988	1,491	994	746	497

Table 3.24. CT Values for Inactivation of Viruses by UV

Log Inactivation	
2.0	**3.0**
21	36

CHAPTER 4

WASTEWATER

4.1. SCOPE

This Chapter contains criteria to control and regulate discharges of wastewater into surface waters. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges, and pollutants from indirect dischargers.

4.2. DEFINITIONS

4.2.1. 7-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of seven consecutive days.

4.2.2. 30-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.)

4.2.5. Best Management Practices (BMP). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into waters of the host nation.

4.2.6. Biochemical Oxygen Demand (BOD_5). The five-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

4.2.7. Carbonaceous BOD_5 ($CBOD_5$). The five-day measure of the pollutant parameter, $CBOD_5$. This test can substitute for the BOD_5 testing which suppresses the nitrification reaction/component in the BOD_5 test.

4.2.8. Conventional Pollutants. BOD_5, total suspended solids (TSS), oil and grease, fecal coliforms, and pH.

4.2.9. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

4.2.10. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

4.2.11. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to waters of the host nation from any "point source."

4.2.12. Domestic Wastewater Treatment System (DWTS). Any DoD or HN facility designed to treat wastewater before its discharge to waters of the host nation and in which the majority of such wastewater is made up of domestic sewage.

4.2.13. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into waters of the host nation.

4.2.14. Existing Source. A source in operation, or under construction, prior to 1 October 1994, unless it is subsequently substantially modified, that discharges pollutants.

4.2.15. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

4.2.16. Industrial Activities Associated with Storm Water. Activities that may contribute pollutants to storm water runoff or drainage during wet weather events. (See Table 4.4, "Best Management Practices.")

4.2.17. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to waters of the host nation.

4.2.18. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

4.2.19. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

4.2.20. New Source. A source built or substantially modified on or after 1 October 1994 that directly or indirectly discharges pollutants to the wastewater system.

4.2.21. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft, or any conveyance that merely collects natural surface flows of precipitation.

4.2.22. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical waste;

biological material; radioactive material; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

4.2.23. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

4.2.24. Regulated Facilities. Those facilities for which criteria are established under this Chapter, such as DWTS, IWTS, or industrial discharges.

4.2.25. Storm Water. Run-off and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

4.2.26. Substantial Modification. Any modification to a facility, the cost of which exceeds $1,000,000, regardless of funding source.

4.2.27. Total Suspended Solids (TSS). The pollutant parameter total filterable suspended solids.

4.2.28. Total Toxic Organics (TTO). The summation of all quantifiable values > 0.01 mg/L for the toxic organics in Table 4.2, "Components of Total Toxic Organics."

4.2.29. Waters of the Host Nation. Surface water including the territorial seas recognized under customary international law, including:

4.2.29.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce.

4.2.29.2. Waters which are or could be used for recreation or other purposes.

4.2.29.3. Waters from which fish or shellfish are or could be taken and sold.

4.2.29.4. Waters which are used or could be used for industrial purposes by industries.

4.2.29.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

4.2.29.6. Tributaries of waters identified in this definition.

4.2.29.7. Exclusions to waters of the host nation. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this Chapter, are not waters of the host nation. This exclusion applies only to manmade bodies of water that were neither originally waters of the host nation nor resulted from impoundment of waters of the host nation.

4.3. CRITERIA

4.3.1. Effluent Limitations for Direct Dischargers of Conventional Pollutants

4.3.1.1. All new sources of pollutants directly discharged to waters of host nations will comply with the following effluent limitations on Table 4.1.

4.3.1.2. Monitoring. Monitoring requirements apply to all regulated facilities. The monitoring frequency (including both sampling and analysis) given in Table 4.3, "Monitoring Requirements," includes all three parameters which are regulated (BOD_5, TSS, and pH). Samples shall be collected at the point of discharge to the waters of the host nation.

4.3.1.3. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. Retain records for three years.

4.3.1.3.1. The effluent, concentration, or other measurement specified for each regulated parameter.

4.3.1.3.2. The daily volume of effluent discharge from each point source.

4.3.1.3.3. Test procedures for the analysis of pollutants.

4.3.1.3.4. The date, exact place, and time of sampling and/or measurements.

4.3.1.3.5. The name of the person who performed the sampling and/or measurements.

4.3.1.3.6. The date of analysis.

4.3.1.3.7. Additional record-keeping requirements for waste treatment units. An Operations Register shall be maintained for a period of three years. In addition to the criteria above, it shall comprise of the following information, depending on the type of discharge:

4.3.1.3.7.1. Concentration of pollutants in sludge, wastes or secondary remains arising from the treatment process.

4.3.1.3.7.2. Concentrations of emissions to air arising from the treatment process .

4.3.1.3.7.3. Concentration of pollutants in industrial drainage water arising from the treatment process and released into the sea every 3 months in accordance with Table 4.1 effluent limits.

4.3.1.3.7.4. Concentration of pollutants in soil/ groundwater at the treatment unit site.

4.3.1.3.7.5. Information describing the waste/secondary remains from the treatment process including the name of both generator and carrier and the dates of receipt, treatment or disposal.

4.3.1.4. Complaint System. A system for investigating water pollution complaints from individuals or HN water pollution control authorities will be established, involving the EEA, as appropriate.

4.3.1.5. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 185.49 m^3 (0.0 and 0.049 million gallons per day (MGD)), monthly sample must comply with level for 30-day average.

4.3.2. Effluent Limitations For Non-Categorical Industrial Indirect Dischargers

4.3.2.1. Effluent Limits. The following effluent limits will apply to all discharges of pollutants to DWTSs and associated collection systems from process wastewater for which categorical standards have not been established (see subparagraphs 4.3.3.1.8., 4.3.3.1.9., and 4.3.3.1.10. for a list of categorical standards).

4.3.2.1.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater treatment plant flow is prohibited.

4.3.2.1.2. Ignitability and Explosiveness

4.3.2.1.2.1. The discharge of wastewater with a closed cup flashpoint of < 60°C (140°F) is prohibited.

4.3.2.1.2.2. The discharge of waste with any of the following characteristics is prohibited:

4.3.2.1.2.2.1. A liquid solution that contains > 24% alcohol by volume and has a flash point < 60°C (140°F).

4.3.2.1.2.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction.

4.3.2.1.2.2.3. An ignitable compressed gas.

4.3.2.1.2.2.4. An oxidizer, such as peroxide.

4.3.2.1.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

4.3.2.1.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

4.3.2.1.3.2. Wastes that react violently with water;

4.3.2.1.3.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water;

4.3.2.1.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

4.3.2.1.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

4.3.2.1.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material"; and

4.3.2.1.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

4.3.2.1.4. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 is allowed, unless the DWTS is specifically designed to handle that type of wastewater.

4.3.2.1.5. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin.

4.3.2.1.6. Spills and Batch Discharges (slugs). Installations treating or disposing liquid hazardous wastes shall prepare an emergency plan (Section 4.3.8.). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

4.3.2.1.6.1. Description of discharge practices, including non-routine batch discharges;

4.3.2.1.6.2. Description of stored chemicals;

4.3.2.1.6.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this Chapter, including procedures for subsequent written notification within five days;

4.3.2.1.6.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training;

4.3.2.1.6.5. Proper procedures for building containment structures or equipment;

4.3.2.1.6.6. Necessary measures to control toxic organic pollutants and solvents; and

4.3.2.1.6.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

4.3.2.1.7. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited. Approval is required for the transport and disposal of hazardous waste (see Chapter 6, "Hazardous Waste"). Disposal of hazardous waste/ sludge into sewers, sea or soil is prohibited.

4.3.2.1.8. Heat. Heat in amounts that inhibit biological activity in the DWTS resulting in interference, but in no case in such quantities that the temperature of the process water at the DWTS exceeds 40°C (104°F).

4.3.2.2. Complaint System. A system for investigating water pollution complaints from HN water pollution control authorities will be established, involving the EEA as appropriate.

4.3.3. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect). Any installations which have activities that fall into any of the industrial categories listed below must comply with the following effluent limitations (i.e., either direct or indirect discharge limitations at the source of the discharge). For most categories, the effluent limitations are the same for new and existing activities. Where differences in limitations exist, activities constructed or substantially modified on or after 1 October 1994 will meet the limitations for new activities.

4.3.3.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

4.3.3.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

4.3.3.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

4.3.3.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

4.3.3.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

4.3.3.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

4.3.3.1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

4.3.3.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

4.3.3.1.8. The following discharge standards apply to new and existing facilities in the above electroplating subparts which directly or indirectly discharge < 38,000 liters per day (10,000 gallons per day):

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, amenable	5.0	2.7
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Toxic Organics	4.57	---

4.3.3.1.9. The following discharge standards apply to new and existing facilities in the above electroplating subparts that directly, or indirectly, discharge 38,000 liters per day (10,000 gallons per day) or more:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, total	1.9	1.0
Copper	4.5	2.7
Nickel	4.1	2.6
Chrome	7.0	4.0
Zinc	4.2	2.6
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Metals	10.5	6.8
Total Toxic Organics	2.13	---

4.3.3.1.10. In addition to the above standards, new and existing facilities that electroplate precious metals and that directly or indirectly discharge 38,000 liters per day (10,000 gallons per day) or more must comply with the following standard:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Silver	1.2	0.7

4.3.3.2. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters that are specified in the paragraph of this Chapter dealing with industrial dischargers. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan. (See Table 4.3, "Monitoring Requirements.")

4.3.4. Storm Water Management

4.3.4.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table 4.4, "Best Management Practices." Update the SWPPP annually using in-house resources.

4.3.4.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

4.3.5. Septic System. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

4.3.6. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate. In particular, installations shall note that:

4.3.6.1. Sludge resulting from the treatment processes described in Table 6.1 through Tables 6.12 of Chapter 6, "Hazardous Wastes" shall be disposed of as hazardous waste.

4.3.6.2. Disposal of sludge arising from the cleaning of transport vehicle tanks to sewers, soil or sea is prohibited.

Table 4.1. Monthly Average and Maximum Discharge Standards to Receiving Waters

Parameter	**Monthly Average[1] (mg/l unless otherwise specified)**	**Maximum Value (mg/l unless otherwise specified)**
Physiochemical		
Floating particles (no units)	Nil	-
pH (no units)	6-9	-
Total Suspended Solids	20	35
Temperature (°C)	$(\Delta T) \pm 3$	-
Turbidity (NTU)	25	75
Biochemical		
Biochemical Oxygen Demand	25	50
Chemical Oxygen Demand	150	350
Total Organic Carbon	50	-
Total Kjeldahl Nitrogen	5	10
Oil & Grease	8	15
Fluorescent Petroleum Matter	0.1	0.1
Phenols	0.5	1
Chemical		
Ammoniacal Nitrogen (as N)	1	3
Residual Chlorine	0.5	2
Total Cyanide (CN)	0.05	0.1
Nitrite (NO_2/N)	-	10
Nitrate (NO_3/N)	-	1
Sulfide	0.5	1
Total Phosphate (P)	1	2
Arsenic	0.1	0.5
Cadmium	0.01	0.05
Chromium total	0.1	1
Copper	0.2	0.5
Lead	0.2	1
Mercury	0.001	0.005
Nickel	0.2	0.5
Aluminum	15	25
Iron	5	10
Zinc	2	5
Biological		
Total Coliform (MPN/100ml)	1000	1000

Notes:
[1] Average reading during 30 days.
[2] Maximum values must not be exceeded at any time

Table 4.2. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1,2-Dichloropropane
Methyl bromide (bromomethane)	1,3-Dichloropropylene (1,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1,2-Trichloroethane
1,1-Dichloroethene	Benzene
1,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1,2-Dichloroethane	Bromoform (tribromomethane)
1,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1,2-Diphenylhydrazine
1,3-Dichlorobenzene	N-nitrosodiphenylamine
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate
Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractables Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	
Pesticides/PCBs	
Alpha-Endosulfan	Endrin
Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor

Table 4.2. Components of Total Toxic Organics

Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)
Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and metabolites)	PCB-1016 (Arochlor 1016)
Dieldrin	

Table 4.3. Monitoring Requirements

Plant Capacity (MGD)	**Monitoring Frequency**
0.001 - 0.99	Monthly
1.0 - 4.99	Weekly
> 5.0	Daily

Table 4.4. Best Management Practices

Activity	**Best Management Practice**
Aircraft Ground Support Equipment Maintenance	Perform maintenance/repair activities inside Use drip pans to capture drained fluids Cap hoses to prevent drips and spills
Aircraft/runway deicing	Perform anti-icing before the storm Put critical aircraft in hangars/shelters
Aircraft/vehicle fueling operations	Protect fueling areas from the rain Provide spill response equipment at fueling station
Aircraft/vehicle maintenance & repair	Perform maintenance/repair activities inside Use drip pans to capture drained fluids
Aircraft/vehicle washing	Capture wash water and send to wastewater treatment plant Treat wash water with oil water separator before discharge
Bulk fuel storage areas	Use dry camlock connectors to reduce fuel loss Capture spills with drip pans when breaking connections Curb fuel transfer areas, treat with oil water separator
Construction activities	Construct sediment dams/silt fences around construction sites
Corrosion control activities	Capture solvent/soaps used to prepare aircraft for painting Perform corrosion control activities inside
Hazardous material storage	Store hazardous materials inside or under cover Reduce use of hazardous materials
Outdoor material storage areas	Cover and curb salt, coal, urea piles Store product drums inside or under cover Reduce quantity of material stored outside
Outdoor painting/depainting operations	Capture sandblasting media for proper disposal Capture paint clean up materials (thinners, rinsates)
Pesticide operations	Capture rinse water when mixing chemicals Store spray equipment inside
Power production	Capture leaks and spills from power production equipment using drip pans, etc.
Vehicle storage yards	Check vehicles in storage for leaks and spills Use drip pans to capture leaking fluids

CHAPTER 5

HAZARDOUS MATERIAL

5.1. SCOPE

This Chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements, which are covered under other Chapters. This Guide does not cover munitions.

5.2. DEFINITIONS

5.2.1. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the following information:

5.2.1.1. Identification/name of hazardous chemicals;

5.2.1.2. Appropriate hazard warnings; and

5.2.1.3. The name and address of the manufacturer, importer, or other responsible party; and that is prepared in accordance with DoDI 6050.05 (DoD Hazard Communication (HAZCOM) Program).

5.2.2. Hazardous Material. Any material that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table 5.1., "Typical Hazardous Materials Characteristics," or the material is listed in Table AP1.4., "List of Hazardous Waste/Substances/Materials." Munitions are excluded.

5.2.2.1. Classification of hazardous material is in accordance with the following hazard classes:

5.2.2.1.1. Explosives (Class 1)

5.2.2.1.2. Compressed or Liquefied Gases (Class 2)

5.2.2.1.3. Flammable Liquids (Class 3)

5.2.2.1.4. Flammable Solids (Class 4)

5.2.2.1.5. Oxidizing Agents (Class 5)

5.2.2.1.6. Toxic Materials (Class 6)

5.2.2.1.7. Radioactive Materials (Class 7)

5.2.2.1.8. Corrosive Materials (Class 8)

5.2.3. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with DoDI 6050.05, "DoD Hazard Communication (HAZCOM) Program."

5.2.4. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle, either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

5.2.5. Material Safety Data Sheet (MSDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

5.3. CRITERIA

5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and Marine Corps Order (MCO) 4450.12A (Storage and Handling of Hazardous Materials), provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Interservice Manual 24-204(I), Army Technical Order (TO) 38-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, DCMAD1, Ch3.4 (HM24), (Preparing Hazardous Materials for Military Air Shipments).

5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

5.3.3. Installations will ensure that for each hazardous material shipment:

5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material and include an MSDS;

5.3.3.2. All drivers are trained on the hazardous material included in the shipment including health risks of exposure and the physical hazards of the material, including potential for fire, explosion, and reactivity;

5.3.3.3. Drivers will be trained on spill control and emergency notification procedures;

5.3.3.4. For any hazardous material categorized on the basis of section AP1.1. of this Guide, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes;

5.3.3.5. The transport vehicles are subjected to a walk-around inspection by the driver before and after the hazardous material is loaded and may also be subjected to a request by the Competent Authority to conduct external and internal vehicle inspections (e.g. internal pressure levels)(Bahraini inspector requests shall be coordinated through the LEC); and

5.3.3.6. Packages are labeled in accordance with paragraph 5.3.7.

5.3.3.7. Transport shall be in accordance with paragraph 5.3.12.

5.3.3.8. Storage requirements shall be in accordance with paragraph 5.3.13.

5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material as well as an inventory of all hazardous materials contained therein. (See paragraph 18.3.2.).

5.3.5. Each MSDS shall be in English or the predominant language in the work place, and shall contain at least the following information:

5.3.5.1. The identity used on the label.

5.3.5.1.1. If the hazardous chemical is a single substance, its chemical and common name.

5.3.5.1.2. If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or

5.3.5.1.3. If the hazardous chemical is a mixture that has not been tested as a whole:

5.3.5.1.3.1. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

5.3.5.1.3.2. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise < 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations that would exceed an established Occupational Safety and Health Administration (OSHA)-permissible exposure limit, or could present a health hazard to employees; and

5.3.5.1.3.3. The chemical and common name(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical;

5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available;

5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen;

5.3.5.8. Any generally applicable precautions for safe handling, storage, transportation, use, and disposal that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

5.3.5.9. Any generally applicable control measures that are known to the chemical manufacturer, importer, or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment;

5.3.5.10. Emergency and first aid procedures;

5.3.5.11. The date of preparation of the MSDS or the last change to it; and

5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

5.3.6. Each work center will maintain a file of MSDSs for each hazardous material procured, stored, or used at the work center. MSDSs that are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site.

5.3.7. All hazardous materials on DoD installations will have Hazardous Chemical Warning Labels in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program" (or Bahraini equivalent) and have MSDS information either available or in the HMIRS in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program" and other DoD Component instructions. These requirements apply throughout the life-cycle of these materials.

5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

5.3.9. All excess hazardous material will be processed through the Defense Logistics Agency (DLA) Disposition Services in accordance with the procedures in DoD 4160.21-M (Defense Materiel Disposition Manual). The DLA Disposition Services will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local pharmacy or exchange program.

5.3.10. All personnel who use, handle, or store hazardous materials will be trained in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program" and other DoD Component instructions.

5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

5.3.12. Land carriers shall transport hazardous material in a safe manner.

5.3.12.1. Vehicles shall comply with the required speed limit and use the appropriate lanes identified for transport vehicles.

5.3.12.2. Vehicles shall be appropriately labelled on all sides of their outer surfaces indicating the level of danger of the contained substances. Labels shall be weather-resistant and painted in a reflecting color

5.3.12.3. Vehicles shall fix a yellow intermittent light on the driver cabin.

5.3.12.4. Installations transporting hazardous material shall consult the LEC to determine approval and licensing requirements for the transport method and drivers. Back up plans in case of accident or emergency are required for approval and licensing.

5.3.13. Installations shall comply with the following requirements for tanks/ containers used for storage of hazardous material:

5.3.13.1. Containers shall be made of a suitable material fit for the external environment (e.g. heat variation, vibration etc.) and the hazardous material.

5.3.13.2. Liquid hazardous material containers shall be coated on the inside to prevent corrosion or reaction.

5.3.13.3. Solid hazardous material containers shall not be made of cardboard but rather material strong enough to sustain transport conditions.

5.3.13.4. Containers shall be designed in accordance with international rules and regulations.

5.3.13.5. Contaners shall have an opening for inspection purposes.

5.3.13.6. Containers shall be equipped with an instrument to release pressure.

5.3.13.7. Filling activities shall comply with United Nations specifications.

5.3.13.8. Containers shall not be stacked up to a height beyond 3 meters (9.84 feet), unless stored on shelves.

5.3.14. Hazardous material storage areas shall be designed as follows:

5.3.14.1. Emergency exits shall be easily noticeable in case of darkness or thick smoke.

5.3.14.2. Suitable air filters/conditions in accordance to the stored substances shall be provided.

5.3.14.3. A smooth, non-slippery floor free of cracks shall be maintained.

5.3.14.4. Kitchen areas or changing facilities shall be situated no less than 10 meters (32.81 feet) from storage areas.

5.3.14.5. Grounding facilities for electrical circuits and appropriate protective gear in case of electrical sparks shall be provided inside storage units.

5.3.14.6. Battery charging and heating devices are prohibited from use inside storage areas.

5.3.14.7. Installations shall prepare a plan outlining the type of danger associated with each part of the storage area. The plan shall contain a list of places and amounts of the stored hazardous materials with the respective dangers, a list and the location of the emergency and fire resistant equipment, and the location of the emergency passages/exits. The plan must be regularly updated and kept in a place far away from the storage area.

5.3.15. Hazardous Material Approval. Installations may require approval for the handling of hazardous materials including their production, storage, transport, and use. Contact the LEC to determine approval requirements.

Table 5.1. Typical Hazardous Materials Characteristics

1. The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials that damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gases, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive materials.
2. The item and/or its disposal is regulated by the host nation because of its hazardous nature.
3. The item has a flashpoint below 93 °C (200 °F) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control.
4. The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of > 1.0 volt or < -1.0 volt.
5. In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics.
6. The item has special characteristics that, in the opinion of the manufacturer or the DoD Components, could cause harm to personnel if used or stored improperly.

CHAPTER 6

HAZARDOUS WASTE

6.1. SCOPE

This Chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed and recycled in an environmentally sound manner.

6.2. DEFINITIONS

6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4., "List of Hazardous Waste/Substances/Material." with a U.S. Environmental Protection Agency (USEPA) waste number with the "P" designator, or those hazardous wastes in Table AP1.T4. with Hazard Code "H".

6.2.2. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into or on any land or water that would allow the waste or constituent to enter the environment. Proper disposal effectively mitigates hazards to human health and the environment.

6.2.3. DoD Hazardous Waste Generator. The Department of Defense considers a generator to be the installation, or activity on an installation, that produces a hazardous waste.

6.2.4. Hazardous Constituent. A chemical compound listed by name in Table AP1.T4., "List of Hazardous Waste/Substances/Material," or that possesses the characteristics described in section AP1.1.

6.2.5. Hazardous Waste. A discarded material that may be solid, semi-solid, liquid, or contained gas, and either exhibit a characteristic of a hazardous waste as defined in section AP1.1. or is listed as a hazardous waste in Tables AP1.T1. through AP1.T4. Excluded from this definition are domestic sewage sludge, and household and medical wastes not possessing the properties in Table 6.1.

6.2.5.1. It includes the following:

6.2.5.1.1. Discarded materials that contain one or more of the characteristics or properties described in 6.1 or 6.2.

6.2.5.1.2. All hazardous waste described in Tables 6.3 through 6.8.

6.2.5.1.3. Any other form of waste defined as hazardous by the Competent Authority

6.2.6. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area

(HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

6.2.7. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending, or other treatment is also hazardous waste fuel.

6.2.8. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this Guide.

6.2.9. Hazardous Waste Profile Sheet (HWPS). A document that identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

6.2.10. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. An HWSA may store more than ***208 liters*** (55 gallons) of a HW stream, and more than one quart of an acute HW stream.

6.2.11. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

6.2.12. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

6.2.13. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste that would render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

6.2.14. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The number could be the Unit Identification Code (UIC) or the DoD Activity Address Code (DoDAAC). The EEA should specify the method for determining the unique identification number in the FGS.

6.2.15. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment. "Used oil," means any oil or other waste petroleum, oil, or lubricant (POL) product that has been refined from crude oil, or is synthetic oil, has been used and as a result of such use, is contaminated by physical or chemical impurities, or is off specification and cannot be used as intended. Although used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, it is still considered used oil, unless it has been mixed with hazardous waste. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

6.2.16. Hazardous Waste Log. A listing of HW deposited and removed from an HWSA. Information such as the waste type, volume, location, and storage removal dates should be recorded.

6.2.17. Elementary Neutralization. A process of neutralizing a HW, that is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

6.3. CRITERIA

6.3.1. DoD Hazardous Waste Generators

6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using their knowledge of the materials and processes that generated the waste or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name), and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics should be measurable by standardized, and available testing protocols.

6.3.1.2. An HWPS will be used to identify each hazardous waste stream. Table 6.1 through Table 6.10 (appended to this FGS) shall also be utilized in the identification process. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams, or process modifications that change the character of the hazardous waste being handled at the storage area.

6.3.1.3. Each generator will use a unique identification number for all recordkeeping, reports, and manifests for hazardous waste.

6.3.1.4. Pre-Transport Requirements.

6.3.1.4.1. Generators shall ensure that they comply with the following pre-transport requirements for hazardous waste:

6.3.1.4.1.1. Soundness of drums/containers

6.3.1.4.1.2. Labeling of drums and containers including generators name, quantity of HW and date of transportation

6.3.1.4.1.3. Waste transportation form accompanies the shipment

6.3.1.4.1.4. Waste carrier is approved by the Competent Authority

6.3.1.4.1.5. Waste is being delivered to a treatment unit or disposal site approved by the Competent Authority

6.3.1.4.2. Transportation

6.3.1.4.2.1. When transporting HW via commercial transportation on Bahrain public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable Bahrain transportation regulations. Requirements may include placarding, marking, containerization and labeling. Hazardous waste designated for international transport will be prepared in accordance with applicable international regulations. In the absence of Bahrain regulations, international standards will be used.

6.3.1.4.2.2. When transporting HW via military vehicle on Bahrain public roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, if required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), Bahrain transportation regulations such as those ensuring that:

6.3.1.4.2.2.1. Vehicle has a hazardous waste transport approval (Section 6.3.12).

6.3.1.4.2.2.2. Hazardous waste shipment is accompanied by a transportation form .

6.3.1.4.2.2.3. Hazardous chemical waste is accompanied by a MSDS and is compliant with chemical safety requirements of the Competent Authority.

6.3.1.4.2.2.4. Waste is transported to approved treatment units or disposal sites.

6.3.1.4.2.2.5. Vehicle placarding.

6.3.1.4.2.2.6. Over pack in the case of damage to drums or tanks.

6.3.1.4.2.2.7. Comply with spill response, disposal and area decontamination procedures during transport (see Chapter 16).

6.3.1.4.2.2.8. Transportation schedule or route is provided to the Competent Authority, if required.

6.3.1.4.3. Manifesting. All HW leaving the installation will be accompanied by a manifest to ensure a complete audit trail from point of origin to ultimate disposal. The manifest will include the information listed below. Bahrain waste transportation forms will be used when applicable, or the DD Form 1348-1A, "Issue Release/Receipt Document," and DD Form 1348-2, "Issue Release/Receipt Document with Address Label," may be used. This manifest should include:

6.3.1.4.3.1. Generator's name, address, and telephone number;

6.3.1.4.3.2. Generator's unique identification number;

6.3.1.4.3.3. Transporter's name, address, and telephone number;

6.3.1.4.3.4. Destination name, address, and telephone number;

6.3.1.4.3.5. Description of waste;

6.3.1.4.3.6. Total quantity of waste;

6.3.1.4.3.7. Date of shipment; and

6.3.1.4.3.8. Date of receipt.

6.3.1.4.4. Generators will maintain an audit trail of HW from the point of generation to disposal. Generators using DLA Disposition Services (DLA-DS) will obtain a signed copy of the manifest from the initial DLA Disposition Services recipient of the waste, at which time DLA-DS Services will assume responsibility. A generator, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different unique identification number (see definition 6.2.14.) will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer, and disposal of the waste. Activities desiring to dispose of their HW outside DLA-DS system will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal.

6.3.2. Hazardous Waste Accumulation Point (HWAP)

6.3.2.1. An HWAP is defined in paragraph 6.2.6. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those that are chemically incompatible. Each HWAP will have warning signs (National Fire Protection Association or appropriate international sign) appropriate for the waste being accumulated at that site.

6.3.2.2. An HWAP will comply with the storage limits in paragraph 6.2.6. When these limits have been reached, the generator will make arrangements within five working days to move the HW to an HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348-1A) to appropriate authorities responsible for removing the HW (e.g., DLA-DS). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-quart) volume accumulation limits, but must be transported off-site to a final destination facility within one year.

6.3.2.3. All criteria of paragraph 6.3.4., “Use and Management of Containers,” apply to HWAPs with the exception of subparagraph 6.3.4.1.5., “Weekly Inspections.”

6.3.2.4. The following provisions of paragraph 6.3.5., "Recordkeeping Requirements," apply to HWAPs: 6.3.5.1. ("Turn-in Documents"), 6.3.5.5. ("Manifests"), and 6.3.5.6. ("Waste Analysis/Characterization Records").

6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate HW training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph 6.3.9.

6.3.3. Hazardous Waste Storage Area (HWSA)

6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

6.3.3.2. Design and Operation of HWSAs. HWSAs must be designed, constructed maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned release of HW or HW constituents to air, soil, groundwater or surface water that could threaten human health or the environment. Hazardous waste should not be stored longer than one year in an HWSA.

6.3.3.3. Waste Analysis and Verification

6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization (Section 6.3.1.1) and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, an HWPS for each waste stream that is stored at each HWSA.

6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided.

6.3.3.3.3.2. Ensure that no waste is accepted for storage unless an HWPS is provided, or is available and properly referenced.

6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

6.3.3.3.4. Analyze waste shipments in accordance with the waste analysis plan to determine whether it matches the waste description on the accompanying manifest and documents; and

6.3.3.3.4.1. Reject shipments that do not match the accompanying waste descriptions unless the generator provides an accurate description.

6.3.3.4. Security

6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the HWSA grounds.

6.3.3.4.2. Security System Design. An acceptable security system for a HWSA consists of either:

6.3.3.4.2.1. A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the HWSA; or

6.3.3.4.2.2. An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff) that completely surrounds the HWSA, combined with a means to control entrance at all times (e.g., an attendant, television monitors, locked gate, or controlled roadway access).

6.3.3.4.3. Required Signs. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the HWSA, and at other locations, in sufficient numbers to be seen from any approach to the HWSA. The legend must be written in English and in any other language predominant in the area surrounding the installation, and must be legible from a distance of at least 7.62 meters (25 feet). Existing signs with a legend other than "Danger Unauthorized Personnel Keep Out," may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the HWSA, and that entry can be dangerous.

6.3.3.5. Required Aisle Space. Aisle space must allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation during an emergency. Containers must not obstruct an exit.

6.3.3.6. Access to Communications or Alarm System

6.3.3.6.1. General. Whenever HW is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

6.3.3.7.1. An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel.

6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams.

6.3.3.7.3. Portable fire extinguishers, fire control equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment.

6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems.

6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, and eyewash and shower facilities.

6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA communications alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its proper operation in time of emergency.

6.3.3.8. General Inspection Requirements

6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of HW constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of HW, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems (e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, or eroding dike).

6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in subparagraph 6.3.4.1.5. Minimum frequencies for inspecting tank systems are found in subparagraph 6.3.7.5.2. For equipment not covered by those paragraphs, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep the records for at least three years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate HW training program in accordance with the training requirements in paragraph 6.3.9.

6.3.3.10. Storage Practices

6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Incompatible hazardous waste types shall be kept in separate drums or containers and not mixed during waste transport. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion, and generation of toxic gases.

6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No Smoking" signs, or the appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "No Smoking" legend must be written in English and in any other language predominant in the area. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

6.3.3.11. Closure and Closure Plans

6.3.3.11.1. Closure. At closure of an HWSA, HW and HW waste residues must be removed from the containment system, including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of HW and according to the Closure Plan.

6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA will also develop a Closure Plan. The Closure Plan will be implemented concurrent with the decision to close the HWSA. The Closure Plan will include: estimates of the storage capacity of the HW, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

6.3.4. Use and Management of Containers

6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following guidelines will apply when handling and storing HW containers.

6.3.4.1.1. Containers holding HW will be in good condition, free from severe rusting, bulging, or structural defects.

6.3.4.1.2. Containers used to store HW, including overpack containers, must be compatible with the materials stored.

6.3.4.1.3. Management of Containers

6.3.4.1.3.1. A container holding HW must always be closed during storage, except when it is necessary to add or remove waste.

6.3.4.1.3.2. A container holding HW must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

6.3.4.1.4. Containers holding HW will be marked with a HW marking, and a label indicating the hazard class of the waste contained (flammable, corrosive, etc.).

6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking and deteriorating containers as well as deterioration of the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

6.3.4.2. Containment. Container storage areas must have a secondary containment system meeting the following:

6.3.4.2.1. Must be sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

6.3.4.2.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

6.3.4.2.3. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in subparagraph 6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

6.3.4.2.4. Rainwater captured in secondary containment areas should be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the HW in the containers. Contaminated water shall be treated as HW until determined otherwise.

6.3.4.3. Special Requirements for Ignitable or Reactive Waste. Areas that store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

6.3.4.4. Special Requirements for Incompatible Wastes

6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

6.3.4.4.3. A storage container holding HW that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments, must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

6.3.5. Recordkeeping Requirements

6.3.5.1. Turn-in Documents. Turn-in documents, e.g., DD 1348-1A, hazardous waste transportation forms or manifests, must be maintained for 3 years.

6.3.5.2. Hazardous Waste Log. A written HW log will be maintained at the HWSA to record all HW handled and should consist of the following:

6.3.5.2.1. Name/address of generator;

6.3.5.2.2. Description and hazard class of the hazardous waste;

6.3.5.2.3. Number and types of containers;

6.3.5.2.4. Quantity of hazardous waste;

6.3.5.2.5. Date stored;

6.3.5.2.6. Storage location; and

6.3.5.2.7. Disposition data, to include: dates received, sealed, and transported, and transporter used.

6.3.5.3. The HW log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

6.3.5.4. Inspection Logs. Records of inspections should be maintained for a period of 3 years.

6.3.5.5. Manifests. Manifests of incoming and outgoing hazardous wastes will be retained for a period of 3 years.

6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until 3 years after closure of the HWSA.

6.3.5.7. The installation will maintain records, identified in subparagraphs 6.3.5.1., 6.3.5.5., and 6.3.5.6. for all HWAPs on the installation.

6.3.6. Contingency Plan

6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of HW in accordance with the provisions of Chapter 18., "Spill Prevention and Response Planning."

6.3.6.2. A current copy of the installation contingency plan must be:

6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan that are pertinent to their facilities and operation); and

6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and upon which the plan relies to provide emergency services. Contingency Plans should be available in both English and the language of the host nation.

6.3.7. Tank Systems. The following criteria apply to all storage tanks containing HW. See Chapter 19, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POLs and hazardous substances.

6.3.7.1. Application. The requirements of this subparagraph apply to HWSAs that use tank systems for storing or treating HW. Tank systems that are used to store or treat HW that contain no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in subparagraph 6.3.7.4., Containment and Detection of Releases. Tank systems, including sumps that serve as part of a secondary containment system to collect or contain releases of HW, are exempted from the requirements in subparagraph 6.3.7.4.

6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of subparagraph 6.3.7.4., installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

6.3.7.3. Design and Installation of New Tank Systems or System Components. Managers of HWSAs installing new tank systems or system components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating HW. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

6.3.7.4. Containment and Detection of Releases. To prevent the release of HW or hazardous constituents to the environment, secondary containment that meets the requirements of this subparagraph must be:

6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

6.3.7.4.3. Provided for tank systems that store or treat HW by 1 January 1999;

6.3.7.4.4. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

6.3.7.4.5. Constructed to include one or more of the following: a liner external to the tank, a vault, or double-walled tank.

6.3.7.5. General Operating Requirements

6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

6.3.7.5.2. The installation must inspect and log at least once each operating day:

6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of HW (e.g., wet spots, dead vegetation).

6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA.

6.3.7.5.4. During tank cleaning operations, HW or sludge generated must not be disposed of to soil, sewerage system, or the marine environment.

6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or that is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

6.3.7.6.1. Cessation of use; prevention of flow or addition of wastes. The installation must immediately stop the flow of HW into the tank system or secondary containment system and inspect the system to determine the cause of the release.

6.3.7.6.2. Containment of visible releases to the environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

6.3.7.6.2.1. Prevent further migration of the leak or spill to soil or surface water;

6.3.7.6.2.2. Remove and properly dispose of any contaminated soil or surface water;

6.3.7.6.2.3. Remove free product to the maximum extent possible; and

6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

6.3.7.6.3. Make required notifications and reports.

6.3.7.6.4. Over pack HW drums damaged during transport.

6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable, and structures and equipment.

6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

6.3.8.1.1. Industrial furnaces.

6.3.8.1.2. Boilers that are identified as follows:

6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

6.3.8.1.2.2. Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids;

6.3.8.1.2.3. Used oil-fired space heaters provided that:

6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.15 MW (0.5 million BTU per hour); and

6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

.3.8.2. Prohibitions on Dust Suppression or Road Treatment. Used oil, HW, or used oil contaminated with any HW will not be used for dust suppression or road treatment.

6.3.8.3. Lead-acid batteries that are to be recycled will be managed as hazardous material. Lead-acid batteries that are not recycled will be managed as HW.

6.3.8.4. Additional Used Oil Criteria. Additional criteria for the management of used oil are included in Chapter 9, "POL".

6.3.9. Hazardous Waste Training

6.3.9.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty after the effective date of this Guide must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05 (DoD Hazard Communication (HAZCOM) Program).

6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

6.3.9.3. Training Contents and Requirements. The training program must:

6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience.

6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

6.3.9.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

6.3.9.3.4.1. Emergency procedures (response to fire/explosion/spills; use of communications/alarm systems; body and equipment clean up);

6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures;

6.3.9.3.4.3. Employee Protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

6.3.9.4. Documentation of Training. Installations must document all HW training for each individual assigned duties involving actual or potential exposure to HW. Updated training records on personnel assigned duties involving actual or potential exposure to HW must be kept by the HWSA manager or the responsible installation office and retained for at least three years after termination of duty of these personnel.

6.3.10. Hazardous Waste Disposal

6.3.10.1. All DoD HW should normally be disposed of through DLA Disposition Services. A decision not to use DLA-DS for HW disposal may be made in accordance with DoDD 4001.1 (Installation Management) to best accomplish the installation mission, but should be concurred with by the component chain of command to ensure that installation contracts and disposal criteria are at least as protective as criteria used by DLA-DS.

6.3.10.2. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or Bahrain law are not disposed of in the host nation unless the disposal is conducted in accordance with FGS and the following:

6.3.10.2.1. When HW cannot be disposed of in accordance with FGS within the host nation, it will either be retrograded to the United States or, if permissible under international agreements, transferred to another country outside the United States where it can be disposed of in an environmentally sound manner and in compliance with FGS applicable to the country of disposal, if any exist. Transshipment of HW to a country other than the United States for disposal must be approved by, at a minimum, the DUSD(I&E). The following record-keeping requirements apply for HW disposed outside Bahrain:

6.3.10.2.1.1. Generators may be required to provide a notification containing the information in Table 6.12. Installations shall contact the LEC to determine Competent Authority notification requirements. When required, a general notification shall be used for regular shipments of hazardous wastes with the same physical and chemical characteristics.

6.3.10.2.1.2. Waste shipments outside of Bahrain shall be accompanied by the waste transportation form and additional required information included in Table 6.13.

6.3.10.2.2. The determination of whether particular DoD-generated HW may be disposed of in a host nation will be made by the EEA, in coordination with the unified combatant commander, the Director of Defense Logistics Agency, other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

6.3.10.2.3. Generators shall notify the Competent Authority via the LEC in writing in the event of rejection of hazardous waste shipments by the treatment unit or disposal site and comply with its procedures for disposal. The following requirements shall be met when sending HW for treatment/disposal:

6.3.10.2.3.1. Installations shall use approved carriers

6.3.10.2.3.2. HW shall be accompanied with the completed waste transportation form

6.3.10.2.3.3. HW shall conform with the description on the completed waste transportation form

6.3.10.2.3.4. Chemical or biological waste shall be accompanied by its MSDS

6.3.10.3. Disposal Procedures

6.3.10.3.1. The determination of whether HW may be disposed of in a host nation must include consideration of whether the means of treatment and/or containment technologies employed in the Bahrain program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the Bahrain program includes:

6.3.10.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

6.3.10.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

6.3.10.3.1.3. Appropriate standards and limitations on the approved methods that may be used to treat and dispose of HW.

6.3.10.3.1.4. Standards designed to minimize the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface, or groundwater.

6.3.10.3.2. The EEA must also be satisfied, either through reliance on the HN regulatory system and/or provisions in the disposal contracts, that:

6.3.10.3.2.1. Persons and facilities in the waste management process have demonstrated the appropriate level of training and reliability; and

6.3.10.3.2.2. Effective inspections, monitoring, and recordkeeping will take place.

6.3.10.3.2.2.1. A monitoring program for the treatment unit and all its facilities and equipment including storage areas, emergency equipment, and safety program shall be developed.

6.3.10.3.2.2.2. See Section 6.3.5. for record-keeping requirements (e.g. waste transportation forms, Operation Register, etc.)

6.3.10.4. Bahrain facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the host nation as being in compliance with their regulatory requirements. This evaluation and approval may-consist of having a valid permit or HN equivalent for the HW that will be handled.

6.3.10.5. Hazardous waste will be recycled or reused to the maximum extent practical. Generators shall work toward preventing or reducing waste generation by upgrading equipment, adopting safe and environmentally acceptable methods to identify, store, prevent leakage, and dispose of HW, to minimize risks to health and the environment. They shall also take into account social, technological and economic aspects of the appropriate measures to ensure that the generation of hazardous wastes and other wastes is reduced to a minimum.

6.3.10.6. Land Disposal Requirements. Hazardous wastes will only be land-disposed when there is a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal site for as long as the wastes remain hazardous. Hazardous waste may be land-disposed only in facilities meeting the following criteria:

6.3.10.6.1. The land disposal facility has a liner and a leachate collection system. The liner will be of natural or man-made materials and restrict the downward or lateral escape of HW, hazardous constituents, or leachate. The permeability of such liners will be no greater than 10^{-7} cm/sec;

6.3.10.6.2. The land disposal facility has a groundwater monitoring program capable of determining the facility's impact on the quality of water in the aquifers underlying the facility as well as monitoring programs for soil, air emissions, industrial drainage water, and hazardous waste treatment products; and

6.3.10.6.3. The requirements of subparagraphs 6.3.10.6.1. or 6.3.10.6.2., above, may be waived for a particular land disposal facility by the LEC if a written determination is made by a qualified geologist or geotechnical engineer that there is a low potential for migration of HW, hazardous constituents, or leachate from the facility to water supply wells, irrigation wells, or surface water. This determination will be based on an analysis of local precipitation, geologic conditions, physical properties, depth to groundwater, and proximity of water supply wells or surface water, as well as use of alternative design and operating practices. Methods for preventing migration will be at least as effective as liners and leachate collection systems required in subparagraph 6.3.10.6.1.

6.3.10.7. Incinerator Standards. This subparagraph applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

6.3.10.7.1. Incinerators used to dispose of HW must be licensed or permitted by a component HN authority or approved by the EEA. This license, permit, or approval must comply with the criteria listed in subparagraph 6.3.10.7.2.

6.3.10.7.2. A license, permit, or EEA approval for incineration of HW must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme that would require an incinerator to achieve the standards set forth in either subparagraphs 6.3.10.7.2.1. or 6.3.10.7.2.2. is acceptable.

6.3.10.7.2.1. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission of particulate matter, and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

6.3.10.7.2.2. The incinerator has demonstrated, as a condition for obtaining a license, permit, or EEA approval, the ability to effectively destroy the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the competent HN authority or the EEA to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

6.3.10.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes categorized as hazardous on the basis of section AP1.1. and which, after treatment as described herein, no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix 1 will continue to be managed as HW under the criteria of this Guide, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of HN disposal alternatives. These technologies should not be implemented without consultation with the EEA, or the Combatant Commander, if there is no EEA.

6.3.10.8.1. Organics

6.3.10.8.1.1. Incineration in accordance with the requirements of subparagraph 6.3.10.7.1.

6.3.10.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

6.3.10.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentrations of a representative compound or indicator parameter (e.g., total organic carbon) has been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the HW being biodegraded.

6.3.10.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction; liquid extraction; precipitation/crystallization, or phase separation techniques, such as decantation, filtration, and centrifugation when used in conjunction with one of the above techniques.

6.3.10.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions.

6.3.10.8.2. Heavy Metals

6.3.10.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

6.3.10.8.2.2. Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals.

6.3.10.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits the characteristic for reactivity defined in Appendix 1.

6.3.10.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3., will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

6.3.10.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with subparagraphs 6.3.10.8.2.1. or 6.3.10.8.2.2. to stabilize, fix or recover heavy metals, as appropriate, and in accordance with subparagraph 6.3.10.8.4. to neutralize any corrosives before disposal.

6.3.10.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accord with subparagraphs 6.3.10.7. and 6.3.10.8. On-site treatment units shall be approved via the LEC by the Competent Authority (see Section 6.3.12); alternatively, HW may be sent to an off-site treatment unit or disposal site.

6.3.11. Record-Keeping Requirements for Treatment Units. The following records shall be maintained by treatment units:

6.3.11.1. Operations Register for no less than three years which includes the following information:

6.3.11.1.1. Quantity and quality of waste shipments including both name of generator, carrier, date of receipt and treatment or disposal

6.3.11.1.2. Description of waste/secondary remains post-treatment including quantity, method and site of disposal

6.3.11.1.3. Analysis results (emissions to air, pollutants in soil/ groundwater and pollutant concentrations in sludge, industrial drainage waste or secondary waste from the treatment process) and describing the quantity, method and site of disposal for waste remaining from the treatment process

6.3.11.2. Periodic report regarding treatment unit/ disposal site activities submitted to the Competent Authority via the LEC every 6 months from the date of operation and whenever requested by the Competent Authority. It shall contain details and measures as per the criteria in Section 6.3.11.1

6.3.12. Hazardous Waste Approval. Installations may require approval for the transport off installation and treatment or disposal of hazardous wastes. Contact the LEC to determine approval requirements.

Table 6.1. List of hazardous characteristics

UN Class[1]	Code	Characteristics
1	H1	Explosive: An explosive substance or waste is a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.
3	H3	Flammable liquids: The word "flammable" has the same meaning as "inflammable". Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc., but not including substances or wastes otherwise classified on account of their dangerous characteristics) which give off a flammable vapor at temperatures of not more than 60.5°C, closed-cup test, or not more than 65.6°C, open-cup test. (Since the results of open-cup tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition.)
4.1	H4.1	Flammable solids: Solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or may cause or contribute to fire through friction.
4.2	H4.2	Substances or wastes liable to spontaneous combustion: Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.
4.3	H4.3	Substances or wastes which, in contact with water emit flammable gases: Substances or wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.
5.1	H5.1	Oxidizing: Substances or wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.
5.2	H5.2	Organic Peroxides: Organic substances or wastes which contain the bivalent-o-o-structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.
6.1	H6.1	Poisonous (Acute): Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.
6.2	H6.2	Infectious substances: Substances or wastes containing viable microorganisms or their toxins which are known or suspected to cause disease in animals or humans.
8	H8	Corrosives: Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards.
9	H10	Liberation of toxic gases in contact with air or water: Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.
9	H11	Toxic (Delayed or chronic): Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity.
9	H12	Ecotoxic: Substances or wastes which if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.
9	H13	Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

Table 6.2. Controlled Waste Categories

Code	A – Wastes Streams
Y1	Clinical wastes from medical care in hospitals, medical centers and clinics
Y2	Wastes from the production and preparation of pharmaceutical products
Y3	Waste pharmaceuticals, drugs and medicines
Y4	Wastes from the production, formulation and use of biocides and phytopharmaceuticals
Y5	Wastes from the manufacture, formulation and use of wood preserving chemicals
Y6	Wastes from the production, formulation and use of organic solvents
Y7	Wastes from heat treatment and tempering operations containing cyanides
Y8	Waste mineral oils unfit for their originally intended use
Y9	Waste oils/water, hydrocarbons/water mixtures, emulsions
Y10	Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) and/or polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
Y11	Waste tarry residues arising from refining, distillation and any pyrolytic treatment
Y12	Wastes from production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish
Y13	Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives
Y14	Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known
Y15	Wastes of an explosive nature not subject to other legislation
Y16	Wastes from production, formulation and use of photographic chemicals and processing materials
Y17	Wastes resulting from surface treatment of metals and plastics
Y18	Residues arising from industrial waste disposal operations
	B – Waste Having The Following As Constituents
Y19	Metal carbonyls
Y20	Beryllium; beryllium compounds
Y21	Hexavalent chromium compounds
Y22	Copper compounds
Y23	Zinc compounds
Y24	Arsenic; arsenic compounds
Y25	Selenium; selenium compounds
Y26	Cadmium; cadmium compounds
Y27	Antimony; antimony compounds
Y28	Tellurium; tellurium compounds
Y29	Mercury; mercury compounds
Y30	Thallium; thallium compounds
Y31	Lead; lead compounds
Y32	Inorganic fluorine compounds excluding calcium fluoride
	B – Waste Having The Following As Constituents
Y33	Inorganic cyanides
Y34	Acidic solutions or acids in solid form
Y35	Basic solutions or bases in solid form
Y36	Asbestos (dust and fibers)
Y37	Organic phosphorus compounds
Y38	Organic cyanides
Y39	Phenols; phenol compounds including chlorophenols
Y40	Ethers
Y41	Halogenated organic solvents
Y42	Organic solvents excluding halogenated solvents
Y43	Any congenor of polychlorinated dibenzo-furan
Y44	Any congenor of polychlorinated dibenzo-p-dioxin
Y45	Organohalogen compounds other than substances referred to in this Table (e.g. Y39, Y41, Y42, Y43, Y44)
	C – Categories of Waste Requiring Special Consideration
Y46	Wastes collected from households

Y47	Residues arising from the incineration of household wastes

Table 6.3. Wastes Characterized as Hazardous Metal and Metal-Bearing

A1010	Metal wastes and waste consisting of alloys of any of the following: • Antimony • Arsenic • Beryllium • Cadmium • Lead • Mercury • Selenium • Tellurium • Thallium but excluding such wastes specifically listed on list B.
A1020	Waste having as constituents or contaminants, excluding metal waste in massive form, any of the following: • Antimony; antimony compounds • Beryllium; beryllium compounds • Cadmium; cadmium compounds • Lead; lead compounds • Selenium; selenium compounds • Tellurium; tellurium compounds
A1030	Wastes having as constituents or contaminants any of the following: • Arsenic; arsenic compounds • Mercury; mercury compounds • Thallium; thallium compounds
A1040	Wastes having as constituents any of the following: • Metal carbonyls • Hexavalent chromium compounds
A1050	Galvanic sludges
A1060	Waste liquors from the pickling of metals
A1070	Leaching residues from zinc processing, dust and sludges such as jarosite, hematite, etc.
A1080	Waste zinc residues not included on list B, containing lead and cadmium in concentrations sufficient to exhibit Table 6.1 characteristics
A1090	Ashes from the incineration of insulated copper wire
A1100	Dusts and residues from gas cleaning systems of copper smelters
A1110	Spent electrolytic solutions from copper electrorefining and electrowinning operations
A1120	Waste sludges, excluding anode slimes, from electrolyte purification systems in copper electrorefining and electrowinning operations
A1130	Spent etching solutions containing dissolved copper
A1140	Waste cupric chloride and copper cyanide catalysts
A1150	Precious metal ash from incineration of printed circuit boards not included on list B[1]
A1160	Waste lead-acid batteries, whole or crushed
A1170	Unsorted waste batteries excluding mixtures of only list B batteries. Waste batteries not specified on list B containing Table 6.2 A, B and C constituents to an extent to render them hazardous
A1180	Waste electrical and electronic assemblies or scrap[2] containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or contaminated with Table 6.2 constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) to an extent that

[1] Note that mirror entry on list B (B1160) does not specify exceptions.
[2] This entry does not include scrap assemblies from electric power generation.

Table 6.3. Wastes Characterized as Hazardous Metal and Metal-Bearing

	they possess any of the characteristics contained in Table 6. 1 (note the related entry on list B B1110)[3]

[3] PCBs are at a concentration level of 50 mg/kg or more.

Table 6.4. Wastes Containing Principally Inorganic Constituents, which may Contain Metals and Organic Materials

A2010	Glass waste from cathode-ray tubes and other activated glasses
A2020	Waste inorganic fluorine compounds in the form of liquids or sludges but excluding such wastes specified on list B
A2030	Waste catalysts but excluding such wastes specified on list B
A2040	Waste gypsum arising from chemical industry processes, when containing Table 6.22 constituents to the extent that it exhibits an Table 6.1 hazardous characteristic (note the related entry on list B B2080)
A2050	Waste asbestos (dusts and fibers)
A2060	Coal-fired power plant fly-ash containing Table 6.2 substances in concentrations sufficient to exhibit Table 6.1 characteristics (note the related entry on list B B2050)

Table 6.5. Wastes Containing Principally Organic Constituents, which may Contain Metals and Inorganic Materials

A3010	Waste from the production or processing of petroleum coke and bitumen
A3020	Waste mineral oils unfit for their originally intended use
A3030	Wastes that contain, consist of or are contaminated with leaded anti-knock compound sludges
A3040	Waste thermal (heat transfer) fluids
A3050	Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives excluding such wastes specified on list B (note the related entry on list B B4020)
A3060	Waste nitrocellulose
A3070	Waste phenols, phenol compounds including chlorophenol in the form of liquids or sludges
A3080	Waste ethers not including those specified on list B
A3090	Waste leather dust, ash, sludges and flours when containing hexavalent chromium compounds or biocides (note the related entry on list B B3100)
A3100	Waste paring and other waste of leather or of composition leather not suitable for the manufacture of leather articles containing hexavalent chromium compounds or biocides (note the related entry on list B B3090)
A3110	Fellmongery wastes containing hexavalent chromium compounds or biocides or infectious substances (note the related entry on list B B3110)
A3120	Fluff - light fraction from shredding
A3130	Waste organic phosphorous compounds
A3140	Waste non-halogenated organic solvents but excluding such wastes specified on list B
A3150	Waste halogenated organic solvents
A3160	Waste halogenated or unhalogenated non-aqueous distillation residues arising from organic solvent recovery operations
A3170	Wastes arising from the production of aliphatic halogenated hydrocarbons (such as chloromethane, dichloro-ethane, vinyl chloride, vinylidene chloride, allyl chloride and epichlorhydrin)
A3180	Wastes, substances and articles containing, consisting of or contaminated with polychlorinated biphenyl (PCB), polychlorinated terphenyl (PCT), polychlorinated naphthalene (PCN) or polybrominated biphenyl (PBB), or any other polybrominated analogues of these compounds, at a concentration level of 50 mg/kg or more[4]

[4] The 50 mg/kg level is considered to be an internationally practical level for all wastes. However, many individual

A3190	Waste tarry residues (excluding asphalt cements) arising from refining, distillation and any pyrolitic treatment of organic materials

countries have established lower regulatory levels (e.g., 20 mg/kg) for specific wastes.

Table 6.6. Wastes which may Contain Either Inorganic or Organic Constituents

A4010	Wastes from the production, preparation and use of pharmaceutical products but excluding such wastes specified on list B
A4020	Clinical and related wastes; that is wastes arising from medical, nursing, dental, veterinary, or similar practices, and wastes generated in hospitals or other facilities during the investigation or treatment of patients, or research projects
A4030	Wastes from the production, formulation and use of biocides and phytopharmaceuticals, including waste pesticides and herbicides which are off-specification, outdated,[5] or unfit for their originally intended use
A4040	Wastes from the manufacture, formulation and use of wood-preserving chemicals[6]
A4050	Wastes that contain, consist of or are contaminated with any of the following: • Inorganic cyanides, excepting precious-metal-bearing residues in solid form containing traces of inorganic cyanides • Organic cyanides
A4060	Waste oils/water, hydrocarbons/water mixtures, emulsions
A4070	Wastes from the production, formulation and use of inks, dyes, pigments, paints, lacquers, varnish excluding any such waste specified on list B (note the related entry on list B B4010)
A4080	Wastes of an explosive nature (but excluding such wastes specified on list B)
A4090	Waste acidic or basic solutions, other than those specified in the corresponding entry on list B (note the related entry on list B B2120)
A4100	Wastes from industrial pollution control devices for cleaning of industrial off-gases but excluding such wastes specified on list B
A4110	Wastes that contain, consist of or are contaminated with any of the following: • Any congenor of polychlorinated dibenzo-furan • Any congenor of polychlorinated dibenzo-dioxin
A4120	Wastes that contain, consist of or are contaminated with peroxides
A4130	Waste packages and containers containing Table 6.2 substances in concentrations sufficient to exhibit Table 6.1 hazard characteristics
A4140	Waste consisting of or containing off specification or outdated[7] chemicals corresponding to Table 6.2 A, B and C categories and exhibiting Table 6.1 hazard characteristics
A4150	Waste chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on human health and/or the environment are not known
A4160	Spent activated carbon not included on list B (note the related entry on list B B2060)

[5] "Outdated" means unused within the period recommended by the manufacturer.
[6] This entry does not include wood treated with wood preserving chemicals.
[7] "Outdated" means unused within the period recommended by the manufacturer.

Table 6.7. B1 Metal and Metal-Bearing Wastes

B1010	Metal and metal-alloy wastes in metallic, non-dispersible form: • Precious metals (gold, silver, the platinum group, but not mercury) • Iron and steel scrap • Copper scrap • Nickel scrap • Aluminum scrap • Zinc scrap • Tin scrap • Tungsten scrap • Molybdenum scrap • Tantalum scrap • Magnesium scrap • Cobalt scrap • Bismuth scrap • Titanium scrap • Zirconium scrap • Manganese scrap • Germanium scrap • Vanadium scrap • Scrap of hafnium, indium, niobium, rhenium and gallium • Thorium scrap • Rare earths scrap • Chromium scrap
B1020	Clean, uncontaminated metal scrap, including alloys, in bulk finished form (sheet, plate, beams, rods, etc), of: • Antimony scrap • Beryllium scrap • Cadmium scrap • Lead scrap (but excluding lead-acid batteries) • Selenium scrap • Tellurium scrap
B1030	Refractory metals containing residues
B1040	Scrap assemblies from electrical power generation not contaminated with lubricating oil, PCB or PCT to an extent to render them hazardous
B1050	Mixed non-ferrous metal, heavy fraction scrap, not containing Table 6.2 A, B and C type materials in concentrations sufficient to exhibit Table 6.1 characteristics[8]
B1060	Waste selenium and tellurium in metallic elemental form including powder
B1070	Waste of copper and copper alloys in dispersible form, unless they contain Table 6.2 constituents to an extent that they exhibit Table 6.1 characteristics
B1080	Zinc ash and residues including zinc alloys residues in dispersible form unless containing Table 6.2 A, B and C type constituents in concentration such as to exhibit Table 6.1 characteristics or exhibiting hazard characteristic H4.3 (Table 6.1)[9]
B1090	Waste batteries conforming to a specification, excluding those made with lead, cadmium or mercury

[8] Note that even where low level contamination with these materials initially exists, subsequent processes, including recycling processes, may result in separated fractions containing significantly enhanced concentrations of these materials.
[9] The status of zinc ash is currently under review.

Table 6.7. B1 Metal and Metal-Bearing Wastes

B1100	Metal-bearing wastes arising from melting, smelting and refining of metals: • Hard zinc scrap • Zinc-containing drosses: - Galvanizing slab zinc top dross (>90% Zn) - Galvanizing slab zinc bottom dross (>92% Zn) - Zinc die casting dross (>85% Zn) - Hot dip galvanizers slab zinc dross (batch)(>92% Zn) - Zinc skimmings • Aluminum skimmings (or skims) excluding salt slag • Slags from copper processing for further processing or refining not containing arsenic, lead or cadmium to an extent that they exhibit Table 6.1 hazard characteristics • Wastes of refractory linings, including crucibles, originating from copper smelting • Slags from precious metals processing for further refining • Tantalum-bearing tin slags with less than 0.5% tin
B1110	Electrical and electronic assemblies: • Electronic assemblies consisting only of metals or alloys • Waste electrical and electronic assemblies or scrap[10] (including printed circuit boards) not containing components such as accumulators and other batteries included on list A, mercury-switches, glass from cathode-ray tubes and other activated glass and PCB-capacitors, or not contaminated with Table 6.2 constituents (e.g., cadmium, mercury, lead, polychlorinated biphenyl) or from which these have been removed, to an extent that they do not possess any of the characteristics contained in Table 6.1 (note the related entry on list A A1180) • Electrical and electronic assemblies (including printed circuit boards, electronic components and wires) destined for direct reuse,[11] and not for recycling or final disposal[12]
B1120	Spent catalysts excluding liquids used as catalysts, containing any of:

Transition metals, excluding waste catalysts (spent catalysts, liquid used catalysts or other catalysts) on list A:	Scandium Vanadium Manganese Cobalt Copper Yttrium Niobium Hafnium Tungsten	Titanium Chromium Iron Nickel Zinc Zirconium Molybdenum Tantalum Rhenium
Lanthanides (rare earth metals):	Lanthanum Praseodymium Samarium Gadolinium Dysprosium Erbium Ytterbium	Cerium Neody Europium Terbium Holmium Thulium Lutetium

[10] This entry does not include scrap from electrical power generation.
[11] Reuse can include repair, refurbishment or upgrading, but not major reassembly
[12] In some countries these materials destined for direct re-use are not considered wastes.

Table 6.7. B1 Metal and Metal-Bearing Wastes

B1130	Cleaned spent precious-metal-bearing catalysts
B1140	Precious-metal-bearing residues in solid form which contain traces of inorganic cyanides
B1150	Precious metals and alloy wastes (gold, silver, the platinum group, but not mercury) in a dispersible, non-liquid form with appropriate packaging and labeling
B1160	Precious-metal ash from the incineration of printed circuit boards (note the related entry on list A, A1150)
B1170	Precious-metal ash from the incineration of photographic film
B1180	Waste photographic film containing silver halides and metallic silver
B1190	Waste photographic paper containing silver halides and metallic silver
B1200	Granulated slag arising from the manufacture of iron and steel
B1210	Slag arising from the manufacture of iron and steel including slags as a source of TiO_2 and vanadium
B1220	Slag from zinc production, chemically stabilized, having a high iron content (above 20%) and processed according to industrial specifications (e.g., DIN 4301) mainly for construction
B1230	Mill scaling arising from the manufacture of iron and steel
B1240	Copper oxide mill-scale
B1250	Waste end-of-life motor vehicles, containing neither liquids nor other hazardous components

Table 6.8. B2 Wastes Containing Principally Inorganic Constituents, which may Contain Metals and Organic Materials

B2010	Wastes from mining operations in non-dispersible form: • Natural graphite waste • Slate waste, whether or not roughly trimmed or merely cut, by sawing or otherwise • Mica waste • Leucite, nepheline and nepheline syenite waste • Feldspar waste • Fluorspar waste • Silica wastes in solid form excluding those used in foundry operations
B2020	Glass waste in non-dispersible form: • Cullet and other waste and scrap of glass except for glass from cathode-ray tubes and other activated glasses
B2030	Ceramic wastes in non-dispersible form: • Cermet wastes and scrap (metal ceramic composites) • Ceramic based fibers not elsewhere specified or included
B2040	Other wastes containing principally inorganic constituents: • Partially refined calcium sulfate produced from flue-gas desulphurization (FGD) • Waste gypsum wallboard or plasterboard arising from the demolition of buildings • Slag from copper production, chemically stabilized, having a high iron content (above 20%) and processed according to industrial specifications (e.g., DIN 4301 and DIN 8201) mainly for construction and abrasive applications • Sulfur in solid form • Limestone from the production of calcium cyanamide (having a pH less than 9) • Sodium, potassium, calcium chlorides • Carborundum (silicon carbide) • Crushed concrete • Lithium-tantalum and lithium-niobium containing glass scraps
B2050	Coal-fired power plant fly-ash, not included on list A (note the related entry on list A A2060)
B2060	Spent activated carbon resulting from the treatment of potable water and processes of the food industry and vitamin production (note the related entry on list A, A4160)
B2070	Calcium fluoride sludge
B2080	Waste gypsum arising from chemical industry processes not included on list A (note the related entry on list A, A2040)
B2090	Waste anode butts from steel or aluminum production made of petroleum coke or bitumen and cleaned to normal industry specifications (excluding anode butts from chlor alkali electrolyses and from metallurgical industry)
B2100	Waste hydrates of aluminum and waste alumina and residues from alumina production excluding such materials used for gas cleaning, flocculation or filtration processes
B2110	Bauxite residue ("red mud") (pH moderated to less than 11.5)
B2120	Waste acidic or basic solutions with a pH greater than 2 and less than 11.5, which are not corrosive or otherwise hazardous (note the related entry on list A, A4090)

Table 6.9. B3 Wastes Containing Principally Organic Constituents, which may Contain Metals and Inorganic Materials

B3010	Solid plastic waste: The following plastic or mixed plastic materials, provided they are not mixed with other wastes and are prepared to a specification: • Scrap plastic of non-halogenated polymers and co-polymers, including but not limited to the following[13] - ethylene - styrene - polypropylene - polyethylene terephthalate - acrylonitrile - butadiene - polyacetals - polyamides - polybutylene terephthalate - polycarbonates - polyethers - polyphenylene sulfides - acrylic polymers - alkanes C10-C13 (plasticizer) - polyurethane (not containing CFCs) - polysiloxanes - polymethyl methacrylate - polyvinyl alcohol - polyvinyl butyral - polyvinyl acetate • Cured waste resins or condensation products including the following: - urea formaldehyde resins - phenol formaldehyde resins - melamine formaldehyde resins - epoxy resins - alkyd resins - polyamides • The following fluorinated polymer wastes[14] - perfluoroethylene/propylene (FEP) - perfluoro alkoxyl alkane - tetrafluoroethylene/per fluoro vinyl ether (PFA) - tetrafluoroethylene/per fluoro methylvinyl ether (MFA) - polyvinylfluoride (PVF) - polyvinylidenefluoride (PVDF)
B3020	Paper, paperboard and paper product wastes The following materials, provided they are not mixed with hazardous wastes: Waste and scrap of paper or paperboard of: • unbleached paper or paperboard or of corrugated paper or paperboard • other paper or paperboard, made mainly of bleached chemical pulp, not colored in the mass • paper or paperboard made mainly of mechanical pulp (for example,

[13] It is understood that such scraps are completely polymerized.
[14] Post-consumer wastes are excluded from this entry:

- Wastes shall not be mixed
- Problems arising from open-burning practices to be considered

Table 6.9. B3 Wastes Containing Principally Organic Constituents, which may Contain Metals and Inorganic Materials

	newspapers, journals and similar printed matter) • other, including but not limited to 1) laminated paperboard 2) unsorted scrap
B3030	Textile wastes The following materials, provided they are not mixed with other wastes and are prepared to a specification: • Silk waste (including cocoons unsuitable for reeling, yarn waste and garnetted stock) - not carded or combed - other • Waste of wool or of fine or coarse animal hair, including yarn waste but excluding garnetted stock - noils of wool or of fine animal hair - other waste of wool or of fine animal hair - waste of coarse animal hair • Cotton waste (including yarn waste and garnetted stock) - yarn waste (including thread waste) - garnetted stock - other • Flax tow and waste • Tow and waste (including yarn waste and garnetted stock) of true hemp (Cannabis sativa L.) • Tow and waste (including yarn waste and garnetted stock) of jute and other textile based fibers (excluding flax, true hemp and ramie) • Tow and waste (including yarn waste and garnetted stock) of sisal and other textile fibers of the genus Agave • Tow, noils and waste (including yarn waste and garnetted stock) of coconut • Tow, noils and waste (including yarn waste and garnetted stock) of abaca (Manila hemp or Musa textilis Nee) • Tow, noils and waste (including yarn waste and garnetted stock) of ramie and other vegetable textile fibers, not elsewhere specified or included • Waste (including noils, yarn waste and garnetted stock) of man-made fibers - of synthetic fibers - of artificial fibers • Worn clothing and other worn textile articles • Used rags, scrap twine, cordage, rope and cables and worn out articles of twine, cordage, rope or cables of textile materials - sorted - other
B3040	Rubber wastes The following materials, provided they are not mixed with other wastes: • Waste and scrap of hard rubber (e.g., ebonite) • Other rubber wastes (excluding such wastes specified elsewhere)
B3050	Untreated cork and wood waste: • Wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms • Cork waste: crushed, granulated or ground cork
B3060	Wastes arising from agro-food industries provided it is not infectious: • Wine lees • Dried and sterilized vegetable waste, residues and byproducts, whether or not in the form of pellets, of a kind used in animal feeding, not elsewhere specified or included

Table 6.9. B3 Wastes Containing Principally Organic Constituents, which may Contain Metals and Inorganic Materials

	• Degras: residues resulting from the treatment of fatty substances or animal or vegetable waxes • Waste of bones and horn-cores, unworked, defatted, simply prepared (but not cut to shape), treated with acid or degelatinized • Fish waste • Cocoa shells, husks, skins and other cocoa waste • Other wastes from the agro-food industry excluding by-products which meet national and international requirements and standards for human or animal consumption
B3070	The following wastes: • Waste of human hair • Waste straw • Deactivated fungus mycelium from penicillin production to be used as animal feed
B3080	Waste parings and scrap of rubber
B3090	Paring and other wastes of leather or of composition leather not suitable for the manufacture of leather articles, excluding leather sludges, not containing hexavalent chromium compounds and biocides (note the related entry on list A A3100)
B3100	Leather dust, ash, sludges or flours not containing hexavalent chromium compounds or biocides (note the related entry on list A A3090)
B3110	Fellmongery wastes not containing hexavalent chromium compounds or biocides or infectious substances (note the related entry on list A A3110)
B3120	Wastes consisting of food dyes
B3130	Waste polymer ethers and waste non-hazardous monomer ethers incapable of forming peroxides
B3140	Waste pneumatic tires, excluding those destined for the disposal operations in Section A of Table 6.11.

Table 6.10. B4 Wastes which may Contain Either Inorganic or Organic Constituents

B4010	Wastes consisting mainly of water-based/latex paints, inks and hardened varnishes not containing organic solvents, heavy metals or biocides to an extent to render them hazardous (note the related entry on list A A4070)
B4020	Wastes from production, formulation and use of resins, latex, plasticizers, glues/adhesives, not listed on list A, free of solvents and other contaminants to an extent that they do not exhibit Table 6.1 characteristics, e.g., water-based, or glues based on casein starch, dextrin, cellulose ethers, polyvinyl alcohols (note the related entry on list A A3050)
B4030	Used single-use cameras, with batteries not included on list A

Note: Production waste that is not included as an item in this list:

1. Products that do not comply with specifications
2. Expired products
3. Unusable parts (e.g. spent batteries, spent catalysts)
4. Industrial waste processes (e.g. slag)
5. Waste arising from pollution control operations (e.g. sludge from gas washing equipment, bags used for collecting soot from chimneys and spent air filters)
6. Waste arising from industrial processes and subsequent operations (e.g. lathe waste, grain skin from mills)
7. Waste arising from the processing of raw materials (e.g. mining waste, materials polluted with oil)
8. Fake counterfeit materials (e.g. oils contaminated with polychlorinated biphenyls (PCBs))
9. Unwanted or unusable products (e.g. unwanted commercial, household, agricultural, and commercial products)
10. Materials or products categorized as waste by the producers but are not included in the items listed herewith

Table 6.11. Resource Recovery, Recycling, Reclamation, Direct re-use or Alternative Uses

Section A	Disposal Operations which do not lead to the possibility of resource recovery, recycling, reclamation, direct re-use or alternative uses
D1	Deposit into or onto land, (e.g., landfill, etc.)
D2	Land treatment, (e.g., biodegradation of liquid or sludgy discards in soils, etc.)
D3	Deep injection, (e.g., injection of pumpable discards into wells, salt domes of naturally occurring repositories, etc.)
D4	Surface impoundment, (e.g., placement of liquid or sludge discards into pits, ponds or lagoons, etc.)
D5	Specially engineered landfill, (e.g., placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
D6	Release into a water body except seas/oceans
D7	Release into seas/oceans including sea-bed insertion
D8	Biological treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations in this section (Section A)
D9	Physico chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations in Section A, (e.g., evaporation, drying, calcination, neutralization, precipitation, etc.)
D10	Incineration on land
D11	Incineration at sea
D12	Permanent storage (e.g., emplacement of containers in a mine, etc.)
D13	Blending or mixing prior to submission to any of the operations in this section (Section A)
D14	Repackaging prior to submission to any of the operations in this section (Section A)
D15	Storage pending any of the operations in this section (Section A)
Section B	Operations which may Lead to Resource Recovery, Recycling Reclamation, Direct Re-use or Alternative Uses
R1	Use as a fuel (other than in direct incineration) or other means to generate energy
R2	Solvent reclamation/regeneration
R3	Recycling/reclamation of organic substances which are not used as solvents
R4	Recycling/reclamation of metals and metal compounds
R5	Recycling/reclamation of other inorganic materials
R6	Regeneration of acids or bases
R7	Recovery of components used for pollution abatement
R8	Recovery of components from catalysts
R9	Used oil re-refining or other reuses of previously used oil
R10	Land treatment resulting in benefit to agriculture or ecological improvement
R11	Uses of residual materials obtained from any of the operations numbered R1-R10
R12	Exchange of wastes for submission to any of the operations numbered R1-R11
R13	Accumulation of material intended for any operation in

Note: Section B encompasses all such operations with respect to materials legally defined as or considered to be hazardous wastes and which otherwise would have been destined for operations included in Section A.

Table 6.12. Generator Requirements for the Competent Authority

The following information shall be provided by generators upon notifying Competent Authority of the need to export hazardous waste for disposal:

1. Reason for waste export
2. Exporter of the waste[1]
3. Generator(s) of the waste and site of generation[1]
4. Disposer of the waste and actual site of disposal[1]
5. Intended carrier(s) of the waste or their agents, if known[1]
6. Country of export of the waste
   Competent authority[2]
7. Expected countries of transit
   Competent authority[2]
8. Country of import of the waste
   Competent authority[2]
9. General or single notification
10. Projected date(s) of shipment(s) and period of time over which waste is to be exported and proposed itinerary (including point of entry and exit)[3]
11. Means of transport envisaged (road, rail, sea, air, inland waters)
12. Information relating to insurance[4]
13. Designation and physical description of the waste including Y number and UN number and its composition [5] and information on any special handling requirements including emergency provisions in case of accidents
14. Type of packaging envisaged (e.g. bulk, drummed, tanker)
15. Estimated quantity in weight/volume[6]
16. Process by which the waste is generated[7]
17. For wastes listed in Table 6.2, classifications from Table 6.1: hazardous characteristic, H number, and UN class
18. Method of disposal as per Table 6.11
19. Declaration by the generator and exporter that the information is correct
20. Information transmitted (including technical description of the plant) to the exporter or generator from the disposer of the waste upon which the latter has based his assessment that there was no reason to believe that the wastes will not be managed in an environmentally sound manner in accordance with the laws and regulations of the country of import
21. Information concerning the contract between the exporter and disposer.

Notes

[1] Full name and address, telephone, telex or telefax number and the name, address, telephone, telex or telefax number of the person to be contacted.

[2] Full name and address, telephone, telex or telefax number.

[3] In the case of a general notification covering several shipments, either the expected dates of each shipment or, if this is not known, the expected frequency of the shipments will be required.

[4] Information to be provided on relevant insurance requirements and how they are met by exporter, carrier and disposer.

[5] The nature and the concentration of the most hazardous components, in terms of toxicity and other dangers presented by the waste both in handling and in relation to the proposed disposal method.

[6] In the case of a general notification covering several shipments, both the estimated total quantity and the estimated quantities for each individual shipment will be required.

[7] Insofar as this is necessary to assess the hazard and determine the appropriateness of the proposed disposal operation.

Table 6.13. Information Requirements for Waste Disposal Outside Bahrain

For waste disposed outside of Bahrain, the following information shall be provided:

1. Exporter of the waste[1]
2. Generator(s) of the waste and site of generation[1]
3. Disposer of the waste and actual site of disposal[1]
4. Carrier(s) of the waste[1] or his agent(s)
5. Subject of general or single notification
6. The date the trans boundary movement started and date(s) and signature on receipt by each person who takes charge of the waste
7. Means of transport (road, rail, inland waterway, sea, air) including countries of export, transit and import, also point of entry and exit where these have been designated
8. General description of the waste (physical state, proper UN shipping name and class, UN number, Y number and H number as applicable)
9. Information on special handling requirements including emergency provision in case of accidents
10. Type and number of packages
11. Quantity in weight/volume
12. Declaration by the generator or exporter that the information is correct
13. Declaration by the generator or exporter indicating no objection from the competent authorities of all States concerned which are Parties
14. Certification by disposer of receipt at designated disposal facility and indication of method of disposal and of the approximate date of disposal.

Notes

The information required on the movement document shall where possible be integrated in one document with that required under transport rules. Where this is not possible the information should complement rather than duplicate that required under the transport rules. The movement document shall carry instructions as to who is to provide information and fill-out any form.

[1] Full name and address, telephone, telex or telefax number and the name, address, telephone, telex or telefax number of the person to be contacted in case of emergency.

CHAPTER 7

SOLID WASTE

7.1. SCOPE

This Chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated, and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4, "Pollution Prevention", and service solid waste management manuals. The criteria in this Chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are provided in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste Management," Chapter 11, "Pesticides," and Chapter 14, "Polychlorinated Biphenyls."

7.2. DEFINITIONS

7.2.1. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

7.2.2. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

7.2.3. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

7.2.4. Collection Frequency. The number of times collection is provided in a given period of time.

7.2.5. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes, that do not contain solvents or degreasing materials, oils, ink, sludge, acids, alkaline, or other non-household materials.

7.2.6. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

7.2.7. Construction and Demolition Waste. The waste building materials, packaging, and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures.

7.2.8. Curb Collection. Collection of solid waste placed adjacent to a street.

7.2.9. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

7.2.10. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

7.2.11. Disposal. Processes such as burial, treatment (biological, physical or chemical), permanent storage or incineration.

7.2.12. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

7.2.13. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

7.2.14. Generation. The act or process of producing solid waste.

7.2.15. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

7.2.16. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

7.2.17. Inert Waste. Chemically or biologically inactive materials in the natural environment including, but not limited to, glass, building debris, plastic parts, wood, rubber, wires or metal plates as well as uncontaminated soil free of plants.

7.2.18. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities, but not including medical waste as defined by Chapter 8.

7.2.19. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

7.2.20. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C (77°F) and atmospheric pressure.

7.2.21. Municipal Solid Waste (MSW). Normally, residential, institutional and commercial solid waste generated within a community, including food waste, but not including yard waste or hazardous waste as defined in Chapter 6, "Hazardous Waste." (See also definition in Chapter 2, "Air Emissions.")

7.2.22. Municipal Solid Waste Landfill (MSWLF) Unit. A discrete area of land or an excavation, on or off an installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. An MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

7.2.23. Open Burning. Burning of solid wastes in the open, such as in an open dump.

7.2.24. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

7.2.25. Residential Solid Waste. The wastes generated by normal household activities, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

7.2.26. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

7.2.27. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

7.2.28. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

7.2.29. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

7.2.30. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 91-8, Army TM 5-634, Solid Waste Management , or their successor documents.

7.2.31. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

7.2.32. Solid Wastes. Garbage, refuse, sludge, and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

7.2.33. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

7.2.34. Stationary Compactor. A powered machine that is designed to compact solid waste or recyclable materials and that remains stationary when in operation.

7.2.35. Storage. The interim containment of solid waste after generation and prior to collection for treatment, ultimate recovery or disposal.

7.2.36. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

7.2.37. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

7.2.38. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

7.2.39. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

7.3. CRITERIA

7.3.1. DoD solid wastes will be treated, stored, and disposed of in facilities that have been evaluated against paragraphs 7.3.12., 7.3.14., and 7.3.15. These evaluated facilities will be used to the maximum extent practical.

7.3.2. Installations will cooperate with Bahrain officials, to the extent possible, in the solid waste management planning process.

7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting, and waste minimization efforts.

7.3.4. All solid wastes or materials that have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled *and covered* to avoid spillage.

7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2, “Air Emissions,” or hazardous constituents as defined in Chapter 6, “Hazardous

Waste." Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 14, and 15 of this Guide.

7.3.6. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of this Guide, there will be provisions for storage in accordance with these guidelines that will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

7.3.7. Storage containers should be leak-proof, waterproof, and vermin-proof, including sides, seams and bottoms, and be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking, or deforming in a manner that would impair serviceability. Containers shall be made of either strengthened plastic, galvanized steel, or polyethylene bags and be large enough to collect and contain waste for a period of 24 hours. Storage containers should have functional lids.

7.3.8. Containers should be stored on a firm, level, well-drained surface that is large enough to accommodate all of the containers and that is maintained in a clean, spillage-free condition.

7.3.9. Recycling programs will be instituted on DoD installations in accordance with the policies in DODI 4715.4, "Pollution Prevention".

7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located, and only after justification that unique circumstances mandate a new unit. Consult the Lead Environmental Component (LEC) regarding the location of approved landfill sites.

7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

7.3.11.1. Location restrictions with regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, unstable areas;

7.3.11.2. Procedures for excluding hazardous waste;

7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions, and record keeping requirements; and

7.3.11.4. Inspection program.

7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with the LEC, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

7.3.12. Installations operating MSWLF units will:

7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day.

7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, PCBs, and wastes determined unsuitable for the specific MSWLF unit.

7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling.

7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation.

7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

7.3.12.10. Operate in an aesthetically acceptable manner.

7.3.12.11. Operate in a manner to protect aquifers.

7.3.12.12. Control public access to landfill facilities.

7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

7.3.12.14. Maintain records on the preceding criteria.

7.3.12.15. During closure and post-closure operations, installations will:

7.3.12.15.1. Install a final cover system that is designed to minimize infiltration and erosion.

7.3.12.15.2. Ensure that the infiltration layer is composed of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or a combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present, or a permeability no greater than .00005 cm/sec, whichever is less.

7.3.12.15.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earthen material that is capable of sustaining native plant growth.

7.3.12.15.4. If possible, re-vegetate the final cap with native plants that are compatible with the landfill design, including the liner.

7.3.12.15.5. Prepare a written Closure Plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, groundwater monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. The post-closure period will be a minimum of 5 years.

7.3.13. Open burning will not be the regular method of solid waste disposal. Where burning is the method, incinerators meeting air quality requirements of Chapter 2, "Air Emissions," will be used.

7.3.14. A composting facility that is located on a DoD installation and that processes annually > 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") will comply with the following criteria:

7.3.14.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge, and other materials, such as nutrient or bulking agents being composted, including the source and volume or weight of the material.

7.3.14.1.1. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

7.3.14.1.2. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically.

7.3.14.1.3. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system.

7.3.14.1.4. The temperature and retention time for the material being composted must be monitored and recorded.

7.3.14.1.5. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate, nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCBs.

7.3.14.1.6. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

7.3.14.1.6.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing to maintain aerobic conditions during the composting process; and

7.3.14.1.6.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55°C (131°F). A stabilization period of at least 7 days must follow the decomposition period.

7.3.15. Classification and Use of Compost From DoD Composting Facilities. Compost produced at a composting facility that is located on a DoD installation and that processes annually > 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

7.3.15.1. Class A compost must be stored until the compost is matured, i.e., 60 % decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated below. The compost must be stabilized and contain no greater amounts of inert material than indicated. Allowable average contaminant concentrations in milligrams per kilogram on a dry weight basis are:

PCB	1
Cadmium	10
Chromium	1,000
Copper	500
Lead	500
Mercury	5
Nickel	100
Zinc	1,000

7.3.15.2. Class B compost consists of any compost generated that fails to meet Class A standards.

7.3.15.3. Compost distribution and end use:

7.3.15.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

7.3.15.3.2. Class B compost may not be distributed for agricultural applications.

CHAPTER 8

MEDICAL WASTE

8.1. SCOPE

This Chapter contains criteria for the management of medical waste at medical, dental, research and development, and veterinary facilities generated in the diagnosis, treatment, or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This waste also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

8.2. DEFINITIONS

8.2.1. Infectious Agent. Any organism (such as a virus or bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

8.2.2. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitology laboratory.

8.2.3. Infectious Medical Waste. Solid waste produced by medical and dental treatment facilities, nursing, laboratories, research centers, veterinary clinics, and pharmaceutical factories and warehouses, that is specially managed because it has the potential for causing disease in humans and may pose a risk to both individuals or community health if not managed properly, and that includes the following classes:

8.2.3.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration, are known to cause disease in humans.

8.2.3.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Animal carcasses, body parts, blood, and bedding from contaminated animals are also included.

8.2.3.3. Human blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products, that are capable of releasing these materials during handling.

8.2.3.4. Potentially infectious materials, including human body fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

8.2.3.5. Sharps, including hypodermic needles, syringes, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste.

8.2.3.6. Infectious waste from isolation rooms, but only including those items that were contaminated or likely to have been contaminated with infectious agents or pathogens, including excretion exudates and discarded materials contaminated with blood.

8.2.3.7. Contagious, chemical or drug waste.

8.2.3.8. Medical waste contaminated with radioactive material.

8.2.4. Noninfectious Medical Waste. Solid waste created that does not require special management because it has been determined to be incapable of causing disease in humans or which has been treated to render it noninfectious.

8.2.5. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

8.2.6. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed.

8.2.7. Treatment Unit. A facility where the chemical, biological or physical properties of infectious hazardous waste are changed with the use of environmentally-sound technologies with the aim of reducing the hazards of such waste.

8.3. CRITERIA

8.3.1. Infectious medical waste will be separated, if practical, from other solid waste at the point of origin.

8.3.1.1. Medical waste shall be further separated within storage areas. Medical waste shall be segregated into the following categories on a daily basis prior to storage and transport:

8.3.1.1.1. Contagious/infectious waste

8.3.1.1.2. Sharp materials waste

8.3.1.1.3. Chemical drug waste including damaged and expired drugs

8.3.1.1.4. Chemical laboratory waste including chemicals used in laboratories

8.3.1.1.5. Bed item waste including bed-sheets, blankets, containers for receiving the patients secretions not infected with contagious diseases and their intestine waste

8.3.1.1.6. Mortuary and laboratory room waste including clothing, contaminated covers, petri dishes and containers used to deal with biological tissues and bacteria.

8.3.2. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M (Defense Materiel Disposition Manual) and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. DLA Disposition Services has no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

8.3.3. Solid waste that is classified as a hazardous waste in accordance with Appendix 1 will be managed in accordance with the criteria in Chapter 6, "Hazardous Waste."

8.3.4. Mixtures of other solid waste and infectious medical waste will be handled as infectious medical waste.

8.3.5. Radioactive medical waste will be managed in accordance with Service Directives.

8.3.6. Infectious medical waste will be segregated, transported, and stored in bags or receptacles a minimum of 3 mils thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use.

8.3.6.1. Medical waste shall not be left in bags and containers in the collection area for a period exceeding 24 hours before it is transported outside the health facility.

8.3.7. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and Arabic, and will include markings that identifies the generator, date of generation, and the contents. All medical waste types (Section 8.3.1.), including infectious medical waste, shall be labeled with suitable adhesive cards providing details of their contents, and the hazards associated with their contents. Contact the Lead Environmental Component (LEC) regarding label requirements.

8.3.8. Sharps will only be discarded into rigid receptacles. Needles will not be clipped, cut, bent, or recapped before disposal.

8.3.9. Medical waste will be transported and stored to minimize human exposure and protect the environment. Infectious medical waste, in particular, will not be placed in chutes or dumbwaiters. Consult the LEC regarding additional storage requirements.

8.3.10. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph 8.3.18. Containers holding sharps will not be compacted.

8.3.11. All anatomical pathology waste (i.e., large body parts) must be placed in containers lined with plastic bags that comply with paragraph C8.3.6., and may only be disposed of in a landfill or by burial in a designated area after being treated for disposal by incineration or cremation.

8.3.12. Blood, blood products, and other liquid infectious wastes will be handled as follows:

8.3.12.1. Bulk blood and blood products may be decanted into a sewer system connection (sinks, drains, etc.), unless pre-treatment is required. If pre-treatment is required, the methods contained in Table 8.1, "Treatment and Disposal Methods for Infectious Medical Waste," will be employed prior to discharge to the sewer system. The emptied containers will continue to be managed as infectious medical waste.

8.3.12.2. Suction canister waste from operating rooms will either be decanted into a clinical sink or will be sealed into leak-proof containers and incinerated.

8.3.13. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

8.3.14. If infectious medical waste cannot be treated on-site, it will be managed during storage as follows:

8.3.14.1. Infectious medical waste will be maintained in a nonputrescent state, using refrigeration as necessary.

8.3.14.2. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

8.3.15. Storage sites must be:

8.3.15.1. Specifically designated;

8.3.15.2. Constructed to prevent entry of insects, rodents, and other pests;

8.3.15.3. Prevent access by unauthorized personnel;

8.3.15.4. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and Arabic.

8.3.16. Generators shall abide by the following conditions prior to transporting medical waste off installation:

8.3.16.1. Ensure safety and soundness of all the bags and containers which contain medical waste. Bags and receptacles containing infectious medical waste, in particular, must be placed into rigid or semi-rigid, leak-proof containers before being transported off-site.

8.3.16.2. Adhesive labels shall be placed on the containers in accordance with Section 8.3.7.

8.3.16.3. Ensure that completed transportation form is turned over with waste to transporter.

8.3.16.4. Prior to waste being transported, ensure the transporter has the proper approval issued by the Competent Authority for transporting medical waste.

8.3.16.5. Ensure that the medical waste treatment unit has been approved by the Competent Authority. If the installation treats their own waste, contact the LEC for approval procedures.

8.3.17. Installations transporting medical waste off installation are required to obtain approval (Section 8.3.22.).

8.3.18. Infectious medical waste must be treated in accordance with Table 8.1, "Treatment and Disposal Methods for Infectious Medical Waste," and the following before disposal:

8.3.18.1. Sterilizers must maintain the temperature at 121℃ (250℉) for at least 30 minutes at 103.4 kPa (15 psi).

8.3.18.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips or an equivalent biological performance test.

8.3.18.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens and must meet applicable criteria in Chapter 2, "Air Emissions."

8.3.18.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6, "Hazardous Waste." Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

8.3.18.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

8.3.18.6. Waste Treatment Units. Installations operating their own waste treatment units for medical waste shall comply with the following requirements:

8.3.18.6.1. Treatment units shall refuse waste if the waste is:

8.3.18.6.1.1. From non-DoD carriers not approved by the Competent Authority

8.3.18.6.1.2. Not accompanied by a duly-completed and signed waste transport form from the producer and carrier or consignment's which do not conform with the details indicated in the form

8.3.18.6.1.3. Of a chemical nature that is not accompanied by their safety details (e.g. Material Safety Data Sheet)

8.3.18.6.2. Waste shall be over packed if the original bag or container is damaged and if temporary storage prior to treatment in the treatment unit is required.

8.3.18.6.3. Dispose of waste and sludge arising from the treatment process at authorized waste disposal sites. Contact the LEC to determine appropriate sites.

8.3.18.6.4. Measure the concentration of the following substances arising from the treatment process:

8.3.18.6.4.1. Emissions to air, on the dates determined by the LEC and according to the standards in Chapter 2, Air Emission

8.3.18.6.4.2. Concentration of contaminants in the industrial discharge water according to the discharge standards in Chapter 4, Wastewater

8.3.18.6.4.3. Concentration of contaminants in sludge and solid waste arising from the waste treatment process on the dates and according to the standards in the waste treatment unit approval, if applicable

8.3.18.6.5. Upon use of incineration technology in waste treatment, a treatment unit shall:

8.3.18.6.5.1. Ensure all chimney emissions to air are colorless and free from heavy smoke at all times

8.3.18.6.5.2. Prohibit the leakage of odors from the emissions produced by the chimney outside the boundaries of the incineration site

8.3.18.6.5.3. Ensure the levels of concentrations emitted into the air shall not exceed the standards in Chapter 2, Air Emissions

8.3.19. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

8.3.20. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

8.3.20.1. Response personnel must comply with paragraph 8.3.13.

8.3.20.2. Blood, body fluid, and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste.

8.3.20.3. Surfaces contacted by infectious medical waste must be washed with soap and water and chemically decontaminated in accordance with subparagraph C8.3.18.5.

8.3.21. Installations with waste management/treatment units will keep the following records of medical waste disposal for at least three years after the date of disposal:

8.3.21.1. A description of the type and quantity of each waste consignment received, including producer's name, carrier's name, date of hand-over and treatment date

8.3.21.2. A description of the waste produced from the treatment process, its quantity, method and location of disposal

8.3.21.3. Results of the measurements of the concentration of emissions in the air arising from the treatment process

8.3.21.4. Results of the analysis of concentration in sludge and solid waste arising from the treatment process

8.3.21.5. Results of the analysis of the concentration of contaminants in the discharge water arising from the treatment process and released into the sea

8.3.21.6. Waste transportation forms

8.3.22. Installations without waste management/ treatment units shall keep the following records for at least three years after the date of disposal:

8.3.22.1. Type of waste

8.3.22.2. Amount of waste (volume or weight) being transported outside the health facility, date of such transport, and waste carrier's name

8.3.22.3. Treatment, if any, including date of treatment

8.3.22.4. Name of treatment unit

8.3.22.5. Disposition, including date of disposition, and if the waste was transferred to Bahrain facilities, and receipts acknowledging subparagraphs 8.3.22.1. - 8.3.22.3. for each transfer

8.3.22.6. A dedicated register shall be submitted quarterly to the LEC

8.3.23. <u>Medical Waste Approval</u> Installations may require approval to operate a waste treatment unit or transport medical waste. Contact the LEC to determine approval requirements.

Table 8.1. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	Method of Treatment	Method of Disposal
Microbiological	[1] Steam sterilization	[2] Municipal solid waste landfill (MSWLF)
	Chemical disinfection	MSWLF
	Incineration	MSWLF
Pathological	[3] Incineration	MSWLF
	[3] Cremation	Burial
	[4] Chemical Sterilization	[5] Domestic wastewater treatment plant (DWTP)
	[4] Steam sterilization	DWTP
Bulk blood & suction canister waste	[6] Steam sterilization Chemical disinfection	DWTP
	[6] Incineration	MSWLF
Sharps in sharps containers	Steam sterilization	MSWLF
	Incineration	MSWLF

Notes

1. Preferred method for cultures and stocks because they can be treated at point of generation
2. See Chapter 7 for criteria for solid waste landfills.
3. Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.
4. This only applies to placentas, small organs and small body parts which may be steam sterilized or chemically sterilized, ground, and discharged to a domestic wastewater treatment plant.
5. See Chapter 4 for criteria for domestic wastewater treatment plants.
6. Bulk blood or suction canister waste known to be infectious must be treated by incineration or steam sterilization before disposal.

CHAPTER 9

PETROLEUM, OIL, AND LUBRICANTS

9.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 18, "Spill Prevention and Response Planning."

9.2. DEFINITIONS

9.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs, that are exempt from all criteria in Chapter 19, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 19 are counted toward the aggregate thresholds in subparagraph C9.2.7.2 below.

9.2.3. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

9.2.4. Loading/ Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

9.2.5. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

9.2.6. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

9.2.7. POL Facility. An installation with either:

9.2.7.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

9.2.7.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

9.2.7.3. A pipeline facility as identified in the "Pipeline Facility" description

9.2.8. POL Storage Container. POL containers with capacities > 208 liters (55 gallons) (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 19 are EXCLUDED from the definition of POL storage containers.

9.2.9. Used Oil. Any liquid or semi-solid material which contains entirely or partially metallic or manufactured hydrocarbon oils such as waste oil resulting from maintenance activities of vehicles, engines and other machinery or oil mixed with water produced from a facility or oil used for oiling such engines and other machinery where the original characteristics of oil has been changed during usage. In Bahrain, used oil is only considered hazardous waste if mixed with polychlorinated biphenyls (PCBs) or other hazardous substances (see Chapter 6, "Hazardous Waste.")

9.3. CRITERIA

9.3.1. Applicability. The below criteria, excluding the used oil criteria in Section 9.3.7, apply only at POL Facilities as defined in paragraph 9.2.7. Used oil criteria (9.3.7.) apply for all activities involving used oil.

9.3.2. General POL Storage Container Criteria

9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criteria for below ground storage containers.

9.3.2.3. Permeability. Permeability for containment areas will be a maximum of 10^{-7} cm/sec.

9.3.2.4. Containment Area Drainage. Drainage of stormwater from containment areas will be controlled by a valve that is locked closed when not in active use. Stormwater will be inspected for petroleum sheen before being drained from containment areas. If a petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, "Hazardous Waste."

9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

9.3.3. Additional POL Storage Container Criteria

9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices. Chapter 5, "Hazardous Material," includes additional storage design criteria for hazardous chemical substances such as POL.

9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

9.3.3.4. Additional storage criteria, such as labeling requirements, are included in Chapter 5, "Hazardous Material."

9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

9.3.4.1. POL container cleaning wastes (sludge and wash waters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

9.3.5. General Transport and Distribution Criteria

9.3.5.1. Loading/Unloading Racks and Areas

9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit. In addition, inspectors of the Competent Authority may request external and internal vehicle inspections (e.g., internal pressure levels). Bahrain inspector requests shall be coordinated through the LEC.

9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and/or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL, which reasonably could be expected to cause a sheen on waters of the host nation defined in Chapter 4, "Wastewater."

9.3.5.2. POL Pipeline Facilities

9.3.5.2.1. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

9.3.5.2.1.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies.

9.3.5.2.1.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

9.3.5.2.1.3. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

9.3.5.3. Additional Transport Requirements. Installations shall comply with the additional hazardous chemical transport requirements included in Section 5.3.12 of Chapter 5, "Hazardous Material" if the POL meets the definition of a hazardous chemical substance in Chapter 5.

9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; and the applicable contents of the facility Spill Plan.

9.3.7. Used Oil Management

9.3.7.1. Applicability. The criteria in this sub-paragraph shall apply to all activities which are entirely or partially linked with used oil, including its collection, transport and treatment.

9.3.7.2. Exceptions. Used oil--polychlorinated biphenyls (PCBs) mixtures and any other used oil if designated by the Competent Authority to be dangerous or unsuitable for recycling, are exempt from these requirements. See Chapter 6 for requirements regarding used oil-PCB.

9.3.7.3. Used Oil Generation. Generators of used oil shall comply with the following:

9.3.7.3.1. Soundness of drums/containers used in the transportation of used oil.

9.3.7.3.2. Consignments are accompanied by a transportation form.

9.3.7.3.3. Used oil is not mixed with transformer oil, flammable liquids or any other material which contains halogen-containing compounds or which has been identified specifically by the Competent Authority.

9.3.7.3.4. Used oil transporters and treatment units are approved by the Competent Authority. Approval requirements are the same as for hazardous waste. Installations shall refer to Section 6.3.13. of Chapter 6, "Hazardous Waste."

9.3.7.3.5. Compliance with transporter duties listed in Section 9.3.7.5. in the case of producer transporting their own used oil.

9.3.7.4. Used Oil Storage Criteria. Used oil shall be loaded into barrels or tankers and stored in designated areas.

9.3.7.5. Used Oil Transportation. Transportation of used oil shall comply with the following transportation requirements:

9.3.7.5.1. Transportation Forms. Used oil consignments shall be accompanied by completed transportation forms (from generators) at all times.

9.3.7.5.2. Used oil shall be packaged in accordance with the provisions of Section 9.3.7.4.

9.3.7.5.3. Used oil shall be kept in separate containers or drums and not mixed with other types of used oil or other substances.

9.3.7.5.4. Consignments shall be compatible with the details included in the transportation form prior to transport.

9.3.7.6. Used Oil Treatment.

9.3.7.6.1. Approval. Used oil treatment units shall submit the details and documents listed in Section 6.3.11. of Chapter 6, "Hazardous Waste," to the Competent Authority via the LEC along with their application for approval.

9.3.7.6.2. Treatment Requirements. Used oil treatment units shall comply with the following requirements:

9.3.7.6.2.1. Ensure that transportation forms signed by the generator accompanies consignments.

9.3.7.6.2.2. Measure the concentration of industrial discharge water arising from the treatment process every three months to ensure compliance with the standards included in Chapter 4, "Wastewater."

9.3.7.6.2.3. Record-keeping. Treatment units shall comply with the record-keeping requirements included in Section 6.3.11. of Chapter 6, "Hazardous Waste."

9.3.8. Approvals. Installations may require approval for the handling of POL classified as hazardous material (see Chapter 5) or hazardous waste (see Chapter 6). Contact the LEC to determine approval requirements.

Chapter 10

Pesticides

10.1. SCOPE

This chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and in Chapter 7, "Solid Waste."

10.2. DEFINITIONS

10.2.1. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides, and who have been formally certified in accordance with DoD 4150.7-M, "DoD Pest Management Training and Certification" (which accepts HN certification in appropriate circumstances).

10.2.2. Hazardous Chemical Substances. Any chemical material with reactive characteristics whether on its own or within a mixture or whether this material is in its original form or manufactured. Classification of hazardous chemical substances is in accordance with the following 8 UN hazard classes:

10.2.2.1. Explosives (Class 1)

10.2.2.2. Compressed or Liquefied Gases (Class 2)

10.2.2.3. Flammable Liquids (Class 3)

10.2.2.4. Flammable Solids (Class 4)

10.2.2.5. Oxidizing Agents (Class 5)

10.2.2.6. Toxic materials (Class 6)

10.2.2.7. Radioactive Materials (Class 7)

10.2.2.8. Corrosive Materials (Class 8)

10.2.3. Integrated Pest Management (IPM). A planned program, incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods, including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control and, where necessary, the judicious use of least-hazardous pesticides.

10.2.4. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the wellbeing of humans or animals; attack real property, supplies, equipment or vegetation; or are otherwise undesirable.

10.2.5. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities who provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

10.2.6. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

10.2.7. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

10.2.7.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or HN authority;

10.2.7.2. Any pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

10.2.7.3. Any material used to clean up a pesticide spill; or

10.2.7.4. Any containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are NOT considered hazardous waste, and can be disposed of as normal solid waste.

10.2.8. Registered Pesticide. A pesticide that has been registered and approved for sale or use within the United States and Bahrain.

10.3. CRITERIA

10.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1 "Pest Management Maintenance Report," or a computer-generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910-M, "DoD Procedures for Management of Information Requirements."

10.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

10.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

10.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

10.3.3.2. Arthropod skin and clothing repellents; and

10.3.3.3. Pesticides applied as part of an installation's self-help program.

10.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides. Local national personnel shall be monitored in coordination with an approved professional medical clinic.

10.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed. In addition, applicators shall also ensure the use of such equipment when handling chemical pesticides and provide services for its maintenance and cleaning.

10.3.6. Installations will only use registered pesticides that are on the list approved by the Armed Forces Pest Management Board (AFPMB) that have Bahraini approved equivalents (i.e., same manufacturer and same formulations), or Bahraini registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan.

10.3.7. Pesticides will be included in the installation spill contingency plan. (See Chapter 18, "Spill Prevention and Response Planning.")

10.3.8. Pest management facilities, including mixing and storage areas, will comply with AFPMB Technical Guide 17 "Military Handbook Design of Pest Management Facilities" and with relevant requirements included in Chapter 5 of this Guide which shall apply for the handling and use of chemical pesticides in Bahrain.

10.3.9. All pesticide applications will be in accordance with guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If foreign nationals will be using the pesticides, the precautionary messages and use instructions will be in English and in Arabic. Chemical pesticide labels shall additionally comply with the labeling requirements for hazardous chemical substances which are included in Chapter 5 of this Guide.

10.3.10. MSDSs and labels for all pesticides will be available at the storage and holding facility, in accordance with Chapter 5 of this Guide, "Hazardous Material."

10.3.11. Pesticide storage areas will contain a readily-visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

10.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below:

10.3.12.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6 of this Guide.

10.3.12.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of this Guide.

10.3.12.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through DLA-DS, as a solid waste. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

CHAPTER 11

HISTORIC & CULTURAL RESOURCES

11.1. SCOPE

This Chapter contains criteria for required plans and programs needed to ensure proper protection and management of cultural resources, such as properties on the World Heritage List or on the Bahraini list equivalent to the U.S. National Register of Historic Places.

11.2. DEFINITIONS

11.2.1. Adverse Effect. Changes that diminish the quality or significant value of historic or cultural resources.

11.2.2. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal remains, or any portion of any of the foregoing items.

11.2.3. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

11.2.3.1. Limiting the magnitude of the action

11.2.3.2. Relocating the action in whole or in part

11.2.3.3. Repairing, rehabilitating, or restoring the affected resources, affected property; and

11.2.3.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered

11.2.4. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

11.2.5. Historic or Cultural Resources. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object, and also includes natural resources (plants, animals, landscape features, etc.) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or the Bahraini equivalent of the National Register of Historic Places. Bahraini lists of properties should be evaluated to determine if they are equivalent with the National Register of Historic Places prior to application.

11.2.6. Inventory. To determine the location of historic and cultural resources that may have world, national, or local significance.

11.2.7. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

11.2.7.1. Surface or subsurface structures

11.2.7.2. Surface or subsurface artifact concentrations or scatters

11.2.7.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments

11.2.7.4. By-products, waste products, or debris resulting from manufacture or use

11.2.7.5. Organic waste

11.2.7.6. Human remains

11.2.7.7. Rock carvings, rock paintings, and intaglios

11.2.7.8. Rock shelters and caves

11.2.7.9. All portions of shipwrecks; or

11.2.7.10. Any portion or piece of any of the foregoing

11.2.8. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

11.2.9. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack, or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

11.3. CRITERIA

11.3.1. U.S. installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on Bahrain's equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

11.3.2. Installations shall have access to the World Heritage List and the Bahraini equivalent of the National Register of Historic Places. Contact the LEC for Bahraini equivalent.

11.3.3. U.S. installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resources management.

11.3.4. Installations shall, after coordination with the Bahraini installation commander or similar appropriate Bahraini authorities, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

11.3.5. Installations shall, after coordination with the Bahraini installation commander or similar appropriate Bahraini authorities, and if financially and otherwise practical:

11.3.5.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

11.3.5.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

11.3.5.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

11.3.6. U.S. installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the host nation.

11.3.7. U.S. Installation Commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

11.3.7.1. Installations shall submit an application for the evaluation of the environmental impact of a major action to the Lead Environmental Component (LEC). If required, the LEC will notify the installation whether an environmental evaluation impact report and environmental approval is required. The installation should obtain environmental approval, if required, through the LEC, and should also consult the LEC prior to conducting environmental evaluations. Installations shall employ specialized consulting firms approved by the Competent Authority, or those with sufficient experience in the field of specialization as supported by relevant documentation, to conduct studies and analyses as part of the environmental evaluation impact report.

11.3.7.2. Approved installations shall maintain a register listing the effects of major actions on the environment for a period of ten years. Bahraini inspector requests to examine these registers should be coordinated through the LEC.

11.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the Bahraini installation commander or similar appropriate Bahraini authorities.

11.3.8.1. Consult the LEC prior to providing information to the Bahraini Base Commander/Competent Authority.

Chapter 12

Natural Resources and Endangered Species

12.1. SCOPE

This Chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the U.S. or Bahrain governments.

12.2. DEFINITIONS

12.2.1. Adverse Effect. Changes that diminish the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance, and fitness.

12.2.2. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

12.2.3. Bahrain-Protected Species. Any species of flora or fauna listed or designated by Bahrain, because continued existence of the species is, or is likely to be, threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

12.2.4. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

12.2.5. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

12.2.6. Natural Resources Management. Actions taken that combine science, economics, and policy, to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

12.2.7. Significant Land or Water Area. Land or water area that is normally 202 hectares (500 acres) or more outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

12.2.8. Threatened and Endangered Species. Any species of fauna or flora, listed in Table 12.1. This also includes any species of fauna or flora listed on an equivalent Bahrain protected species list.

12.3. CRITERIA

12.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and Bahrain-protected species and their habitat.

12.3.2. Installations shall maintain, or have access to, Table 12.1, "Select Endangered and Threatened Species," as well as a current list of Bahrain-protected species, if applicable, and Table 13.2, "List of Bahrain Protected Areas."

12.3.3. Installations with significant land or water areas shall, after coordination with the Bahrain installation commander or-LEC, develop natural resources management plans.

12.3.4. Installations with natural resources management plans shall, after coordination with the Bahrain installation commander or LEC, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

12.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or Bahrain-protected species, or support Bahrain surveys.

12.3.4.2. Implement natural resources management plans

12.3.5. An environmental evaluation impact report and approval may be required for certain types of projects. Consult the LEC regarding project approval requirements. Only approved specialized consulting firms shall be utilized to conduct studies and analyses as part of an environmental evaluation impact report. Installations shall maintain environmental evaluation impact reports for ten years.

12.3.6. The LEC and Bahrain installation commander or, if there is no Bahrain installation commander, the U.S. Ambassador will be notified of the discovery of any endangered or threatened species and Bahrain-protected species not previously known to be present on the installation.

12.3.7. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent Bahrain facilities where practical.

12.3.8. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, Bahraini -protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

12.3.9. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna.

12.3.10. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

12.3.11. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

Table 12.1. Select Endangered & Threatened Species

Common Name	Scientific Name	OCONUS Country of Listing
FAUNA		
Mammals		
Cheetah	*Acinonyx jubatus*	Africa to India
Dugong	*Dugong dugon*	East Africa to southern Japan, including U.S.A. (Trust Territories)
Gazelle, sand	*Gazella subgutturosa marica*	Jordan, Arabian Peninsula
Gazelle, Saudi Arabian	*Gazella dorcas saudiya*	Israel, Iraq, Jordan, Syria, Arabian Peninsula
Oryx, Arabian	*Oryx, leucoryx*	Arabian Peninsula
Dolphin	*Not specified*	Bahrain
Birds		
Bulbul, White-Cheeked	*Pycnonotus leucogenys*	Bahrain
Bustards, Houbara	*Chlamydotis undulate*	Bahrain
Falcon, Eurasian peregrine	*Falco peregrinus peregrinus*	Europe, Eurasia south to Africa and Mideast
Ibis, northern bald	*Geronticus eremita*	Southern Europe
Reptiles		
Crocodile, Nile	*Crocodylus niloticus*	Africa, Middle East
Monitor, desert	*Varanus griseus*	North Africa to Aral Sea, through Central Asia to Pakistan, Northwest India
Sea turtle, green	*Chelonia mydas*	circumglobal in tropical and temperate seas and oceans
Sea turtle, loggerhead	*Caretta caretta*	Circumglobal in tropical and temperate seas and oceans
Sea turtle, olive ridley	*Lepidochelys olivacea*	Circumglobal in tropical and temperate seas
Crustaceans		
Shrimp	Not specified	Bahrain
Lobster	Not specified	Bahrain
Fish		
Rabbit Fish	*Siganus (genus)*	Bahrain
FLORA		
Palm tree	Not specified	Bahrain

Note: This table does not include a complete list of Bahraini-designated threatened and endangered species. The Competent Authority shall be consulted as needed regarding the determination of additional threatened, protected or endangered species in Bahrain.

Table 12.2. List of Bahrain Protected Areas

Protected Area	**Area Type**
Hawar islands and waters	Archipelago
Toubli Bay	Inshore coastal area
Al Areen Wildlife Park and Reserve	Terrestrial protected area
Mashtan Island	Offshore island
Douha Araad	Sheltered bay

Chapter 13

Polychlorinated Biphenyls

13.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage, and disposal of polychlorinated biphenyls (PCB). These criteria include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers, and cables.

13.2. DEFINITIONS

13.2.1. Capacitor - A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

13.2.2. Chemical Waste Landfill - A landfill at which a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.

13.2.3. Hazardous Chemical Substances - Any chemical material with reactive characteristics whether on its own or within a mixture or whether this material is in its original form or manufactured. Classification of hazardous chemical substances is in accordance with the following 8 UN hazard classes:

13.2.3.1. Explosives (Class 1)

13.2.3.2. Compressed or Liquefied Gases (Class 2)

13.2.3.3. Flammable Liquids (Class 3)

13.2.3.4. Flammable Solids (Class 4)

13.2.3.5. Oxidizing Agents (Class 5)

13.2.3.6. Toxic materials (Class 6)

13.2.3.7. Radioactive Materials (Class 7)

13.2.3.8. Corrosive Materials (Class 8)

13.2.4. In or Near Commercial Buildings - Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters (98.43 feet) of a non-industrial, non-substation building.

13.2.5. Incinerator - An engineered device using controlled-flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.

13.2.6. Leak or Leaking - Any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

13.2.7. Mark - The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to this Guide.

13.2.8. Marked - PCB items and PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

13.2.9. Non-PCB Transformers - Any transformer that contains < 50 ppm PCB.

13.2.10. PCB Article - Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

13.2.11. PCB Article Container - Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.

13.2.12. PCB Container - Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.

13.2.13. PCB-Contaminated Electrical Equipment - Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain 50 ppm or greater PCB, but < 500 ppm PCB.

13.2.14. PCB Equipment - Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

13.2.15. PCB Item - Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of 50 ppm or greater.

13.2.16. PCB Transformer - Any transformer that contains 500 ppm PCB or greater.

13.2.17. Restricted Access Area - Areas where access by unauthorized personnel is controlled by fences, other man-made structures, or naturally occurring barriers such as mountains, cliffs, or rough terrain.

13.2.18. Substantial Contact Area - An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

13.2.19. PCB Large High Voltage Capacitor - A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at 2,000 volts (alternating current (ac) or direct current (dc)) or above.

13.2.20. PCB Large Low Voltage Capacitor - A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates below 2,000 volts (ac or dc).

13.3. CRITERIA

13.3.1. General

13.3.1.1. The installation spill contingency plan will address PCB items, including temporary storage items. Chapter 18, "Spill Prevention and Response Planning," provides criteria on how to prepare these plans.

13.3.1.2. Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up in accordance with the following:

13.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms (μg) per 100 square centimeters (cm^2).

13.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 μg per 100 cm^2.

13.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing < 1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling, and a reference to any reports documenting the site conditions.

13.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of *25.4 cm* (10 inches) or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing < 1 ppm PCBs.

13.3.1.3. All PCB transformers, PCB large high voltage capacitors, PCB containers, and certain PCB items containing PCBs at concentrations 50 ppm or greater (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and Arabic. The marking must identify the item as containing

PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criteria also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. Storage containers for PCB-contaminated oil shall comply with container requirements included in Chapter 6, "Hazardous Wastes" as PCB-contaminated oil is considered to be hazardous waste. In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB large low voltage capacitors and equipment containing a PCB transformer or PCB large high voltage capacitor.

13.3.1.4. Each installation having PCB items will maintain a written inventory that includes a current list by type of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of for that year. Inventory records should be maintained for a period of time at least 3 years after disposal of the last item on the list.

13.3.1.5. Disposal of PCB items will only be through the servicing DLA-DS in accordance with DoD 4160.21-M, "Defense Demilitarization Manual" or paragraph 13.3.5 of this Guide.

13.3.1.6. All periodic inspections as required in this Chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for three years after disposal of the transformer.

13.3.2. PCB Transformers (500 ppm PCB or greater)

13.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

13.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

13.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

13.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed one year.

13.3.2.5. PCB transformers will be serviced as follows:

13.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing < 500 ppm PCB;

13.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

13.3.2.5.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of in accordance with paragraph 14.3.5;

13.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

13.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing < 500 ppm PCBs that are mixed with fluids containing ≥ 500 ppm PCBs will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be > 500 ppm PCBs; and

13.3.2.5.6. Dielectric fluids containing ≥ 500 ppm PCBs will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

13.3.2.6. All in-service PCB transformers (> 500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100 % of dielectric fluid or PCB transformers tested and found to contain < 60,000 ppm PCBs will be inspected at least every 12 months.

13.3.2.7. If any PCB transformer is involved in a fire and was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and treated if required.

13.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

13.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

13.3.3. <u>Other PCB Items</u>

13.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

13.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing < 500 ppm PCB;

13.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of ≥ 500 ppm that requires the removal and rework of the internal components is prohibited;

13.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

13.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of 500 ppm or greater will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

13.3.3.1.5. Dielectric fluids containing ≥ 500 ppm will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

13.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

13.3.3.2.1. Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors that pose an exposure risk to food or feed is prohibited;

13.3.3.2.2. Use of PCB large high-voltage and PCB large low-voltage capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have an adequate roof, walls, and floor to contain any release of PCBs; and

13.3.3.3. Any PCB item removed from service will be marked with the date it is removed from service.

13.3.4. Storage

13.3.4.1. PCBs and PCB items at concentrations ≥ 50 ppm that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

13.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

13.3.4.1.2. A containment berm, at least 15.24 cm (6 inches) high, sufficient to contain twice the internal volume of the largest PCB article, or 25 % of the total internal volume of all PCB articles or containers stored, whichever is greater;

13.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines, or other openings constructed to prevent any release from the bermed area;

13.3.4.1.4. Continuous, smooth, and impervious flooring material; and

13.3.4.1.5. To the maximum extent possible, a new PCB storage area will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where there is a high possibility of such risks, the installation spill prevention and control plan will address the risk.

13.3.4.1.6. Compliance with additional hazardous chemical storage requirements (see Chapter 5).

13.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

13.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

13.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

13.3.4.2.3. PCB containers in which non-liquid PCBs have been placed; and

13.3.4.2.4. PCB containers in which PCBs at a concentration between 50-499 ppm have been placed, and whose containers are marked to indicate there is < 500 ppm PCB.

13.3.4.3. Non-leaking and structurally undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting the criteria of paragraph 14.3.4. if they are inspected weekly.

13.3.4.4. All other PCB storage areas will be inspected at least monthly.

13.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing DLA-DS. In addition, PCB storage containers shall also comply with the criteria for hazardous chemical substance containers included in Chapter 5 of this guide.

13.3.5. Disposal. PCB wastes are considered to be hazardous waste and shall be disposed of in accordance with the requirements of Chapter 6, "Hazardous Waste." In addition, installations shall also comply with the following disposal requirements for specific PCB waste products:

13.3.5.1. Installations that generate PCB waste of ≥ 50 ppm PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, "Hazardous Waste." Installations will coordinate with the LEC to obtain host nation concurrence for in-country PCB disposal as for HW disposal.

13.3.5.2. PCB-contaminated dielectric fluid with concentrations > 500 ppm will only be disposed in an incinerator with 99.9 % combustion efficiency.

13.3.5.3. PCB-contaminated dielectric fluid with concentrations ≥ 50 ppm, but < 500 ppm, will only be disposed as follows:

13.3.5.3.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.3.2. In a high-efficiency boiler that is rated at a minimum of 14.65 W (50 MBtu/hr) and is fueled by natural gas, oil, or coal.

13.3.5.4. Rags, soil, and other debris with PCBs at concentrations of $\geq$ 50 ppm will be disposed of:

13.3.5.4.1. In an incinerator with 99.9 %combustion efficiency; or

13.3.5.4.2. In a chemical waste landfill.

13.3.5.5. PCB transformers will be disposed of:

13.3.5.5.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.5.2. In a chemical waste landfill, provided the transformers, and all their inner workings, are first drained of all free-flowing liquids.

13.3.5.6. PCB capacitors will be disposed of as follows:

13.3.5.6.1. PCB capacitors will be disposed of in an incinerator with 99.9 % combustion efficiency, except,

13.3.5.6.2. Intact non-leaking small PCB capacitors may be disposed of in a solid waste landfill unless large quantities (more than 45.36 kg (100 pounds)) are identified at the same time.

13.3.5.7. PCB hydraulic machines containing PCBs may be disposed of as municipal solid waste if:

13.3.5.7.1. The machines containing PCBs at concentrations of 50 ppm or greater are drained of all free-flowing liquid.

13.3.5.7.2. The machines containing PCB liquid of $\geq$1,000 ppm are flushed prior to disposal with a solvent containing < 50 ppm PCB.

13.3.5.8. PCB-contaminated electrical equipment, except capacitors, will be disposed of as municipal solid waste only after draining all free-flowing liquid.

13.3.5.9. PCB articles, other than those already described, will be disposed of:

13.3.5.9.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.9.2. In a chemical waste landfill, provided the articles are first drained of all free-flowing liquids.

13.3.5.10. PCB containers with concentrations of $\geq$ 500 ppm may be disposed of:

13.3.5.10.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.10.2. In a chemical waste landfill, provided the containers are first drained of all free-flowing liquids.

13.3.5.11. Where PCB fluids, items, or articles are disposed of in a high-temperature boiler, the following procedures will be followed:

13.3.5.11.1. The boiler must be rated at a minimum of 14.65 MW hours (50 million BTU hours);

13.3.5.11.2. If the boiler uses natural gas or oil as the primary fuel, the carbon monoxide concentration in the stack must be ≤ 50 ppm and the excess oxygen is at least 3 % when PCBs are being burned;

13.3.5.11.3. If the boiler uses coal as the primary fuel, the carbon monoxide concentration in the stack is ≤ 100 ppm and the excess oxygen is at least 3 % when PCBs are being burned;

13.3.5.11.4. The mineral oil dielectric fluid does not comprise more than 10 %, by volume, of the total fuel feed rate;

13.3.5.11.5. The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start up or shut down operations;

13.3.5.11.6. The performance of the boiler is continuously monitored for carbon monoxide and excess oxygen percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning < 112,500 liters (30,000 gallons) of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes;

13.3.5.11.7. The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes; and

13.3.5.11.8. The flow of mineral oil dielectric fluid is stopped if the criteria respecting carbon monoxide or excess oxygen are exceeded.

13.3.5.12. Where PCB fluids, items or articles are disposed of in an incinerator, the following procedures will be followed:

13.3.5.12.1. Combustion criteria shall maintain the introduced liquids for a 2-second dwell time at 1,200°C, plus or minus 100°C (2,200°F +/- 212°F), and 3 % excess oxygen in the stack gas or maintenance of the introduced liquids for a 1-1/2 second dwell time at 1,600°C, plus or minus 100°C (3,050°F +/- 212°F) and 2 % excess oxygen in the stack gas;

13.3.5.12.2. Combustion efficiency, measured by the ratio of the concentration of carbon dioxide to the total concentration of both carbon dioxide and carbon monoxide, will be maintained at least 99.9 %;

13.3.5.12.3. The rate and quantity of PCBs that are fed to the combustion system shall be measured and recorded at regular intervals not > 15 minutes;

13.3.5.12.4. The temperatures of the incineration process shall be continuously measured and recorded;

13.3.5.12.5. The flow of PCBs to the incinerator shall stop automatically if temperature criteria are not met;

13.3.5.12.6. Monitoring is conducted sufficient to determine that an incinerator to be used for disposal the first time will operate within the criteria above; and

13.3.5.12.7. Continuous monitoring is conducted during incineration of PCBs for oxygen and carbon monoxide and periodic monitoring for carbon dioxide.

13.3.5.13. PCB containers used to contain only PCBs at a concentration < 500 ppm may be disposed of as municipal solid waste only after draining all free-flowing liquid.

13.3.5.14. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the United States will be returned to the United States for delivery to a permitted disposal facility if host country or third country disposal is not possible, is prohibited, or would not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with criteria in subparagraph 13.3.1.3.

13.3.6. Elimination of PCB Products

13.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

13.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

13.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs (< 2 ppm) at the time of shipment.

13.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

Chapter 14

Asbestos

14.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1, "DoD Safety and Occupational Health (SOH) Program" and DoDI 6055.5, "Industrial Hygiene and Occupational Health" and concomitant service instructions.

14.2. DEFINITIONS

14.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions coming from ACM are observed, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

14.2.2. Asbestos. Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated and/or altered.

14.2.3. Asbestos-Containing Material (ACM). Any material containing > 1% asbestos by weight.

14.2.4. Friable Asbestos. Any material containing > 1% asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

14.2.5. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing > 1% asbestos.

14.2.6. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing > 1% asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

14.2.7. Regulated ACM. Means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

14.3. CRITERIA. Installations shall contact the LEC to determine approval requirements for activities involving the handling, removal or disturbance of asbestos.

14.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

14.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

14.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

14.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

14.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

14.3.2.4. Work control/permit systems to control activities that might disturb ACM including;

14.3.2.4.1. Work Control. Barriers and/or markers to warn personnel of asbestos areas and preventing unauthorized access.

14.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM such as daily maintenance of equipment and materials to clear asbestos particles and dust;

14.3.2.6. Record keeping to document O&M activities related to asbestos identification management and abatement;

14.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

14.3.2.8. Procedures to assess and prioritize identified hazards for abatement; and

14.3.2.9. Procedures to prevent the use of ACM in new construction.

14.3.2.10. Requirement for importers to provide customs with a certificate proving the asbestos-free nature of their products, if required and if importing suspect asbestos-containing materials.

14.3.3. Prior to demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

14.3.4. Prior to demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

14.3.5. Installations will remove friable ACM when the ACM poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

14.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all regulated ACM.

14.3.7. When disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leak-proof container, and properly dispose of it in an MSWLF as defined in Chapter 7, "Solid Waste." Containers will be labeled in English and Arabic: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD." Permanent records documenting the disposal action and site will be maintained. Asbestos dust and fiber waste are considered to be hazardous wastes and shall be disposed of in accordance with the provisions in Chapter 6 of this Guide.

14.3.8. DoD schools will comply with applicable requirements of 15 U.S.C. 2643(l) and implementing regulations in 40 CFR Part 763, Subpart E, "Asbestos-Containing Materials in Schools."

CHAPTER 15

LEAD-BASED PAINT

15.1. SCOPE

This Chapter contains criteria to establish and implement a lead hazard management program to identify, control, or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from lead exposure, refer to DoDI 6055.1, "DoD Safety and Occupational Health", DoDI 6055.5, "Industrial Hygiene and Occupational Health", and concomitant service instructions.

15.2. DEFINITIONS

15.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

15.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

15.2.3. Bare Soil. Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

15.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least two different days within any week, provided that each days' visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.

15.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exist in a facility frequented by children under the age of 6.

15.2.6. Deteriorated Paint. Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking, or is otherwise damaged or separated from the substrate.

15.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 μg/dl (micrograms of lead per deciliter) for a single test, or 15-19 μg/dl in two tests taken at least 3 months apart.

15.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

15.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

15.2.10. Evaluation. A visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, lead-based paint, or a lead-based paint hazard.

15.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

15.2.12. Hazardous Chemical Substances. Any chemical material with reactive characteristics whether on its own or within a mixture or whether this material is in its original form or manufactured. Classification of hazardous chemical substances is in accordance with the following 8 UN hazard classes:

15.2.12.1. Explosives (Class 1)

15.2.12.2. Compressed or Liquefied Gases (Class 2)

15.2.12.3. Flammable Liquids (Class 3)

15.2.12.4. Flammable Solids (Class 4)

15.2.12.5. Oxidizing Agents (Class 5)

15.2.12.6. Toxic materials (Class 6)

15.2.12.7. Radioactive Materials (Class 7)

15.2.12.8. Corrosive Materials (Class 8)

15.2.13. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through various methods, including interim controls or abatement or a combination of the two.

15.2.14. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

15.2.15. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.

15.2.16. Lead-Based Paint. Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per cm^2, or 0.5 % by weight or 5,000 ppm by weight.

15.2.17. Lead-Based Paint Hazard includes paint-lead-hazard, dust-lead hazard or soil-lead hazard as identified below:

15.2.17.1. Paint-lead hazard. A paint-lead hazard is any of the following:

15.2.17.1. Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill, or floor) are equal to or greater than the dust-lead hazard levels identified in the definition for dust-lead hazard (previously defined as lead-contaminated dust) – see below.

15.2.17.2. Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe).

15.2.17.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

15.2.17.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

15.2.17.2. Dust-lead hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

15.2.17.3. Soil-lead hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm ($\mu g/g$) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

15.2.18. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint, and the provision of a report explaining the results of the investigation.

15.2.19. Permanent. An expected design life of at least 20 years.

15.2.20. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

15.2.21. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

15.2.22. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

15.2.23. Risk Assessment Screen. A sampling protocol that is used in dwellings that are in relatively good condition and where the probability of finding lead-based hazards are low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.

15.3. CRITERIA

15.3.1. Installations will:

15.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

15.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement. In addition, new projects or major alterations to existing projects which involve lead-based paints will utilize the best available technology to prevent or control pollution to reduce the risk of environmental deterioration.

15.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

15.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 $\mu g/ft_2$ for floors, >125 $\mu g/ft^2$ for interior window sills, a lead-based paint risk assessment should be performed.

15.3.1.3.2. Lead-based paint risk assessments.

15.3.1.3.3. Routine facility inspection for fire and safety.

15.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

15.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

15.3.1.3.6. Lead-based paint reevaluations.

15.3.1.3.7. Review of construction, painting, and maintenance histories.

15.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

15.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-based paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

15.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

15.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, "Hazardous Waste," paragraph 6.2.5.

CHAPTER 16

SPILL PREVENTION AND RESPONSE PLANNING

16.1. SCOPE

This Chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8 (Environmental Remediation for DoD Activities Overseas).

16.2. DEFINITIONS

16.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

16.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

16.2.3. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in Appendix 1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

16.2.3.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

16.2.3.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

16.2.3.3. Classification of hazardous substances is in accordance with the following hazard classes:

16.2.3.3.1. Explosives (Class 1)

16.2.3.3.2. Compressed or Liquefied Gases (Class 2)

16.2.3.3.3. Flammable Liquids (Class 3)

16.2.3.3.4. Flammable Solids (Class 4)

16.2.3.3.5. Oxidizing Agents (Class 5)

16.2.3.3.6. Toxic Materials (Class 6)

16.2.3.3.7. Radioactive Materials (Class 7)

16.2.3.3.8. Corrosive Materials (Class 8)

16.2.4. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

16.2.5. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

16.2.6. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

16.2.7. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

16.2.8. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

16.2.8.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP 1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

16.2.8.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 400 liters (110 gallons);

16.2.8.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

16.2.8.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

16.2.8.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

16.2.9. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

16.3. CRITERIA

16.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT with an updated copy available in close proximity to, but not in, the storage areas, in the case of hazardous chemical substance spill.

16.3.1.1. The plan will be updated at least every 5 years or:

16.3.1.1.1. Within 6 months of any significant changes to operations.

16.3.1.1.2. When there have been two significant spills to navigable waters in any 12-month period;

16.3.1.1.3. When there has been a spill of 3,785 liters (1,000 gallons) or greater.

16.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification. The plan shall be submitted to the LEC who shall determine requirement to provide to Bahrain authorities.

16.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

16.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate.

16.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in subparagraph 18.3.2.3, critical water resources, land uses, and possible migration pathways.

16.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure and the types of dangers associated with hazardous chemical substances in every part of the storage site.

16.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in subparagraph 18.3.2.3. A list of locations of the hazardous chemical substances, along with their associated dangers, shall also be provided.

16.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of nondestructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

16.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," subparagraph 9.3.2.5.

16.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

16.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

16.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground storage tanks, pesticides, and PCBs provide specific criteria for containment structure requirements.

16.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

16.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

16.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

16.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

16.3.2.14. Written procedures for:

16.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

16.3.2.14.2. Inspections; and

16.3.2.14.3. Record keeping requirements.

16.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

16.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and to provide assistance to other agencies when requested. At a minimum, this section of the plan will contain:

16.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills.

16.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered.

16.3.3.3. The responsibilities, composition, and training requirements of the FRT.

16.3.3.4. The command structure that will be established to manage a worst case discharge. Include an organization chart and the responsibilities and composition of the organization.

16.3.3.5. Procedures for FRT alert and response to include provisions for:

16.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill.

16.3.3.5.2. Public affairs involvement.

16.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours.

16.3.3.7. The plan will provide for notification of the FIC, installation commander, and local authorities in the event of hazard to human health or environment.

16.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers.

16.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills.

16.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill.

16.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation.

16.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation.

16.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations.

16.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions.

16.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

16.3.4. Reporting Section. The reporting section of the spill plan will address the following:

16.3.4.1. Recordkeeping when emergency procedures are invoked.

16.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill.

16.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency and the LEC and submit a follow-up written report when:

16.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

16.3.4.3.2. The spill exceeds 400 liters (110 gallons) of POLs;

16.3.4.3.3. A water resource has been polluted; or

16.3.4.3.4. The FIC has determined that the spill is significant.

16.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local Bahraini drinking water resource, the appropriate in-theater component commander and/or Defense Agency, EEA, and Bahraini Authorities will be notified immediately.

16.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in subparagraph 16.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

16.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment.

16.3.6. After completion of the initial response, any remaining free product and/or obviously contaminated soil will be appropriately removed and managed. Further action will be governed by DoDI 4715.8, "Environmental Remediation for DoD Activities Overseas." Remains from container contents or any leaking materials belonging to one of the categories in Table 6.2 of Chapter 6, "Hazardous Waste", shall be handled as hazardous waste.

CHAPTER 17

UNDERGROUND STORAGE TANKS

17.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in underground storage tanks (USTs). Standards for USTs containing hazardous wastes are covered in Chapter 6, "Hazardous Waste." Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, "Petroleum, Oil, and Lubricants."

17.2. DEFINITIONS

17.2.1. POL. Refined petroleum, oils, and lubricants.

17.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, "Hazardous Material." The term does not include:

17.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

17.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

17.2.3. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

17.2.4. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, > 416 liters (110 gallons) that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10 % or more beneath the surface of the ground, but does not include:

17.2.4.1. Tanks containing heating oil used for consumption on the premises where it is stored;

17.2.4.2. Septic tanks;

17.2.4.3. Stormwater or wastewater collection systems;

17.2.4.4. Flow through process tanks;

17.2.4.5. Surface impoundments, pits, ponds, or lagoons;

17.2.4.6. Field constructed tanks;

17.2.4.7. Hydrant fueling systems;

17.2.4.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

17.2.4.9. UST containing de minimis concentrations of regulated substances, except where subparagraph 17.3.2.7. is applicable; and

17.2.4.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

17.2.5. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

17.2.6. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

17.2.6.1. A hydrant fuel distribution system; or

17.2.6. 2. A field-constructed tank.

17.3. CRITERIA

17.3.1. All installations will maintain a UST inventory.

17.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

17.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

17.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fill pipe. Overfill prevention will be provided by one of the following methods:

17.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity).

17.3.2.2.2. High level alarm (set at 90% of tank capacity).

17.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or 1% of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

17.3.2.3.1. USTs will use at least one of the following leak detection methods:

17.3.2.3.1.1. Automatic tank gauging;

17.3.2.3.1.2. Vapor monitoring;

17.3.2.3.1.3. Groundwater monitoring; or

17.3.2.3.1.4. Interstitial monitoring.

17.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

17.3.2.3.3. Suction piping will either have a line tightness test conducted every three years or use monthly monitoring.

17.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

17.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

17.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.8 (Environmental Remediation for DoD Activities Overseas). Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

17.3.2.7. When a UST has not been used for one year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph 9.3.3.

17.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

17.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

17.3.2.9.1. Vent lines must be left open and functioning; and

17.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

17.3.3. UST Recordkeeping. Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

17.3.4. Hazardous Material USTs

17.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults.

17.3.4.2. Leak Detection. The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

17.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in subparagraph C17.3.4.1. shall be immediately removed from service and upgraded or replaced as necessary.

17.3.5. Deferred USTs. Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

A1. APPENDIX 1
CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

A1.1. CHARACTERISTICS OF HAZARDOUS WASTE

A1.1.1. General

A1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

A1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

A1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

A1.1.2. Characteristic of Ignitability

A1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

A1.1.2.1.1. It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

A1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

A1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

A1.1.2.1.4. It is an oxidizer.

A1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

A1.1.3. Characteristic of Corrosivity

A1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

A1.1.3.1.1. It is aqueous and has a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter.

A1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

A1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

A1.1.4. Characteristic of Reactivity

A1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

A1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

A1.1.4.1.2. It reacts violently with water.

A1.1.4.1.3. It forms potentially explosive mixtures with water.

A1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

A1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

A1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

A1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

A1.1.4.1.8. It is a forbidden explosive.

A1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

A1.1.5. Toxicity Characteristic

A1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste contains any of the contaminants listed in Table AP1.T1., "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section A1.1. at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself is considered to be the extract for the purpose of this section.

A1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table AP1.T1 or section A1.2., which corresponds to the toxic contaminant causing it to be hazardous.

A1.2. LISTS OF HAZARDOUS WASTES

A1.2.1. General

A1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

A1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

A1.2.1.3. Each hazardous waste listed in section A1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

A1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table AP1.T3., "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

A1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table AP1.T4., annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

A1.2.4. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.

A1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel or burned as a fuel.

A1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

A1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate ***which, if it met specifications, would have the generic name listed in*** Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

A1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

A1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, such waste will be listed in paragraph AP1.2.2. above or will be identified as a hazardous waste by the characteristics set forth in section AP1.1. of this Appendix.]

A1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4., annotated "P" as the first character in the USEPA HW# are hereby identified as acute hazardous waste (H). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA HW#s are listed in Table AP1.T4., annotated "P" as the first character in the USEPA HW#.

A1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table AP1.T4., subparagraphs A1.2.4.1.1.1. through A1.2.4.1.1.4. of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

Table AP1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

USEPA HW No.[1]	Contaminant	CAS No. [2]	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-2	1.0
D007	Chromium	7440-47-3	5.0
D016	2,4-D	94-75-7	10.0
D012	Endrin	72-20-8	0.02
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D015	Toxaphene	8001-35-2	0.5
D017	2,4,5-TP (Silvex)	93-72-1	1.0

Notes

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T2. Maximum Concentration of Contaminants for Non-Wastewater

USEPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/kg)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
DO33	Hexachlorobutadiene	87-68-3	0.5
DO34	Hexachloroethane	67-72-1	3.0
DO35	Methyl Ethyl Ketone	78-93-3	200.0
DO36	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl Chloride	75-01-4	0.2

Notes

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spend halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)[2]
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Spent cyanide plating bath solutions from electroplating operations.	(R,T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	(T)
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process.	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in Sec26131 or Sec26132).	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (This listing does not include formulations containing Hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, and F027.	(T)
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that have had the F032 waste code deleted in accordance with Sec 26135 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F037	Petroleum refinery primary oil/water/solids separation sludge—Any sludge generated from the gravitational separation of oil/water/ solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/ solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non- contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in Sec 26131(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge—Any sludge and/or float generated from the physical and/or chemical separation of oil/water/ solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in Sec 26131(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028)	(T)

Notes

1. U.S. EPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Acenaphthene	83329			100
Acenaphthylene	208968			5,000
Acetaldehyde (I)	75070		U001	1,000
Acetaldehyde, chloro-	107200		P023	1,000
Acetaldehyde, trichloro-	75876		U034	5,000
Acetamide	60355			100
Acetamide, N-(aminothioxomethyl)-	591082		P002	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442		U187	100
Acetamide, 2-fluoro-	640197		P057	100
Acetamide, N-9H-fluoren-2-yl-	53963		U005	1
Acetic acid	64197			5,000
Acetic acid (2,4-dichlorophenoxy)- salts and esters	94757		U240	100
Acetic acid, lead(2+) salt	301042		U144	10
Acetic acid, thallium(1+) salt	563688		U214	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765		U232	1,000
Acetic acid, ethyl ester (I)	141786		U112	5,000
Acetic acid, fluoro-, sodium salt	62748		P058	10
Acetic anhydride	108247			5,000
Acetone (I)	67641		U002	5,000
Acetone cyanohydrin	75865	1,000	P069	10
Acetone thiosemicarbazide	1752303	1,000/10,000		1
Acetonitrile (I,T)	75058		U003	5,000
Acetophenone	98862		U004	5,000
2-Acetylaminofluorene	53963		U005	1
Acetyl bromide	506967			5,000
Acetyl chloride (C,R,T)	75365		U006	5,000
1-Acetyl-2-thiourea	591082		P002	1
Acrolein	107028	500	P003	1
Acrylamide	79061	1,000/10,000	U007	5,000
Acrylic acid (I)	79107		U008	5,000
Acrylonitrile	107131	10,000	U009	100
Acrylyl chloride	814686	100		1
Adipic acid	124049			5,000
Adiponitrile	111693	1,000		1
Aldicarb	116063	100/10,000	P070	1
Aldrin	309002	500/10,000	P004	1
Allyl alcohol	107186	1,000	P005	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Allylamine	107119	500		1
Allyl chloride	107051			1,000
Aluminum phosphide (R,T)	20859738	500	P006	100
Aluminum sulfate	10043013			5,000
4-Aminobiphenyl	92671			1
5-(Aminomethyl)-3-isoxazolol	2763964		P007	1,000
Aminopterin	54626	500/10,000		1
4-Aminopyridine	504245		P008	1,000
Amiton	78535	500		1
Amiton oxalate	3734972	100/10,000		1
Amitrole	61825		U011	10
Ammonia	7664417	500		100
Ammonium acetate	631618			5,000
Ammonium benzoate	1863634			5,000
Ammonium bicarbonate	1066337			5,000
Ammonium bichromate	7789095			10
Ammonium bifluoride	1341497			100
Ammonium bisulfite	10192300			5,000
Ammonium carbamate	1111780			5,000
Ammonium carbonate	506876			5,000
Ammonium chloride	12125029			5,000
Ammonium chromate	7788989			10
Ammonium citrate, dibasic	3012655			5,000
Ammonium fluoborate	13826830			5,000
Ammonium fluoride	12125018			100
Ammonium hydroxide	1336216			1,000
Ammonium oxalate	6009707			5,000
	5972736			
	14258492			
Ammonium picrate (R)	131748		P009	10
Ammonium silicofluoride	16919190			1,000
Ammonium sulfamate	7773060			5,000
Ammonium sulfide	12135761			100
Ammonium sulfite	10196040			5,000
Ammonium tartrate	14307438			5,000
	3164292			
Ammonium thiocyanate	1762954			5,000
Ammonium vanadate	7803556		P119	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Amphetamlne	300629	1,000		1
Amyl acetate	628637			5,000
Iso-Amyl acetate	123922			
Sec-Amyl acetate	626380			
Tert-Amyl acetate	625161			
Aniline (I,T)	62533	1,000	U012	5,000
Aniline, 2,4,6- trimethyl	88051	500		1
o-Anisidine	90040			100
Anthracene	120127			5,000
Antimony++	7440360			5,000
Antimony pentachloride	7647189			1,000
Antimony pentafluoride	7783702	500		1
Antimony potassium tartrate	28300745			100
Antimony tribromide	7789619			1,000
Antimony trichloride	10025919			1,000
Antimony trifluoride	7783564			1,000
Antimony trioxide	1309644			1,000
Antimycin A	1397940	1,000/10,000		1
ANTU (Thiourea 1-Naphthalenyl)	86884	500/10,000		100
Argentate(1-), bis(cyano-C)-, potassium	506616		P099	1
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
Aroclors	1336363			1
Arsenic++	7440382			1
Arsenic acid H_3AsO_4	1327522		P010	1
	7778394			
Arsenic disulfide	1303328			1
Arsenic oxide As_2O_3	1327533		P012	1
Arsenic oxide As_2O_5	1303282		P011	1
Arsenic pentoxide	1303282	100/10,000	P011	1
Arsenic trichloride	7784341			1
Arsenic trioxide	1327533		P012	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Arsenic trisulfide	1303339			1
Arsenous oxide	1327533	100/10,000	P012	1
Arsenous trichloride	7784341	500		5,000
Arsine	7784421	100		1
Arsine, diethyl-	692422		P038	1
Arsinic acid, dimethyl-	75605		U136	1
Arsorous dichloride, phenyl-	696286		P036	1
Asbestos+++	1332214			1
Auramine	492808		U014	100
Azaserine	115026		U015	1
Aziridine	151564		P054	1
Azindine, 2-methyl-	75558		P067	1
Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1a-alpha, 8-beta, 8a-alpha, 8b-alpha)]-	50077		U010	10
Azinphos-ethyl	2642719	100/10,000		100
Azinphos-methyl	86500	10/10,000		1
Barium cyanide	542621		P013	10
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495		U157	10
Benz[c]acridine	225514		U016	100
Benzal chloride	98873	500	U017	5,000
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23950585		U192	5,000
Benz[a]anthracene	56553		U018	10
1,2-Benzanthracene	56553		U018	10
Benz[a]anthracene, 7,12-dimethyl-	57976		U094	1
Benzenamine (I,T)	62533		U012	5,000
Benzenamine, 3-(Trifluoromethyl)	98168	500		1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808		U014	100
Benzenamine, 4-chloro-	106478		P024	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933		U049	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117		U093	10
Benzenamine, 2-methyl-	95534		U328	100
Benzenamine, 4-methyl-	106490		U353	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		U158	10
Benzenamine, 2-methyl-, hydrochloride	636215		U222	100
Benzenamine, 2-methyl-5-nitro-	99558		U181	100
Benzenamine, 4-nitro-	100016		P077	5,000
Benzene (I,T)	71432		U109	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	500/10,000		1
Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156		U038	10
Benzene, 1-bromo-4-phenoxy-	101553		U030	100
Benzenearsonic Acid	98055	10/10,000		1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033		U035	10
Benzene, chloro-	108907		U037	100
Benzene, chloromethyl-	100447		P028	100
Benzenediamin, ar-methyl-	25376458		U221	10
	95807			
	496720			
	823405			
1,2-Benzenedicarboxylic acid, dioctyl ester	117840		U107	5,000
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817		U028	100
1,2-Benzenedicarboxylic acid, dibutyl ester	84742		U069	10
1,2-Benzenedicarboxylic acid, diethyl ester	84662		U088	1,000
1,2-Benzenedicarboxylic acid, dimethyl ester	131113		U102	5,000
Benzene, 1,2-dichloro-	95501		U070	100
Benzene, 1,3-dichloro-	541731		U071	100
Benzene, 1,4-dichloro-	106467		U072	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548		U060	1
Benzene, dichloromethyl-	98873		U017	5,000
Benzene, 1,3-diisocyanotomethyl- (R,T)	584849		U223	100
	91087			
	264716254			
Benzene, dimethyl (I,T)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
1,3-Benzenediol	108463		U201	5,000
1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- (R) -	51434		P042	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098		P046	5,000
Benzene, hexachloro-	118741		U127	10
Benzene, hexahydro- (I)	110827		U056	1,000
Benzene, hydroxy-	108952		U188	1,000
Benzene, methyl-	108883		U220	1,000
Benzene, 2-methyl-1,3-dinitro-	606202		U106	100
Benzene, 1-methyl-2,4-dinitro-	121142		U105	10
Benzene, 1-methylethyl- (I)	98828		U055	5,000
Benzene, nitro-	98953		U169	1,000
Benzene, pentachloro-	608935		U183	10
Benzene, pentachloronitro-	82688		U185	100
Benzenesulfonic acid chloride (C,R)	98099		U020	100
Benzenesulfonyl chloride	98099		U020	100
Benzene, 1,2,4,5-tetrachloro-	95943		U207	5,000
Benzenethiol	108985		P014	100
Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-	50293		U061	1
Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435		U247	1
Benzene, (trichloromethyl)-	98077		U023	10
Benzene, 1,3,5-trinitro-	99354		U234	10
Benzidine	92875		U021	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	500/10,000		1
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072		U202	100
Benzo[a]anthracene	56553		U018	10
Benzo[b]fluoranthene	205992			1
Benzo[k]fluoranthene	207089			5,000
Benzo[j,k]fluorene	206440		U120	100
1,3-Benzodioxole, 5-(1-propenyl)-	120581		U141	100
1,3-Benzodioxole, 5-(2-propenyl)-	94597		U203	100
1,3-Benzodioxole, 5-propyl-	94586		U090	10
Benzoic acid	65850			5,000
Benzonitrile	100470			5,000
Benzo[rst]pentaphene	189559		U064	10
Benzo[ghi]perylene	191242			5,000
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812		P001	100
Benzo[a]pyrene	50328		U022	1
3,4-Benzopyrene	50328		U022	1
p-Benzoquinone	106514		U197	10
Benzotrichloride (C,R,T)	98077	500	U023	10
Benzoyl chloride	98884			1,000
1,2-Benzphenanthrene	218019		U050	100
Benzyl chloride	100447	500	P028	100
Benzyl cyanide	140294	500		1
Beryllium++	7440417		P015	10
Beryllium chloride	7787475			1
Beryllium fluoride	7787497			1
Beryllium nitrate	13597994			1
	7787555			
alpha-BHC	319846			10
beta-BHC	319857			1
delta-BHC	319868			1
gamma-BHC	58899		U129	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-	15271417	500/10,000		1
2,2'-Bioxirane	1464535		U085	10
Biphenyl	92524			100
(1,1'-Biphenyl)-4,4'diamine	92875		U021	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941		U073	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904		U091	10
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937		U095	10
Bis(chloromethyl) ketone	534076	10/10,000		1
Bis(2-chloroethyl)ether	111444		U025	10
Bis(2-chloroethoxy)methane	111911		U024	1,000
Bis(2-ethylhexyl)phthalate	117817		U028	100
Bitoscanate	4044659	500/10,000		1
Boron trichloride	10294345	500		1
Boron trifluoride	7637072	500		1
Boron trifluoride compound with methyl ether (1:1)	353424	1,000		1
Bromoacetone	598312		P017	1,000
Bromadiolone	28772567	100/10,000		1
Bromine	7726956	500		1
Bromoform	75252		U225	100
4-Bromophenyl phenyl ether	101553		U030	100
Brucine	357573		P018	100
1,3-Butadiene	106990			10
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683		U128	1
1-Butanamine, N-butyl-N-nitroso-	924163		U172	10
1-Butanol	71363		U031	5,000
2-Butanone	78933		U159	5,000
2-Butanone peroxide (R,T)	1338234		U160	10
2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamno)carbonyl] oxime	39196184		P045	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
2-Butenal	123739		U053	100
	4170303			
2-Butene, 1,4-dichloro- (I,T)	764410		U074	1
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1-oxobutoxy] methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]-	303344		U143	10
Butyl acetate	123864			5,000
iso-Butyl acetate	110190			
sec-Butyl acetate	105464			
tert-Butyl acetate	540885			
n-Butyl alcohol (I)	71363		U031	5,000
Butylamine	109739			1,000
iso-Butylamine	78819			
sec-Butylamine	513495			
tert-Butylamine	13952846			
	75649			
Butyl benzyl phthalate	85687			100
n-Butyl phthalate	84742		U069	10
Butyric acid	107926			5,000
iso-Butyric acid	79312			
Cacodylic acid	75605		U136	1
Cadmium++ (2+)	7440439			10
Cadmium acetate	543908			10
Cadmium bromide	7789426			10
Cadmium chloride	10108642			10
Cadmium oxide	1306190	100/10,000		1
Cadmium stearate	2223930	1,000/10,000		1
Calcium arsenate	7778441	500/10,000		1
Calcium arsenite	52740166			1
Calcium carbide	75207			10
Calcium chromate	13765190		U032	10
Calcium cyanamide	156627			1,000
Calcium cyanide Ca(CN)2	592018		P021	10
Calcium dodecylbenzenesulfonate	26264062			1,000
Calcium hypochlorite	7778543			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Camphechlor	8001352	500/10,000		1
Camphene, octachloro-	8001352		P123	1
Cantharidin	56257	100/10,000		1
Carbachol chloride	51832	500/10,000		1
Caprolactum	105602			5,000
Captan	133062			10
Carbamic acid, ethyl ester	51796		U238	100
Carbamic acid, methylnitroso-, ethyl ester	615532		U178	1
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	100/10,000		1
Carbamic chloride, dimethyl-	79447		U097	1
Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546		U114	5,000
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164		U062	100
Carbaryl	63252			100
Carbofuran	1563662	10/10,000		10
Carbon disulfide	75150	10,000	P022	100
Carbon oxyfluoride (R,T)	353504		U033	1,000
Carbon tetrachloride	56235		U211	10
Carbonic acid, dithallium(1+) salt	6533739		U215	100
Carbonic dichloride	75445		P095	10
Carbonic difluoride	353504		U033	1,000
Carbonochloridic acid, methyl ester	79221		U156	1,000
Carbonyl Sulfide	463581			100
Carbophenothion	786196	500		1
Catechol	120809			100
Chloral	75876		U034	5,000
Chlorambem	133904			100
Chlorambucil	305033		U035	10
Chlordane	57749	1,000	U036	1
Chlordane, alpha & gamma isomers	57749		U036	1
Chlordane, technical	57749		U036	1
Chlorfenvinfos	470906	500		1
Chlorinated champhene (Campheclor)	8001352			1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Chlorine	7782505	100		10
Chlormephos	24934916	500		1
Chlormequat chloride	999815	100/10,000		1
Chlornaphazine	494031		U026	100
Choroacetaldehyde	107200		P023	1,000
Chloroacetophenone	532274			100
Chloroacetic acid	79118	100/10,000		100
p-Chloroaniline	106478		P024	1,000
Chlorobenzene	108907		U037	100
Chlorobenzilate	510156		U038	10
p-Chloro-m-cresol (4)	59507		U039	5,000
1-Chloro-2,3-epoxypropane	106898		U041	100
Chlorodibromomethane	124481			100
Chloroethane	75003			100
Chloroethanol	107073	500		1
Chloroethyl chlorofomate	627112	1,000		1
2-Chloroethyl vinyl ether	110758		U042	1,000
Chloroform	67663	10,000	U044	10
Chloromethane	74873		U045	100
Chloromethyl ether	542881	100	P016	1
Chloromethyl methyl ether	107302	100	U046	1
beta-Chloronaphthalene	91587		U047	5,000
2-Chloronaphthalene	91587		U047	5,000
Chlorophacinone	3691358	100/10,000		1
o-Chlorophenol (2)	95578		U048	100
4-Chlorophenyl phenyl ether	7005723			5,000
1-(o-Chlorophenyl)thiourea	5344821		P026	100
Chloroprene	126998			100
3-Chloropropionitrile	542767		P027	1,000
Chlorosulfonic acid	7790945			1,000
4-Chloro-o-toluidine, hydrochloride	3165933		U049	100
Chlorpyrifos	2921882			1
Chloroxuron	1982474	500/10,000		1
Chlorthiophos	21923239	500		1
Chromic acetate	1066304			1,000
Chromic acid	11115745			10
	7738945			
Chromic acid H_2CrO_4, calcium salt	13765190		U032	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Chromic chloride (Chromium chloride)	10025737	1/10,000		1
Chromic sulfate	10101538			1,000
Chromium++	7440473			5,000
Chromous chloride	10049055			1,000
Chrysene	218019		U050	100
Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-,	62207765	100/10,000		1
Cobaltous bromide	7789437			1,000
Cobalt carbonyl	10210681	10/10,000		1
Cobaltous formate	544183			1,000
Cobaltous sulfamate	14017415			1,000
Coke Oven Emissions	NA			1
Colchicine	64868	10/10,000		1
Copper++	7440508			5,000
Copper cyanide	544923		P029	10
Coumaphos	56724	100/10,000		10
Coumatetralyl	5836293	500/10,000		1
Creosote	8001589		U051	1
Cresol(s) (Phenol, Methyl)	1319773		U052	100
m-Cresol	108394	1,000/10,000		100
o-Cresol	95487			100
p-Cresol	106445			100
Cresylic acid	1319773		U052	100
m-Cresylic acid	108394			100
o-Cresylic acid	95487			100
p-Cresylic acid	106445			100
Crimidine	535897	100/10,000		1
Crotonaldehyde	123739	1,000	U053	100
	4170303	1,000		100
Cumene (I)	98828		U055	5,000
Cupric acetate	142712			100
Cupric acetoarsenite	12002038			1
Cupric chloride	7447394			10
Cupric nitrate	3251238			100
Cupric oxalate	5893663			100
Cupric sulfate	7758987			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Cupric sulfate, ammoniated	10380297			100
Cupric tartrate	815827			100
Cyanides (soluble salts and complexes) not otherwise specified	57125		P030	10
Cyanogen	460195		P031	100
Cyanogen bromide	506683	500/10,000	U246	1,000
Cyanogen chloride	506774		P033	10
Cyanogen iodide (Iodine cyanide)	506785	1,000/10,000		1
Cyanophos	2636262	1,000		1
Cyanuric fluoride	675149	100		1
2,5-Cyclohexadiene-1,4-dione	106514		U197	10
Cyclohexane (I)	110827		U056	1,000
Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)-	58899		U129	1
Cyclohexanone (I)	108941		U057	5,000
2-Cyclohexanone	131895		P034	100
Cycloheximide	66819	100/10,000		1
Cyclohexylamine	108918	10,000		1
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474		U130	10
Cyclophosphamide	50180		U058	10
2,4-D Acid	94757		U240	100
2,4-D Ester	94111			100
	94791			
	94804			
	1320189			
	1928387			
	1928616			
	1929733			
	2971382			
	25168267			
	53467111			
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757		U240	100
Daunomycin	20830813		U059	10
Decarborane(14)	17702419	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Demeton	8065483	500		1
Demeton-S-Methyl	919868	500		1
DDD, 4,4'DDD	72548		U060	1
DDE, 4,4'DDE	72559			1
DDT, 4,4'DDT	50293		U061	1
DEHP (Diethylhexyl phthalate)	117817		U028	100
Diallate	2303164		U062	100
Dialifor	10311849	100/10,000		1
Diazinon	333415			1
Diazomethane	334883			100
Dibenz[a,h]anthracene	53703		U063	1
1,2:5,6-Dibenzanthracene	53703		U063	1
Dibenzo[a,h]anthracene	53703		U063	1
Dibenzofuran	132649			100
Dibenz[a,i]pyrene	189559		U064	10
1,2-Dibromo-3-chloropropane	96128		U066	1
Dibromoethane	106934		U067	1
Diborane	19287457	100		1
Dibutyl phthalate	84742		U069	10
Di-n-butyl phthalate	84742		U069	10
Dicamba	1918009			1,000
Dichlobenil	1194656			100
Dichlone	117806			1
Dichlorobenzene	25321226			100
m-Dichlorobenzene (1,3)	541731		U071	100
o-Dichlorobenzene (1,2)	95501		U070	100
p-Dichlorobenzene (1,4)	106467		U072	100
3,3'-Dichlorobenzidine	91941		U073	1
Dichlorobromomethane	75274			5,000
1,4-Dichloro-2-butene (I,T)	764410		U074	1
Dichlorodifluoromethane	75718		U075	5,000
1,1-Dichloroethane	75343		U076	1,000
1,2-Dichloroethane	107062		U077	100
1,1-Dichloroethylene	75354		U078	100
1,2-Dichloroethylene	156605		U079	1,000
Dichloroethyl ether	11444	10,000	U025	10
Dichloroisopropyl ether	108601		U027	1,000
Dichloromethoxy ethane	111911		U024	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Dichloromethyl ether	542881		P016	1
Dichloromethylphenylsilane	149746	1,000		1
2,4-Dichlorophenol	120832		U081	100
2,6-Dichlorophenol	87650		U082	100
Dichlorophenylarsine	696286		P036	1
Dichloropropane	26638197			1,000
1,1-Dichloropropane	78999			
1,3-Dichloropropane	142289			
1,2-Dichloropropane	78875		U083	1,000
Dichloropropane--Dichloropropene (mixture)	8003198			100
Dichloropropene	26952238			100
2,3-Dichloropropene	78886			
1,3-Dichloropropene	542756		U084	100
2,2-Dichloropropionic acid	75990			5,000
Dichlorvos	62737	1,000		10
Dicofol	115322			10
Dicrotophos	141662	100		1
Dieldrin	60571		P037	1
1,2:3,4-Diepoxybutane (I,T)	1464535	500	U085	10
Diethanolamine	111422			100
Diethyl chlorophosphate	814493	500		1
Diethylamine	109897			1,000
Diethylarsine	692422		P038	1
Diethylcarbmazine citrate	1642542	100/10,000		1
1,4-Diethylenedioxide	123911		U108	100
Diethylhexyl phthalate	117817		U028	100
N,N-Diethylaniline	91667			1,000
N,N'-Diethylhydrazine	1615801		U086	10
O,O-Diethyl S-methyl dithiophosphate	3288582		U087	5,000
Diethyl-p-nitrophenyl phosphate	311455		P041	100
Diethyl phthalate	84662		U088	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972		P040	100
Diethylstilbestrol	56531		U089	1
Diethyl sulfate	64675			10
Digitoxin	71636	100/10,000		1
Diglycidyl ether	2238075	1,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Digoxin	20830755	10/10,000		1
Dihydrosafrole	94586		U090	10
Diisopropyfluorophosphate	55914		P043	100
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a-beta)-	309002		P004	1
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)-	465736		P060	1
2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)-	60571		P037	1
2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1a-alpha, 2-beta, 2a-beta, 3-alpha, 6-alpha, 6a-beta, 7-beta, 7a-alpha)-	72208		P051	1
Dimethoate	60515		P044	10
3,3'-Dimethoxybenzidine	119904		U091	10
Dimefox	115264	500		1
Dimethoate	60515	500/10,000		10
Dimethyl Phosphorochloridothioate	2524030	500		1
Dimethyl sulfate	77781	500		100
Dimethylamine (I)	124403		U092	1,000
p-Dimethylaminoazobenzene	60117		U093	10
7,12-Dimethylbenz[a]anthracene	57976		U094	1
3,3'-Dimethylbenzidine	119937		U095	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159		U096	10
Dimethylcarbamoyl chloride	79447		U097	1
Dimethylformamide	68122			100
Dimethyldichlorosilane	75785	500		1
1,1-Dimethylhydrazine	57147	1,000	U098	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
1,2-Dimethylhydrazine	540738		U099	1
alpha, alpha-Dimethylphenethylamine	122098		P046	5,000
Dimethyl-p-phenylenediamine	99989	10/10,000		1
2,4-Dimethylphenol	105679		U101	100
Dimethyl phthalate	131113		U102	5,000
Dimethyl sulfate	77781		U103	100
Dimetilan	644644	500/10,000		1
Dinitrobenzene (mixed)	25154545			100
m-Dinitrobenzene	99650			
o-Dinitrobenzene	528290			
p-Dinitrobenzene	100254			
4,6-Dinitro-o-cresol and salts	534521	10/10,000	P047	10
Dinitrophenol	25550587			10
2,5-Dinitrophenol	329715			
2,6-Dinitrophenol	573568			
2,4-Dinitrophenol	51285		P048	10
Dinitrotoluene	25321146			10
3,4-Dinitrotoluene	610399			
2,4-Dinitrotoluene	121142		U105	10
2,6-Dinitrotoluene	606202		U106	100
Dinoseb	88857	100/10,000	P020	1,000
Dinoterb	1420071	500/10,000		1
Di-n-octyl phthalate	117840		U107	5,000
1,4-Dioxane	123911		U108	100
Dioxathion	78342	500		1
Diphacinone	82666	10/10,000		1
1,2-Diphenylhydrazine	122667		U109	10
Diphosphoramide, octamethyl-	152169	100	P085	100
Diphosphoric acid, tetraethyl ester	107493		P111	10
Dipropylamine	142847		U110	5,000
Di-n-propylnitrosamine	621647		U111	10
Diquat	85007			1,000
	2764729			
Disulfoton	298044	500	P039	1
Dithiazanine iodide	514738	500/10,000		1
Dithiobiuret	541537	100/10,000	P049	100
Diuron	330541			100
Dodecylbenzenesulfonic acid	27176870			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Emetine, Dihydrochloride	316427	1/10,000		1
Endosulfan	115297	10/10,000	P050	1
alpha-Endosulfan	959988			1
beta-Endosulfan	33213659			1
Endosulfant sulfate	1031078			1
Endothall	145733		P088	1,000
Endothion	2778043	500/10,000		1
Endrin	72208	500/10,000	P051	1
Endrin aldehyde	7421934			1
Endrin & metabolites	72208		P051	1
Epichlorohydrin	106898	1,000	U041	100
Epinephrine	51434		P042	1,000
EPN	2104645	100/10,000		1
1,2-Epoxybutane	106887			100
Ergocalciferol	50146	1,000/10,000		1
Ergotamine tartrate	379793	500/10,000		1
Ethanal	75070		U001	1,000
Ethanamine, N-ethyl-N-nitroso-	55185		U174	1
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805		U155	5,000
Ethane, 1,2-dibromo-	106934		U067	1
Ethane, 1,1-dichloro-	75343		U076	1,000
Ethane, 1,2-dichloro-	107062		U077	100
Ethanedinitrile	460195		P031	100
Ethane, hexachloro-	67721		U131	100
Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	111911		U024	1,000
Ethane, 1,1'-oxybis-	60297		U117	100
Ethane, 1,1'-oxybis(2-chloro-	111444		U025	10
Ethane, pentachloro-	76017		U184	10
Ethanesulfonyl chloride, 2-chloro	1622328	500		1
Ethane, 1,1,1,2-tetrachloro-	630206		U208	100
Ethane, 1,1,2,2-tetrachloro-	79345		U209	100
Ethanethioamide	62555		U218	10
Ethane, 1,1,1-trichloro-	71556		U226	1,000
Ethane, 1,1,2-trichloro-	79005		U227	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752775		P066	100
Ethanol, 1,2-Dichloro-, acetate	10140871	1,000		1
Ethanol, 2-ethoxy-	110805		U359	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547		U173	1
Ethanone, 1-phenyl-	98862		U004	5,000
Ethene, chloro-	75014		U043	1
Ethene, 2-chloroethoxy-	110758		U042	1,000
Ethene, 1,1-dichloro-	75354		U078	100
Ethene, 1,2-dichloro- (E)	156605		U079	1,000
Ethene, tetrachloro-	127184		U210	100
Ethene, trichloro-	79016		U228	100
Ethion	563122	1,000		10
Ethoprophos	13194484	1,000		1
Ethyl acetate (I)	141786		U112	5,000
Ethyl acrylate (I)	140885		U113	1,000
Ethylbenzene	100414			1,000
Ethylbis(2-Chloroethyl)amine	538078	500		1
Ethyl carbamate (urethane)	51796		U238	100
Ethyl chloride	75003			100
Ethyl cyanide	107120		P101	10
Ethylenebisdithiocarbamic acid, salts & esters	111546		U114	5,000
Ethylenediamine	107153			5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004			5,000
Ethylene dibromide	106934		U067	1
Ethylene dichloride	107062		U077	100
Ethylene fluorohydrin	371620	10		1
Ethylene glycol	107211			5,000
Ethylene glycol monoethyl ether	110805		U359	1,000
Ethylene oxide (I,T)	75218	1,000	U115	10
Ethylenediamine	107153	10,000		5,000
Ethylenethiourea	96457		U116	10
Ethyleneimine	151564	500	P054	1
Ethyl ether (I)	60297		U117	100
Ethylthiocyanate	542905	10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Ethylidene dichloride	75343		U076	1,000
Ethyl methacrylate	97632		U118	1,000
Ethyl methanesulfonate	62500		U119	1
Famphur	52857		P097	1,000
Fenamlphos	22224926	10/10,000		1
Fenltrothion	122145	500		1
Fensulfothion	115902	500		1
Ferric ammonium citrate	1185575			1,000
Ferric ammonium oxalate	2944674			1,000
	55488874			
Ferric chloride	7705080			1,000
Ferric fluoride	7783508			100
Ferric nitrate	10421484			1,000
Ferric sulfate	10028225			1,000
Ferrous ammonium sulfate	10045893			1,000
Ferrous chloride	7758943			100
Ferrous sulfate	7720787			1,000
	7782630			
Fluenetil	4301502	100/10,000		1
Fluoranthene	206440		U120	100
Fluorene	86737			5,000
Fluorine	7782414	500	P056	10
Fluoroacetamide	640197	100/10,000	P057	100
Fluoracetic acid	144490	10/10,000		1
Fluoroacetic acid, sodium salt	62786		P058	10
Fluoroacetyl chloride	359068	10		1
Fluorouracil	51218	500/10,000		1
Fonofos	944229	500		1
Formaldehyde	50000	500	U122	100
Formaldehyde cyanohydrin	107164	1,000		1
Formetanate hydrochloride	23422539	500/10,000		1
Formothion	2540821	100		1
Formparanate	17702577	100/10,000		1
Formic acid (C,T)	64186		U123	5,000
Fosthletan	21548323	500		1
Fubendazole	3878191	100/10,000		1
Fulminic acid, mercury(2^-) salt (R,T)	628864		P065	10
Fumaric acid	110178			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Furan (I)	110009	500	U124	100
Furan, tetrahydro- (I)	109999		U213	1,000
2-Furancarboxaldehyde (I)	98011		U125	5,000
2,5-Furandione	108316		U147	5,000
Furfural (I)	98011		U125	5,000
Furfuran (I)	110009		U124	100
Gallium trichloride	13450903	500/10,000		1
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664		U206	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664		U206	1
Glycidylaldehyde	765344		U126	10
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257		U163	10
Guthion	86500			1
Heptachlor	76448		P059	1
Heptachlor epoxide	1024573			1
Hexachlorobenzene	118741		U127	10
Hexachlorobutadiene	87683		U128	1
Hexachlorocyclohexane (gamma isomer)	58899		U129	1
Hexachlorocyclopentadiene	77474	100	U130	10
Hexachloroethane	67721		U131	100
Hexachlorophene	70304		U132	100
Hexachloropropene	1888717		U243	1,000
Hexaethyl tetraphosphate	757584		P062	100
Hexamethylene-1, 6-diisocyanate	822060			100
Hexamethylphosphoramide	680319			1
Hexamethylenediamine, N,N'-Dibutyl	4835114	500		1
Hexane	110543			5,000
Hexone (Methyl isobutyl ketone)	108101		U161	5,000
Hydrazine (R,T)	302012	1,000	U133	1
Hydrazine, 1,2-diethyl-	1615801		U086	10
Hydrazine, 1,1-dimethyl-	57147		U098	10
Hydrazine, 1,2-dimethyl-	540738		U099	1
Hydrazine, 1,2-diphenyl-	122667		U109	10
Hydrazine, methyl-	60344		P068	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Hydrazinecarbothioamide	79196		P116	100
Hydrochloric acid	7647010			5,000
Hydrocyanic acid	74908	100	P063	10
Hydrofluoric acid	7664393		U134	100
Hydrogen chloride (gas only)	7647010	500		5,000
Hydrogen cyanide	74908		P063	10
Hydrogen fluoride	7664393	100	U134	100
Hydrogen peroxide (Conc. >52%)	7722841	1,000		1
Hydrogen phosphide	7803512		P096	100
Hydrogen selenide	7783075	10		1
Hydrogen sulfide	7783064	500	U135	100
Hydroperoxide, 1-methyl-1-phenylethyl-	80159		U096	10
Hydroquinone	123319	500/10,000		100
2-Imidazolidinethione	96457		U116	10
Indeno(1,2,3-cd)pyrene	193395		U137	100
Iodomethane	74884		U138	100
Iron, Pentacarbonyl-	13463406	100		1
Isobenzan	297789	100/10,000		1
1,3-Isobenzofurandione	85449		U190	5,000
Isobutyronitrile	78820	1,000		1
Isobutyl alcohol (I,T)	78831		U140	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	500/10,000		1
Isodrin	465736	100/10,000	P060	1
Isofluorphate	55914	100		100
Isophorone	78591			5,000
Isophorone Diisocyanate	4098719	100		1
Isoprene	78795			100
Isopropanolamine dodecylbenzene sulfonate	42504461			1,000
Isopropyl chloroformate	108236	1,000		1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	500		1
Isosafrole	120581		U141	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964		P007	1,000
Kepone	143500		U142	1
Lactonitrile	78977	1,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Lasiocarpine	303344		U143	10
Lead acetate	301042		U144	#
Lead arsenate	7784409			1
	7645252			
	10102484			
Lead, bis(acetato-O)tetrahydroxytri	1335326		U146	10
Lead chloride	7758954			10
Lead fluoborate	13814965			10
Lead fluoride	7783462			10
Lead iodide	10101630			10
Lead nitrate	10099748			10
Lead phosphate	7446277		U145	10
Lead stearate	7428480			10
	1072351			
	52652592			
	56189094			
Lead subacetate	1335326		U146	10
Lead sulfate	15739807			10
	7446142			
Lead sulfide	1314870			10
Lead thiocyanate	592870			10
Leptophos	21609905	500/10,000		1
Lewisite	541253	10		1
Lindane	58899	1,000/10,000	U129	1
Lithium chromate	14307358			10
Lithium hydride	7580678	100		1
Malathion	121755			100
Maleic acid	110167			5,000
Maleic anhydride	108316		U147	5,000
Maleic hydrazide	123331		U148	5,000
Malononitrile	109773	500/10,000	U149	1,000
Manganese, tricarbonyl methylcyclopentadienyl	12108133	100		1
MDI (Methylene diphenyl diisocyanate)	101688			5,000
Mechlorethamine	51752	10		1
MEK (Methyl ethyl ketone)	78933		U159	5,000
Melphalan	148823		U150	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Mephosfolan	950107	500		1
Mercaptodimethur	2032657			10
Mercuric acetate	1600277	500/10,000		1
Mercuric chloride	7487947	500/10,000		1
Mercuric cyanide	592041			1
Mercuric nitrate	10045940			10
Mercuric oxide	21908532	500/10,000		1
Mercuric sulfate	7783359			10
Mercuric thiocyanate	592858			10
Mercurous nitrate	10415755			10
	7782867			
Mercury	7439976		U151	1
Mercury (acetate-O)phenyl-	62384		P092	100
Mercury fulminate	628864		P065	10
Methacrolein diacetate	10476956	1,000		1
Methacrylic anhydride	760930	500		1
Methacrylonitrile (I,T)	126987	500	U152	1,000
Methacryloyl chloride	920467	100		1
Methacryloyloxyethyl isocyanate	30674807	100		1
Methamidophos	10265926	100/10,000		1
Methanamine, N-methyl-	124403		U092	1,000
Methanamine, N-methyl-N-nitroso-	62759		P082	10
Methane, bromo-	74839		U029	1,000
Methane, chloro- (I,T)	74873		U045	100
Methane, chloromethoxy-	107302		U046	1
Methane, dibromo-	74953		U068	1,000
Methane, dichloro-	75092		U080	1,000
Methane, dichlorodifluoro-	75718		U075	5,000
Methane, iodo-	74884		U138	100
Methane, isocyanato-	624839		P064	10
Methane, oxybis(chloro-	542881		P016	1
Methanesulfenyl chloride, trichloro-	594423		P118	100
Methanesulfonyl fluoride	558258	1,000		1
Methanesulfonic acid, ethyl ester	62500		U119	1
Methane, tetrachloro-	56235		U211	10
Methane, tetranitro- (R)	509148		P112	10
Methane, tribromo-	75252		U225	100
Methane, trichloro-	67663		U044	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Methane, trichlorofluoro-	75694		U121	5,000
Methanethiol (I,T)	74931		U153	100
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115297		P050	1
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one,1,1a,3,3a,4,5,5a,5b,6-decachloroctahydro-	143500		U142	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro-	76448		P059	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro-	57749		U036	1
Methanol (I)	67561		U154	5,000
Methapyrilene	91805		U155	5,000
Methidathion	950378	500/10,000		1
Methiocarb	2032657	500/10,000	P199	10
Methomyl	16752775	500/10,000	P066	100
Methoxychlor	72435		U247	1
Methoxyethylmercuric acetate	151382	500/10,000		1
Methyl alcohol (I)	67561		U154	5,000
Methyl aziridine	75558		P067	1
Methyl bromide	74839	1,000	U029	1,000
1-Methylbutadiene (I)	504609		U186	100
Methyl chloride (I,T)	74873		U045	100
Methyl 2-chloroacrylate	80637	500		1
Methyl chlorocarbonate (I,T)	79221		U156	1,000
Methyl chloroform	71556		U226	1,000
Methyl chloroformate	79221	500	U156	1,000
3-Methylcholanthrene	56495		U157	10
4,4'-Methylenebis(2-chloroaniline)	101144		U158	10
Methylene bromide	74953		U068	1,000
Methylene chloride	75092		U080	1,000
4,4'-Methylenedianiline	101779			10
Methylene diphenyl diisocyanate (MDI)	101688			5,000
Methyl ethyl ketone (MEK) (I,T)	78933		U159	5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Methyl ethyl ketone peroxide (R,T)	1338234		U160	10
Methyl hydrazine	60344	500	P068	10
Methyl iodide	74884		U138	100
Methyl isobutyl ketone	108101		U161	5,000
Methyl isocyanate	624839	500	P064	10
Methyl isothiocyanate	556616	500		1
2-Methyllactonitrile	75865		P069	10
Methyl mercaptan	74931	500	U153	100
Methyl methacrylate (I,T)	80626		U162	1,000
Methyl parathion	298000		P071	100
Methyl phenkapton	3735237	500		1
Methyl phosphonic dichloride	676971	100		1
4-Methyl-2-pentanone (I)	108101		U161	5,000
Methyl tert-butyl ether	1634044			1,000
Methyl thiocyanate	556649	10,000		1
Methylthiouracil	56042		U164	10
Methyl vinyl ketone	78944	10		1
Methylmercuric dicyanamide	502396	500/10,000		1
Methyltrichlorosilane	75796	500		1
Metolcarb	1129415	100/10,000		1
Mevinphos	7786347	500		10
Mexacarbate	315184	500/10,000		1,000
Mitomycin C	50077	500/10,000	U010	10
MNNG	70257		U163	10
Monocrotophos	6923224	10/10,000		1
Monoethylamine	75047			100
Monomethylamine	74895			100
Muscimol	2763964	500/10,000	P007	1,000
Mustard gas	505602	500		1
Naled	300765			10
5,12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	20830813		U059	10
1-Naphthalenamine	134327		U167	100
2-Naphthalenamine (beta-Naphthylamine)	91598		U168	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031		U026	100
Naphthalene	91203		U165	100
Naphthalene, 2-chloro-	91587		U047	5,000
1,4-Naphthalenedione	130154		U166	5,000
2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-tetrasodium salt	72571		U236	10
Naphthenic acid	1338245			100
1,4-Naphthoquinone	130154		U166	5,000
alpha-Naphthylamine	134327		U167	100
beta-Naphthylamine (2-Naphthalenamine)	91598		U168	1
alpha-Naphthylthiourea	86884		P072	100
Nickel++	7440020			100
Nickel ammonium sulfate	15699180			100
Nickel carbonyl	13463393	1	P073	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393		P073	10
Nickel chloride	7718549			100
	37211055			
Nickel cyanide	557197		P074	10
Nickel hydroxide	12054487			10
Nickel nitrate	14216752			100
Nickel sulfate	7786814			100
Nicotine & salts	54115	100	P075	100
Nicotine sulfate	65305	100/10,000		1
Nitric acid	7697372	1,000		1,000
Nitric acid, thallium(1+) salt	10102451		U217	100
Nitric oxide	10102439	100	P076	10
p-Nitroaniline	100016		P077	5,000
Nitrobenzene (I,T)	98953	10,000	U169	1,000
4-Nitrobiphenyl	92933			10
Nitrocyclohexane	1122607	500		1
Nitrogen dioxide	10102440	100	P078	10
	10544726			
Nitrogen oxide	10102439		P076	10
Nitroglycerine	55630		P081	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Nitrophenol (mixed)	25154556			100
m-Nitrophenol	554847			100
o-Nitrophenol (2)	88755			100
p-Nitrophenol (4)	100027		U170	100
2-Nitropropane (I,T)	79469		U171	10
N-Nitrosodi-n-butylamine	924163		U172	10
N-Nitrosodiethanolamine	1116547		U173	1
N-Nitrosodiethylamine	55185		U174	1
N-Nitrosodimethylamine	62759	1,000	P082	10
N-Nitrosodiphenylamine	86306			100
N-Nitroso-N-ethylurea	759739		U176	1
N-Nitroso-N-methylurea	684935		U177	1
N-Nitroso-N-methylurethane	615532		U178	1
N-Nitrosomethylvinylamine	4549400		P084	10
N-Nitrosomorpholine	59892			1
N-Nitrosopiperidine	100754		U179	10
N-Nitrosopyrrolidine	930552		U180	1
Nitrotoluene	1321126			1,000
m-Nitrotoluene	99081			
o-Nitrotoluene	88722			
p-Nitrotoluene	99990			
5-Nitro-o-toluidine	99558		U181	100
Norbromide	991424	100/10,000		1
Octamethylpyrophosphoramide	152169		P085	100
Organorhodium complex (PMN-82-147)	0	10/10,000		1
Osmium tetroxide	20816120		P087	1,000
Ouabain	630604	100/10,000		1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733		P088	1,000
Oxamyl	23135220	100/10,000	P194	1
1,2-Oxathiolane, 2,2-dioxide	1120714		U193	10
2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180		U058	10
Oxetane, 3,3-bis(chloromethyl)-	78717	500		1
Oxirane (I,T)	75218		U115	10
Oxiranecarboxyaldehyde	765344		U126	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Oxirane, (chloromethyl)-	106898		U041	100
Oxydisulfoton	2497076	500		1
Ozone	10028156	100		1
Paraformaldehyde	30525894			1,000
Paraldehyde	123637		U182	1,000
Paraquat	1910425	10/10,000		1
Paraquat methosulfate	2074502	10/10,000		1
Parathion	56382	100	P089	10
Parathion-methyl	298000	100/10,000		100
Paris green	12002038	500/10,000		100
PCBs	1336363			
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
PCNB (Pentachloronitrobenzene)	82688		U185	100
Pentaborane	19624227	500		1
Pentachlorobenzene	608935		U183	10
Pentachloroethane	76017		U184	10
Pentachlorophenol	87865		U242	10
Pentachloronitrobenzene (PCNB)	82688		U185	100
Pentadecylamine	2570265	100/10,000		1
Paracetic acid	79210	500		1
1,3-Pentadiene (I)	504609		U186	100
Perachloroethylene	127184		U210	100
Perchloromethylmercaptan	594423	500		100
Phenacetin	62442		U187	100
Phenanthrene	85018			5,000
Phenol	108952	500/10,000	U188	1,000
Phenol, 2-chloro-	95578		U048	100
Phenol, 4-chloro-3-methyl-	59507		U039	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895		P034	100
Phenol, 2,4-dichloro-	120832		U081	100
Phenol, 2,6-dichloro-	87650		U082	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531		U089	1
Phenol, 2,4-dimethyl-	105679		U101	100
Phenol, 2,4-dinitro-	51285		P048	10
Phenol, methyl-	1319773		U052	1,000
m-Cresol	108394			
o-Cresol	95487			
p-Cresol	106445			
Phenol, 2-methyl-4,6-dinitro-and salts	534521		P047	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304		U132	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	100/10,000		1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857		P020	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	500/10,000		1
Phenol, 4-nitro-	100027		U170	100
Phenol, pentachloro-	87865		U242	10
Phenol, 2,3,4,6-tetrachloro-	58902		U212	10
Phenol, 2,4,5-trichloro-	95954		U230	10
Phenol, 2,4,6-trichloro-	88062		U231	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748		P009	10
Phenoxarsine, 10,10'-oxydi-	58366	500/10,000		1
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823		U150	1
Phenyl dichloroarsine	696286	500		1
1,10-(1,2-Phenylene)pyrene	193395		U137	100
p-Phenylenediamine	106503			5,000
Phenylhydrazine hydrochloride	59881	1,000/10,000		1
Phenylmercury acetate	62384	500/10,000	P092	100
Phenylsilatrane	2097190	100/10,000		1
Phenylthiourea	103855	100/10,000	P093	100
Phorate	298022	10	P094	10
Phosacetim	4104147	100/10,000		1
Phosfolan	947024	100/10,000		1
Phosgene	75445	10	P095	10
Phosmet	732116	10/10,000		1
Phosphamidon	13171216	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Phosphine	7803512	500		100
Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester	2587908	500		1
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	500		1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	100		1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	500		1
Phosphoric acid	7664382			5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455		P041	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	500		1
Phosphoric acid, lead(2+) salt (2:3)	7446277	500	U145	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044		P039	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022		P094	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582		U087	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515		P044	10
Phosphorofluondic acid, bis(1-methylethyl) ester	55914		P043	100
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382		P089	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857		P097	1,000
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000		P071	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972		P040	100
Phosphorus	7723140	100		1
Phosphorus oxychloride	10025873	500		1,000
Phosphorous pentachloride	10026138	500		1
Phosphorus pentasulfide (R)	1314803		U189	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Phosphorus pentoxide	1314563	10		1
Phosphorus trichloride	7719122	1,000		1,000
Phthalic anhydride	85449		U190	5,000
Physostigmine	57476	100/10,000	P204	1
Phosostigmine, salicylate (1:1)	57647	100/10,000		1
2-Picoline	109068		U191	5,000
Picotoxin	124878	500/10,000		1
Piperidine	110894	1,000		1
Piperidine, 1-nitroso-	100754		U179	10
Pirimifos-ethyl	23505411	1,000		1
Plumbane, tetraethyl-	78002		P110	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363			1
Potassium arsenate	7784410			1
Potassium arsenite	10124502	500/10,000		1
Potassium bichromate	7778509			10
Potassium chromate	7789006			10
Potassium cyanide	151508	100	P098	10
Potassium hydroxide	1310583			1,000
Potassium permanganate	7722647			100
Potassium silver cyanide	506616	500	P099	1
Promecarb	2631370	500/10,000		1
Pronamide	23950585		U192	5,000
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063		P070	1
1-Propanamine (I,T)	107108		U194	5,000
1-Propanamine, N-propyl-	142847		U110	5,000
1-Propanamine, N-nitroso-N-propyl-	621647		U111	10
Propane, 1,2-dibromo-3-chloro	96128		U066	1
Propane, 2-nitro- (I,T)	79469		U171	10
1,3-Propane sultone	1120714		U193	10
Propane 1,2-dichloro-	78875		U083	1,000
Propanedinitrile	109773		U149	1,000
Propanenitrile	107120		P101	10
Propanenitrile, 3-chloro-	542767		P027	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865		P069	10
Propane, 2,2'-oxybis[2-chloro-	108601		U027	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
1,2,3-Propanetnol, trinitrate- (R)	55630		P081	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		U235	10
1-Propanol, 2-methyl- (I,T)	78831		U140	5,000
2-Propanone (I)	67641		U002	5,000
2-Propanone, 1-bromo-	598312		P017	1,000
Propargite	2312358			10
Propargyl alcohol	107197		P102	1,000
Propargyl bromide	106967	10		1
2-Propenal	107028		P003	1
2-Propenamide	79061		U007	5,000
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717		U243	1,000
1-Propene, 1,3-dichloro-	542756		U084	100
2-Propenenitrile	107131		U009	100
2-Propenenitrile, 2-methyl- (I,T)	126987		U152	1,000
2-Propenoic acid (I)	79107		U008	5,000
2-Prepenoic acid, ethyl ester (I)	140885		U113	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632		U118	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626		U162	1,000
2-Propen-1-o1	107186		P005	100
Propiolactone, beta-	57578	500		1
Propionaldehyde	123386			1,000
Propionic acid	79094			5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721		U233	100
Propionic anhydride	123626			5,000
Propoxor (Baygon)	114261		U411	100
Propionitrile	107120	500		10
Propionitrile, 3-chloro-	542767	1,000		1,000
Propiophenone, 1, 4-amino phenyl	70699	100/10,000		1
n-Propylamine	107108		U194	5,000
Propyl chloroformate	109615	500		1
Propylene dichloride	78875		U083	1,000
Propylene oxide	75569	10,000		100
1,2-Propylenimine	75558	10,000	P067	1
2-Propyn-1-o1	107197		P102	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Prothoate	2275185	100/10,000		1
Pyrene	129000	1,000/10,000		5,000
Pyrethrins	121299			1
	121211			
	8003347			
3,6-Pyridazinedione, 1,2-dihydro-	123331		U148	5,000
4-Pyridinamine	504245		P008	1,000
Pyridine	110861		U196	1,000
Pyridine, 2-methyl-	109068		U191	5,000
Pyridine, 2-methyl-5-vinyl-	140761	500		1
Pyridine, 4-amino-	504245	500/10,000		1,000
Pyridine, 4-nitro-, 1-oxide	1124330	500/10,000		1
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)	54115		P075	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751		U237	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042		U164	10
Pyriminil	53558251	100/10,000		1
Pyrrolidine, 1-nitroso-	930552		U180	1
Quinoline	91225			5,000
Quinone (p-Benzoquinone)	106514		U197	10
Quintobenzene	82688		U185	100
Reserpine	50555		U200	5,000
Resorcinol	108463		U201	5,000
Saccharin and salts	81072		U202	100
Salcomine	14167181	500/10,000		1
Sarin	107448	10		1
Safrole	94597		U203	100
Selenious acid	7783008	1,000/10,000	U204	10
Selenious acid, dithallium (1+) salt	12039520		P114	1,000
Selenium ++	7782492			100
Selenium dioxide	7446084		U204	10
Selenium oxychloride	7791233	500		1
Selenium sulfide (R,T)	7488564		U205	10
Selenourea	630104		P103	1,000
Semicarbazide hydrochloride	563417	1,000/10,000		1
L-Serine, diazoacetate (ester)	115026		U015	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1,000		1
Silver ++	7440224			1,000
Silver cyanide	506649		P104	1
Silver nitrate	7761888			1
Silvex (2,4,5-TP)	93721		U233	100
Sodium	7440235			10
Sodium arsenate	7631892	1,000/10,000		1
Sodium arsenite	7784465	500/10,000		1
Sodium azide	26628228	500	P105	1,000
Sodium bichromate	10588019			10
Sodium bifluoride	1333831			100
Sodium bisulfite	7631905			5,000
Sodium cacodylate	124652	100/10,000		1
Sodium chromate	7775113			10
Sodium cyanide	143339	100	P106	10
Sodium dodecylbenzenesulfonate	25155300			1,000
Sodium fluoride	7681494			1,000
Sodium fluoroacetate	62748	10/10,000		10
Sodium hydrosulfide	16721805			5,000
Sodium hydroxide	1310732			1,000
Sodium hypochlorite	7681529			100
	10022705			
Sodium methylate	124414			1,000
Sodium nitrite	7632000			100
Sodium prentachlorophenate	131522	100/10,000		1
Sodium phosphate, dibasic	7558794			5,000
	10039324			
	10140655			
Sodium phosphate, tribasic	7601549			5,000
	7758294			
	7785844			
	10101890			
	10124568			
	10361894			
Sodium selenate	13410010	100/10,000		1
Sodium selenite	10102188	100/10,000		100
	7782823			

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Sodium tellurite	10102202	500/10,000		1
Stannane, acetoxytriphenyl	900958	500/10,000		1
Streptozotocin	18883664		U206	1
Strontium chromate	7789062			10
Strychnidin-10-one	57249		P108	10
Strychnidin-10-one, 2,3-dimethoxy-	357573		P018	100
Strychnine, & salts	572494	100/10,000	P108	10
Strychnine sulfate	60413	100/10,000		1
Styrene	100425			1,000
Styrene oxide	96093			100
Sulfotep	3689245	500		100
Sulfoxide, 3-chloropropyl octyl	3569571	500		1
Sulfur monochloride	12771083			1,000
Sulfur dioxide	7446095	500		1
Sulfur phosphide (R)	1314803		U189	100
Sulfur tetrafluoride	7783600	100		1
Sulfur trioxide	7446119	100		1
Sulfuric acid	7664939	1,000		1,000
	8014957			
Sulfuric acid, dithallium (1+) salt	7446186		P115	100
	10031591			
Sulfuric acid, dimethyl ester	77781		U103	100
Tabun	77816	10		1
2,4,5-T acid	93765		U232	1,000
2,4,5-T amines	2008460			5,000
	1319728			
	3813147			
	6369966			
	6369977			
Tellurium	13494809	500/10,000		1
Tellurium hexafluoride	7783804	100		1
2,4,5-T esters	93798			1,000
	1928478			
	2545597			
	25168154			
	61792072			
2,4,5-T salts	13560991			1,000
2,4,5-T	93765		U232	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
TDE (Dichloro diphenyl dichloroethane)	72548		U060	1
TEPP (Tetraethyl ester diphosphoric acid)	107493	100		10
Terbufos	13071799	100		1
1,2,4,5-Tetrachlorobenzene	95943		U207	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016			1
1,1,1,2-Tetrachloroethane	630206		U208	100
1,1,2,2-Tetrachloroethane	79345		U209	100
Tetrachloroethene	127184		U210	100
Tetrachloroethylene	127184		U210	100
2,3,4,6-Tetrachlorophenol	58902		U212	10
Tetraethyl lead	78002	100	P110	10
Tetraethyl pyrophosphate	107493		P111	10
Tetraethyldithiopyrophosphate	3689245		P109	100
Tetraethyltin	597648	100		1
Tetramethyllead	75741	100		1
Tetrahydrofuran (I)	109999		U213	1,000
Tetranitromethane (R)	509148	500	P112	10
Tetraphosphoric acid, hexaethyl ester	757584		P062	100
Thallic oxide	1314325		P113	100
Thallium ++	7440280			1,000
Thallium acetate	563688		U214	100
Thallium carbonate	6533739		U215	100
Thallium chloride	7791120		U216	100
Thallium nitrate	10102451		U217	100
Thallium oxide	1314325		P113	100
Thallium selenite	12039520		P114	1,000
Thallium sulfate	7446186	100/10,000	P115	100
	10031591			
Thallous carbonate (Thallium (I) carbonate)	6533739	100/10,000	U215	100
Thallous chloride (Thallium (I) chloride)	7791120	100/10,000	U216	100
Thallous malonate (Thallium (I) malonate)	2757188	100/10,000		1
Thallous sulfate (Thallium (I) sulfate)	7446186	100/10,000	P115	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Thioacetamide	62555		U218	10
Thiocarbazide	2231574	1,000/10,000		1
Thiodiphosphoric acid, tetraethyl ester	3689245		P109	100
Thiofanox	39196184	100/10,000	P045	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537		P049	100
Thiomethanol (I,T)	74931		U153	100
Thionazin	297972	500		100
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl-	137268		U244	10
Thiophenol	108985	500	P104	100
Thiosemicarbazide	79196	100/10,000	P116	100
Thiourea	62566		U219	10
Thiourea, (2-chlorophenyl)-	5344821	100/10,000	P026	100
Thiourea, (2-methylphenyl)-	614788	500/10,000		1
Thiourea, 1-naphthalenyl-	86884		P072	100
Thiourea, phenyl-	103855		P093	100
Thiram	137268		U244	10
Titanium tetrachloride	7550450	100		1,000
Toluene	108883		U220	1,000
Toluenediamine	95807		U221	10
	496720			
	823405			
	25376458			
Toluene diisocyanate (R,T)	584849	500	U223	100
	91087	100		100
	26471625			
o-Toluidine	95534		U328	100
p-Toluidine	106490		U353	100
o-Toluidine hydrochloride	636215		U222	100
Toxaphene	8001352		P123	1
2,4,5-TP acid	93721		U233	100
2,4,5-TP acid esters	32534955			100
1H-1,2,4-Triazol-3-amine	61825		U011	10
Trans-1,4-dichlorobutene	110576	500		1
Triamiphos	1031476	500/10,000		1
Triazofos	24017478	500		1
Trichloroacetyl chloride	76028	500		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Trichlorfon	52686			100
1,2,4-Trichlorobenzene	120821			100
1,1,1-Trichloroethane	71556		U226	1,000
1,1,2-Trichloroethane	79005		U227	100
Trichloroethene	79016		U228	100
Trichloroethylene	79016		U228	100
Trichloroethylsilane	115219	500		1
Trichloronate	327980	500		1
Trichloromethanesulfenyl chloride	594423		P118	100
Trichloromonofluoromethane	75694		U121	5,000
Trichlorophenol	21567822			10
2,3,4-Trichlorophenol	15950660			
2,3,5-Trichlorophenol	933788			
2,3,6-Trichlorophenol	933755			
2,4,5-Trichlorophenol	95954		U230	10
2,4,6-Trichlorophenol	88062		U231	10
3,4,5-Trichlorophenol	609198			
Trichlorophenylsilane	98135	500		1
Trichloro(chloromethyl)silane	1558254	100		1
Trichloro(dichlorophenyl)silane	27137855	500		1
Triethanolamine dodecylbenzene-sulfonate	27323417			1,000
Triethoxysilane	998301	500		1
Trifluralin	1582098			10
Triethylamine	121448			5,000
Trimethylamine	75503			100
Trimethylchlorsilane	75774	1,000		1
2,2,4-Trimethylpentane	540841			1,000
Trimethylolpropane phosphite	824113	100/10,000		1
Trimethyiltin chloride	1066451	500/10,000		1
1,3,5-Trinitrobenzene (R,T)	99354		U234	10
1,3,5-Trioxane, 2,4,6-trimethyl-	123637		U182	1,000
Triphenyltin chloride	639587	500/10,000		1
Tris(2-chloroethyl)amine	555771	100		1
Tris(2,3-dibromopropyl) phosphate	126727		U235	10
Trypan blue	72571		U236	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA		D001	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Unlisted Hazardous Wastes Characteristic of **Corrosivity**	NA		D002	100
Unlisted Hazardous Wastes Characteristic of **Reactivity**	NA		D003	100
Unlisted Hazardous Wastes Characteristic of **Toxicity**				

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Arsenic			D004	1
Barium			D005	1,000
Benzene			D018	10
Cadmium			D006	10
Carbon Tetrachloride			D019	10
Chlordane			D020	1
Chlorobenzene			D021	100
Chloroform			D022	10
Chromium			D007	10
o-Cresol			D023	100
m-Cresol			D024	100
p-Cresol			D025	100
Cresol			D026	100
2,4-D (Dichlorophenoxyacetic acid)			D016	100
1,4-Dichlorobenzene			D027	100
1,2-Dichloroethane			D028	100
1,1-Dichloroethylene			D029	100
2,4-Dinitrotoluene			D030	10
Endrin			D012	1
Heptachlor (and epoxide)			D031	1
Hexachlorobenzene			D032	10
Hexachlorobutadiene			D033	1
Hexachloroethane			D034	100
Lead			D008	10
Lindane			D013	1
Mercury			D009	1
Methoxychlor			D014	1
Methyl ethyl ketone			D035	5,000
Nitrobenzene			D036	1,000
Pentachlorophenol			D037	10
Pyridine			D038	1,000
Selenium			D010	10
Silver			D011	1
Tetrachloroethylene			D039	100
Toxaphene			D015	1
Trichloroethylene			D040	100
2,4,5 Trichlorophenol			D041	10

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(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
2,4,5-TP			D017	100
Vinyl chloride			D043	1
Uracil mustard	66751		U237	10
Uranyl acetate	541093			100
Uranyl nitrate	10102064			100
	36478769			
Urea, N-ethyl-N-nitroso	759739		U176	1
Urea, N-methyl-N-nitroso	684935		U177	1
Urethane (Carbamic acid ethyl ester)	51796		U238	100
Valinomycin	2001958	1,000/10,000		1
Vanadic acid, ammonium salt	7803556		P119	1,000
Vanadic oxide V_20_5	1314621		P120	1,000
Vanadic pentoxide	1314621		P120	1,000
Vanadium pentoxide	1314621	100/10,000		1,000
Vanadyl sulfate	27774136			1,000
Vinyl chloride	75014		U043	1
Vinyl acetate	108054			5,000
Vinyl acetate monomer	108054	1,000		5,000
Vinylamine, N-methyl-N-nitroso-	4549400		P084	10
Vinyl bromide	593602			100
Vinylidene chloride	75354		U078	100
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	500/10,000	P001	100
Warfarin sodium	129066	100/10,000		100
Xylene (mixed)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
Xylenol	1300716			1,000
Xylylene dichloride	28347139	100/10,000		1
Yohimban-16-carboxylic acid, 11,17 dimethoxy-18-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,17-alpha,18-beta,20-alpha)-	50555		U200	5,000
Zinc ++	7440666			1,000
Zinc acetate	557346			1,000

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(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Zinc ammonium chloride	52628258			1,000
	14639975			
	14639986			
Zinc borate	1332076			1,000
Zinc bromide	7699458			1,000
Zinc carbonate	3486359			1,000
Zinc chloride	7646857			1,000
Zinc cyanide	557211		P121	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	100/10,000		1
Zinc fluoride	7783495			1,000
Zinc formate	557415			1,000
Zinc hydrosulfite	7779864			1,000
Zinc nitrate	7779886			1,000
Zinc phenosulfonate	127822			5,000
Zinc phosphide	1314847	500	P122	100
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847		P122	100
Zinc silicofluoride	16871719			5,000
Zinc sulfate	7733020			1,000
Zirconium nitrate	13746899			5,000
Zirconium potassium fluoride	16923958			1,000
Zirconium sulfate	14644612			5,000
Zirconium tetrachloride	10026116			5,000

F001		**F001**	**10**
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10 percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.			
(a) Tetrachloroethylene	127184	U210	100
(b) Trichloroethylene	79016	U228	100
(c) Methylene chloride	75092	U080	1,000
(d) 1,1,1-Trichloroethane	71556	U226	1,000
(e) Carbon tetrachloride	56235	U211	10
(f) Chlorinated fluorocarbons	NA		5,000
F002		**F002**	**10**
The following spent halogenated solvents: all spent solvent mixtures/blends containing, before use, a total of 10 percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.			
(a) Tetrachloroethylene	127184	U210	100
(b) Methylene chloride	75092	U080	1,000
(c) Trichloroethylene	79016	U228	100
(d) 1,1,1-Trichloroethane	71556	U226	1,000
(e) Chlorobenzene	108907	U037	100
(f) 1,1,2-Trichloro-1,2,2 trifluoroethane	76131		5,000
(g) o-Dischlorobenzene	95501	U070	100
(h) Trichlorofluoromethane	75694	U121	5,000
(i) 1,1,2-Trichloroethane	79005	U227	100
F003		**F003**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:			
(a) Xylene	1330207		1,000
(b) Acetone	67641		5,000
(c) Ethyl acetate	141786		5,000
(d) Ethylbenzene	100414		1,000
(e) Ethyl ether	60297		100
(f) Methyl isobutyl ketone	108101		5,000
(g) n-Butyl alcohol	71363		5,000
(h) Cyclohexanone	108941		5,000
(i) Methanol	67561		5,000
F004		**F004**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:			
(a) Cresols/Cresylic acid	1319773	U052	100
(b) Nitrobenzene	98953	U169	1,000

F005		**F005**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:			
(a) Toluene	108883	U220	1,000
(b) Methyl ethyl ketone	78933	U159	5,000
(c) Carbon disulfide	75150	P022	100
(d) Isobutanol	78831	U140	5,000
(e) Pyndine	110861	U196	1,000
F006		**F006**	**10**
Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.			
F007		**F007**	**10**
Spent cyanide plating bath solutions from electroplating operations.			
F008		**F008**	**10**
Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.			
F009		**F009**	**10**
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.			
F010		**F010**	**10**
Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.			
F011		**F011**	**10**
Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.			
F012		**F012**	**10**
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.			
F019		**F019**	**10**
Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process.			
F020		**F020**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)			
F021		**F021**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.			

F022	**F022**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.		
F023	**F023**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.)		
F024	**F024**	**1**
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in Section 261.32.)		
F025	**F025**	**1**
Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.		
F026	**F026**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions.		
F027	**F027**	**1**
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.)		
F028	**K028**	**1**
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, and F027.		
F032	**F032**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used clorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		

F034	**F034**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		
F035	**F035**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		
F037	**F037**	**1**
Petroleum refinery primary oil/water/solids separation sludge--any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment unites) and K051 wastes are not included in this listing.		
F038	**F038**	**1**
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge--any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from once-through non-contact cooling waters segregated from treatment from other process or oil cooling wastes, sludges and floats generated in aggressive biological treatment units as defined in 261.31(b) (2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.		
K001	**K001**	**1**
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.		
K002	**K002**	**10**
Wastewater treatment sludge from the production of chrome yellow and orange pigments.		
K003	**K003**	**10**
Wastewater treatment sludge from the production of molyodate orange pigments.		
K004	**K004**	**10**
Wastewater treatment sludge from the production of zinc yellow pigments.		
K005	**K005**	**10**
Wastewater treatment sludge from the production of chrome green pigments.		
K006	**K006**	**10**
Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).		

K007 Wastewater treatment sludge from the production of iron blue pigments.	**K007**	**10**
K008 Oven residue from the production of chrome oxide green pigments.	**K008**	**10**
K009 Distillation bottoms from the production of acetaldehyde from ethylene.	**K009**	**10**
K010 Distillation side cuts from the production of acetaldehyde from ethylene.	**K010**	**10**
K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.	**K011**	**10**
K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.	**K013**	**10**
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile.	**K014**	**5,000**
K015 Still bottoms from the distillation of benzyl chloride.	**K015**	**10**
K016 Heavy ends or distillation residues from the production of carbon tetrachloride.	**K016**	**1**
K017 Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.	**K017**	**10**
K018 Heavy ends from the fractionation column in ethyl chloride production.	**K018**	**1**
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.	**K019**	**1**
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.	**K020**	**1**
K021 Aqueous spent antimony catalyst waste from fluoromethanes production.	**K021**	**10**
K022 Distillation bottom tars from the production of phenol/acetone from cumene.	**K022**	**1**
K023 Distillation light ends from the production of ophthalic anhydride from naphthalene.	**K023**	**5,000**
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene.	**K024**	**5,000**
K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene.	**K025**	**10**
K026 Stripping still tails from the production of methyl ethyl pyridines.	**K026**	**1,000**
K027 Centrifuge and distillation residues from toluene diisocyanate production.	**K027**	**10**
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.	**K028**	**1**
K029 Waste from the product steam stripper in the production of 1,1,1-trichloroethane.	**K029**	**1**

K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.	**K030**	**1**
K031 By-product salts generated in the production of MSMA and cacodylic acid.	**K031**	**1**
K032 Wastewater treatment sludge from the production of chlordane.	**K032**	**10**
K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.	**K033**	**10**
K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.	**K034**	**10**
K035 Wastewater treatment sludges generated in the production of creosote.	**K035**	**1**
K036 Still bottoms from toluene reclamation distillation in the production of disulfoton.	**K036**	**1**
K037 Wastewater treatment sludges from the production of disulfoton.	**K037**	**1**
K038 Wastewater from the washing and stripping of phorate production.	**K038**	**10**
K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.	**K039**	**10**
K040 Wastewater treatment sludge from the production of phorate.	**K040**	**10**
K041 Wastewater treatment sludge from the production of toxaphene.	**K041**	**1**
K042 Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	**K042**	**10**
K043 2,6-Dichlorophenol waste from the production of 2,4-D.	**K043**	**10**
K044 Wastewater treatment sludges from the manufacturing and processing of explosives.	**K044**	**10**
K045 Spent carbon from the treatment of wastewater containing explosives.	**K045**	**10**
K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.	**K046**	**10**
K047 Pink/red water from TNT operations.	**K047**	**10**
K048 Dissolved air flotation (DAF) float from the petroleum refining industry.	**K048**	**10**
K049 Slop oil emulsion solids from the petroleum refining industry.	**K049**	**10**

K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry.	**K050**	**10**
K051 API separator sludge from the petroleum refining industry.	**K051**	**10**
K052 Tank bottoms (leaded) from the petroleum refining industry.	**K052**	**10**
K060 Ammonia still lime sludge from coking operations.	**K060**	**1**
K061 Emission control dust/sludge from the primary production of steel in electric furnaces.	**K061**	**10**
K062 Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).	**K062**	**10**
K064 Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.	**K064**	**10**
K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.	**K065**	**10**
K066 Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.	**K066**	**10**
K069 Emission control dust/sludge from secondary lead smelting.	**K069**	**10**
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.	**K071**	**1**
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	**K073**	**10**
K083 Distillation bottoms from aniline extraction.	**K083**	**100**
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K084**	**1**
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.	**K085**	**10**
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.	**K086**	**10**
K087 Decanter tank tar sludge from coking operations.	**K087**	**100**
K088 Spent potliners from primary aluminum reduction.	**K088**	**10**

K090 Emission control dust or sludge from ferrochromiumsilicon production.	**K090**	**10**
K091 Emission control dust or sludge from ferrochromium production.	**K091**	**10**
K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.	**K093**	**5,000**
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.	**K094**	**5,000**
K095 Distillation bottoms from the production of 1,1,1-trichloroethane.	**K095**	**100**
K096 Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	**K096**	**100**
K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.	**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.	**K099**	**10**
K100 Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.	**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.	**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	**K105**	**10**
K106 Wastewater treatment sludge from the mercury cell process in chlorine production.	**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines.	**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K109**	**10**

K110 Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.	**K111**	**10**
K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K114**	**10**
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.	**K116**	**10**
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.	**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.	**K118**	**1**
K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.	**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.	**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.	**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.	**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.	**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.	**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	**K136**	**1**

K141 Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).	**K141**	1
K142 Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal.	**K142**	1
K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.	**K143**	1
K144 Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.	**K144**	1
K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.	**K145**	1
K147 Tar storage tank residues from coal tar refining.	**K147**	1
K148 Residues from coal tar distillation, including, but not limited to, still bottoms.	**K148**	1
K149 Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.]	**K149**	10
K150 Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	**K150**	10
K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	**K151**	10
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.)	**K157**	++
K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.	**K158**	++
K159 Organics from the treatment of thiocarbamate wastes.	**K159**	++
K160 Solids (including filter wastes, separation solids, and spent catalysts) from the production of thio-carbamates and solids from the treatment of thiocarbamate wastes.	**K160**	++

K161	**K161**	++
Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)		

Notes:
1 Chemical Abstract Service (CAS) Registry Number.
2 USEPA Hazardous Waste Number.
3 Reportable quantity release that requires notification. (See Chapter 18, "Spill Prevention and Response Planning").
4 Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR'. Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.
++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).
+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.
# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.
The statutory RQ for this hazardous substance may be adjusted in a future rulemaking; until then the statutory RQ applies.
1* Indicates that the 1-pound RQ is a statutory RQ.
** Indicates that no RQ is being assigned to the generic or broad class.
(1+) Indicates that the statutory source for designation of this hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is Clean Water Act (CWA) Section 311(b)(4).
(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 30711(a)(4).
(3+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA section 112.
(4+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is Resource Conservation and Recovery Act, Section 3001.

A2. APPENDIX 2

DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

A2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

A2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

A2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

A2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

A2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

AP2.4. For installations with POL Storage Containers:

A2.4.1. Single POL Storage Container Facilities. For facilities containing only one aboveground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

A2.4.2. Multiple POL Storage Container Facilities

A2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

A2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single above ground oil or hazardous substance storage container.

A2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

A2.4.2.3.1. The total capacity of the above ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

A2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

A2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.

9

ENVIRONMENTAL FINAL GOVERNING STANDARDS

for US Forces in

EGYPT

Prepared by United States Central Command Air Forces

FINAL GOVERNING STANDARDS

FOR

ENVIRONMENTAL SECURITY

BY

UNITED STATES FORCES

IN

EGYPT

PREPARED BY
HEADQUARTERS UNITED STATES CENTRAL COMMAND AIR FORCES
ON BEHALF OF UNITED STATES CENTRAL COMMAND,
THE DOD ENVIRONMENTAL EXECUTIVE AGENT FOR EGYPT

FINAL GOVERNING STANDARDS
FOR
ENVIRONMENTAL SECURITY
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HEADQUARTERS UNITED STATES CENTRAL COMMAND AIR FORCES

EXECUTIVE SUMMARY

This document contains the "Final Governing Standards" (FGS) for environmental protection by U.S. forces in Egypt. It has been prepared to meet the requirements of Department of Defense (DOD) Directive 4715.1 by Headquarters United States Central Command Air Forces (USCENTAF) as the Executing Agent for United States Central Command (USCENTCOM), the Department of Defense's Environmental Executive Agent for the countries comprising the USCENTCOM area of responsibility. These final governing standards are based primarily upon the generally accepted environmental standards for DOD installations and activities in the U.S.(as contained in the Overseas Environmental Baseline Guidance Document - OEBGD, October 1992 and its subsequent revisions), but also take into account U.S. legal obligations in Egypt as well as Egyptian enforcement practices and policies. The FGS is designed to serve as a single and complete source of the environmental protection practices U.S. forces must comply with at DOD installations, facilities, and activities in Egypt. Each Service Component Command, Military Department, or Defense Agency with personnel operating in Egypt will issue the appropriate directives to ensure compliance with these standards

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CHAPTER I

INTRODUCTION

A. PURPOSE. To provide specific standards for environmental protection at facilities used by US forces for the activities of U.S. forces in Egypt.

B. APPLICABILITY. This document applies to all DOD installations, facilities, and activities of U.S. forces in Egypt; however, this document does not apply to:

1. Field operations conducted during time of war or contingency;

2. Operations of US Naval vessels or US military aircraft, which will be operated in accordance with other DOD policies, directives, and applicable international agreements;

3. Facilities and activities covered under E.O. 12344, Naval Nuclear Propulsion Program, and conducted pursuant to 10 USC 7158;

4. The determination or conduct of remedial or cleanup actions to correct environmental problems caused by the Department of Defense's past activities. Such actions shall be determined and conducted in accordance with applicable international agreements, Status of Forces Agreements, and US government policy.

C. POLICY. Executing Agents will develop site-specific procedures for any US activity producing a waste stream that is not disposed of or managed by the host nation. FGS will apply to units operating from a specific location for 90 or more days of either continuous or intermittent operation annually. For the country of Egypt, the FGS will also apply to the biennial Exercise BRIGHT STAR. Unit deployments overseas will include an environmental annex in their deployment plan, as specified by JCS Publication 4-04, "Joint Doctrine for Civil Engineering Support," and will reference these operating standards.

D. RESPONSIBILITIES.

1. HQ USCENTCOM, as the Unified Command and DOD Executive Agent for the Central region will:

a. Coordinate and maintain oversight on the implementation of DOD Directive 4715.1 by its Executive and Executing Agents and all US forces operating in the AOR.

b. Coordinate with the Joint Staff, relevant Offices of the Secretary of Defense (OSD), Defense Agencies, and other Federal Agencies, as required, on environmental matters affecting Egypt.

c. Assist with coordination between Component Commands and Defense Agencies in environmental matters.

d. Develop and publish USCENTCOM policy guidance for Environmental Security (previously Environmental Protection) by US forces within the Central region.

e. Approve and establish the effective implementation date of the Final Governing Standards (FGS) to be used by US forces in Egypt.

f. Review and, if required, propose appropriate corrective action to USCENTCOM component command's implementation of regulations, operating instructions, checklists, and audit/inspection programs to insure that they comply with the FGS.

g. Coordinate with the Defense Logistics Agency (DLA), and USCENTCOM components as necessary, for appropriate disposal of hazardous waste generated by U.S. forces in Egypt.

h. Approve contracts for disposal of US forces-generated hazardous waste in Egypt.

2. HQ USCENTAF, as Executing Agent for Egypt, will:

a. Develop and draft the FGS for Egypt. Identify Egyptian national environmental laws and standards, including those specifically delegated to regional or local governments for implementation, to determine their applicability to DOD activities and facilities and maintain copies of applicable Egyptian environmental documents, standards, and regulations.

b. Identify and maintain copies of all regional and international environmental conventions, treaties, and agreements that the Government of Egypt is a signatory to, has ratified, or has been assimilated as a general practice within the country.

c. Maintain current status on Egyptian environmental laws, policies, and trends that could effect US forces.

d. Evaluate Egyptian capability to dispose of hazardous waste in country.

e. Coordinate with the Defense Logistics Agency (DLA) and USCENTCOM component commands as necessary for appropriate disposal of US forces-generated hazardous waste from Egypt.

f. Keep USCENTCOM, its component commands, and defense agencies informed of Egyptian environmental actions and policy changes.

g. Review compliance with the FGS by US forces operating in Egypt.

h. Insure publication and distribution of USCENTCOM approved FGS to each service component, defense agency, and JTF operating in Egypt.

3. USCENTCOM component commands and defense agencies with personnel operating within Egypt shall:

a. Require compliance with approved Final Governing Standards.

b. Conduct internal environmental compliance audits in accordance with the section E.2.a, below and the OEBGD, Chapter 1. Audit and submit reports to the Egypt executing agent (USCENTAF).

c. Program and budget for environmental projects needed to comply with the FGS.

d. Ensure US contracts for services or construction and DOD contracts for the disposal of hazardous waste include provisions requiring the contractor to comply with the FGS, and that the administration contracts include compliance reviews.

e. Ensure that host-tenant agreements between US forces require compliance with the FGS.

f. Develop and conduct training/education programs to instruct all personnel in the environmental aspects of their jobs and FGS requirements.

g. Report to USCENTCOM any condition, event, or practice that is not in conformance with the FGS.

E. AUDITING.

1. The objectives of the auditing program are to:

a. Determine overall environmental compliance status.

b. Improve and enhance installation environmental compliance and program management.

c. Identify and provide support for financial programs and budgets for environmental compliance program management.

d. Anticipate future environmental programs.

e. Ensure that the Executive Agent, Executing Agent, DOD components, installation and activity commanders are effectively addressing environmental problems which could:

1). Impact mission effectiveness;

2). Jeopardize the health or safety of US personnel or the general public;

3). Significantly degrade the environment;

4). Expose the US Government and its employees to avoidable financial liabilities as a result of non-compliance with environmental requirements;

5). Erode Egyptian confidence in the US and its defense establishment;

6). Expose individuals to civil and criminal liability.

f. Ensure all personnel are trained/educated in the environmental aspects of their job.

2. Responsibility.

a. Each USCENTCOM component is responsible for establishing and implementing an auditing program for its activities and facilities in Egypt. As a minimum, an internal audit will be conducted annually and an external audit will be conducted triennially. All audit reports will be submitted to the Executing Agent for Egypt.

b. Each USCENTCOM component and defense agency is responsible for identifying to the USCENTCOM which of their activities and facilities are subject to auditing. Generally, most US occupied facilities, which would be governed by a regulatory agency in the United States, will be auditing candidates.

F. WAIVERS.

1. DOD components, major commands, and major claimants may issue supplementary criteria that are more protective of the environment than required by the Final Governing Standards for their subordinates.

2. If compliance with the FGS for a particular activity or facility would seriously impair operations, adversely affect relations with Egypt, or require substantial expenditure of funds not available for such purpose, a USCENTCOM Component, JTF Commander, or defense agency may ask USCENTCOM to waive, authorize deviation from, or approve modification to particular standards.

3. Waiver requests must include a complete justification, anticipated duration, and impact if not granted.

4. No waivers of treaty obligations may be granted under this process. Requests of this nature will be forwarded to the DOD Executive Agent for appropriate action.

5. Where the waiver or deviation is to a standard based on Egyptian law, the DOD Executive Agent shall consult with the Office of Military Cooperation (OMC) at the US diplomatic mission in Egypt.

6. USCENTCOM Executing Agents shall maintain written records of all waivers, deviations, and modifications granted.

7. USCENTCOM (CCJ4/7) may directly authorize temporary emergency waivers and deviations if necessary to accomplish an operational mission.

G. INTERNATIONAL CONVENTIONS AND TREATIES. Egypt is a party to or has participated in the negotiation of the following international or regional environmental declarations, conventions and protocols:

1. African Convention on the Conservation of Nature and Natural Resources (1968)

2. Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1991)*

3. Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal (1989)

4. Convention on Biological Diversity (1992)**

5. Montreal Protocol on Substances that deplete the Ozone Layer (1987) and the Vienna Convention for the Protection of the Ozone Layer (1985)

6. Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitats (1971)

7. Rio Declaration on Environment and Development (1992)

8. United Nations Framework Convention on Climate Change (1992)**

* US is not a signatory
** Egypt is a signatory, however, legislative authorities have not ratified

H. TIMING FOR COMPLIANCE. These Final Governing Standards become effective immediately upon approval by Headquarters, USCENTCOM.

I. CITATION. This document may be referred to as the "Final Governing Standards" for Egypt.

CHAPTER II

ENVIRONMENTAL MEDIA AREAS

A. AIR QUALITY.

1. Baseline Standards: Criteria for air emissions and performance standards applied to Department of Defense (DOD) owned and operated equipment are contained in Chapter 2 of Appendix B.

2. Waived/Modified Standards: None

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

B. DRINKING WATER.

1. Baseline Standards: Criteria for potable water, which would otherwise be identified in Chapter 3 of Appendix B, has been modified. The bottled water standards at Appendix D will be applied to water distributed to US forces through the host nation public works system and will be used by the USCENTCOM Veterinary Services (CVS) when testing production facilities.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: Drinking water is collected from a deep water well and treated by a reverse osmosis water purification (ROWPU) system at a rate of 3,000 gal/hour/ROWPU. During BRIGHT STAR, the deployed lead unit will verify that the quality of the water, from the ROWPU, meets the requirements as listed in Chapter 3 of Appendix B.

C. WASTEWATER.

1. Baseline Standards: Criteria to control and regulate discharges of wastewater into surface waters are contained in Chapter 4 of the Appendix B. This includes, but is not limited to, domestic and industrial wastewater discharges and pollutants from non-point or indirect discharges. This does not address septic tanks or on-site treatment processes unless they discharge to surface waters. The siting of such systems is addressed in Chapter 9 of the Appendix B.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: Biological waste from the biomedical research laboratories shall be treated by heating the wastewater to 310 degrees Fahrenheit for one hour. The water should then be cooled and discharged to the city sewage waste system. Effluent monitoring is not required.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: All gray water and water collected from vehicle wash racks shall be collected in an evaporation lagoon. Wastewater from vehicle wash racks should be treated by an oil/water separator before discharge into an evaporation lagoon. Sludge from oil/water separators should be sampled for hazardous characteristics prior to its disposal. Sludge that displays characteristics of hazardous waste shall be handled and disposed of according to Chapter 6 of Appendix B.

D. HAZARDOUS MATERIAL.

1. Baseline Standards: Criteria for the storage, handling, and disposition of hazardous materials used by US forces are contained in Chapter 5 of Appendix B. It does not cover solid waste, underground storage tanks, petroleum storage and related spill contingency and emergency response requirements. These matters are covered under separate chapters of Appendix B. This document does not cover munitions. For guidance on munitions see the Military Munitions Rule, 62 Federal Register 6621.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

E. HAZARDOUS WASTE.

1. Baseline Standards: Criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed and recycled in an environmentally-sound manner are contained in Chapter 6 of Appendix B.

2. Waived/Modified Standards:

a. Disposal of all hazardous waste, except as noted below, will be through a DRMS-I administered contract. The current DRMS-I contract is with LaidLaw Environmental Services and runs through FY 00. Hazardous waste is turned over to DRMR-I prior to its disposal.

b. Generators of hazardous waste must maintain a Hazardous Waste Profile Sheet (HWPS - DRMS Form 1930). Waste profile sheets should be started as soon as a Hazardous Waste Collection Point (HWCP) begins accumulating waste. Instructions for filling out a HWPS and a sample are located in Appendix F.

1). The following materials are prohibited for turn in to DRMS-I:

a). Toxicological, biological, radiological, and lethal chemical warfare materials which, by US law, must be destroyed.

b.) Material such as radioactive and controlled medical items that cannot be disposed of in their present form because of military regulations.

c.) Municipal-type garbage, trash, and refuse.

d.) Contractor-generated materials that are the contractor's responsibility under terms of a contract.

e.) Sludge resulting from municipal-type wastewater treatment operations.

f.) Sludge and residue resulting from industrial waste treatment operations.

g.) Refuse and other described materials that result from mining, dredging, construction, and demolition operations.

h.) Unique wastes and residues of a non-recurring nature that research and development experimental programs generate.

2). Contact the DRMS-I representative for a list of wastes that can be recycled, reclaimed, or resold. Samples of materials that are commonly recycled, reclaimed, or resold throughout the USCENTCOM AOR:

a.) Used POL. Used Petroleum, Oil and Lubricants (POL) may be reclaimed by local contractors for energy recovery, even if the POL exhibits characteristics of reactivity, ignitablity, or corrosivity. This is not true, however, if the POL has been mixed with a hazardous waste, or exhibits the characteristic of toxicity. When used POL is mixed with hazardous waste, it is considered a hazardous waste and cannot be burned for energy reclamation.

b.) Solvents. Resale of spent solvents is only possible if the solvent is not contaminated by other hazardous substances.

c.) Lead Acid Batteries.

d.) Ethylene Glycol (antifreeze). Antifreeze may be recycled for additional use.

3). Procedures for turning over hazardous waste to DRMS-I:

a). Prepare waste by properly identifying, packing, and labeling for shipment.

b.) Fill out four copies of DD Form 1348-1. Fill out the form in accordance with the instructions provided in Appendix F.

c.) Schedule a pre-inspection meeting with DRMS-I.

c. US forces will not operate hazardous waste treatment facilities in Egypt.

d. Egypt has participated in the negotiation of a number of international and regional environmental conventions. Importing Hazardous Waste into Egypt is specifically prohibited by the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1991). The only exception to this convention is the transportation of hazardous waste through the Suez Canal. While the US is not a party to some of these conventions, Egyptian laws or policies implementing these conventions may affect the activities of US forces. In those instances where there is a noticeable or significant impact on the activities or operations of US forces, seek guidance from the Executing Agent and USCENTCOM.

3. Site-specific Procedures:

a. NAMRU-3: NAMRU-3 is a designated disposal location for hazardous waste pick-up under the current DRMS-I hazardous waste disposal contract.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: Hazardous waste should be properly documented, classified, labeled, packed, and manifested for delivery to the DRMS-I representative. During smaller exercises, when directed by the executing agent, limited quantities of hazardous waste may be retrograded back to the United States, via military airlift, for disposal through stateside DRMO channels. Certified military personnel are responsible for labeling, packing, and manifesting hazardous waste.

F. SOLID WASTE.

1. Baseline Standards: Criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated and disposed of safely, and in a manner protective of human health and the environment, are contained in Chapter 7 of Appendix B.

2. Waived/Modified Standards: Open burning of solid waste is prohibited. A waiver is required to dispose of solid waste by open burning. Waivers will be considered based on mission requirements, to ensure safety and health of military personnel by eliminating breeding areas for vectors, local disposal is not economically feasible or local disposal contractors not available.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: A waiver is required for US forces personnel to perform open burn disposal of solid waste during Exercise BRIGHT STAR.

G. MEDICAL WASTE MANAGEMENT.

1. Baseline Standards: Criteria for the management of medical waste generated by US forces at medical and dental treatment facilities generated in the diagnosis, treatment or immunization of human beings or animals are contained in Chapter 8 of Appendix B. It does not apply to what would otherwise be household waste.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: Pathological waste is generated and incinerated on site in a certified medical incinerator.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: Medical waste is disposed of through the NAMRU-3 incinerator.

H. PETROLEUM, OIL, AND LUBRICANTS.

1. Baseline Standards: Criteria to control and abate pollution resulting from the storage, transport, and distribution of petroleum products are contained in Chapter 9 of Appendix B.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

I. NOISE.

1. Baseline Standards: Criteria to control environmental noise within US enclaves contained in Chapter 10 of Appendix B. These criteria are limited to measures allowing reasonable internal DOD planning efforts and do not address procedures for operating aircraft or ships, which are outside the scope of DOD Directive 4715.1.

2. Waived/Modified Standards:

a. Standards for maximum permissible noise limits for outdoor noise environment are:

	Permissible Limit for Sound Loudness (dB)		
Type of Zone	0700-1800	1800-2200	2200-0700
Commercial zones Mid Town	55 - 65	50 - 60	45 - 55
Dwelling zones on a public road	50 - 60	45 - 55	40 - 50
Dwelling zones in the city	45 - 55	40 - 50	35 - 45
Dwelling suburbs	40 - 50	35 - 45	30 - 40
Rural dwelling	35 - 45	30 - 40	25 - 35

zones (hospitals)			
Industrial zones (heavy industries)	60 - 70	55 - 65	50 - 60

b. No waiver requirements exist.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

J. PESTICIDES.

1. Baseline Standards: Criteria regulating the use, storage, handling, and disposal of pesticides, and defoliants are contained in Chapter 11 Appendix B. Specific disposal procedures for pesticides are contained in Chapters 5 and 7 in Appendix B.

2. Waived/Modified Standards:

a. Aerial dispersment of pesticides shall not be performed except in cases deemed an extreme necessity by the Executive Agent. In such event, the areas required to be sprayed shall be indicated on charts and highlighted by a special color. Impediments to flying and regions in which spraying is prohibited will also be properly annotated on the charts. Spraying the areas in the vicinity of dwelling zones, apiaries, fish farms, poultry farms, and other animal folds shall be prohibited to guarantee that humans, animals, plants, water courses, and the rest of their environmental components shall not be exposed, directly or indirectly, to the harmful effects of these pesticides.

b. No waiver requirements exist.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: Only DOD approved pesticides will be used at any time during the exercise. Pesticide use will be annotated on DD Form 1532-1 and reported through the component service that applied the pesticides.

K. HISTORIC AND CULTURAL RESOURCES.

1. Baseline Standards: Criteria for required plans and programs needed to ensure proper protection and management of cultural resources, including historic and prehistoric properties under DOD control, and properties on the World Heritage List (Appendix E) are contained in Chapter 12 of Appendix B.

2. Waived/Modified Standards: No waived or modified standards exist; however, historic and cultural areas are identified in Appendix E.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

L. NATURAL RESOURCES, WETLANDS, AND ENDANGERED SPECIES.

1. Baseline Standards: Criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any biological species declared endangered or threatened by either the United States or host nation governments are contained in Chapter 13 of Appendix B. Biological species include all plants and animals existing on properties under DOD control.

2. Waived/Modified Standards: No waived or modified standards exist; however, a listing of Egyptian natural resources, wetlands, and endangered species is located at Appendix E.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

M. POLYCHLORINATED BIPHENYLS.

1. Baseline Standards: Criteria to control and abate threats to human health and the environment from handling, use, storage and disposal of polychlorinated biphenyls (PCBs) are contained in Chapter 14 of Appendix B.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

N. ASBESTOS.

1. Baseline Standards: Criteria to control and abate threats to human health from asbestos, and a description of management of asbestos during the removal and disposal are contained in Chapter 15 of Appendix B.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

O. RADON.

1. Baseline Standards: Criteria for assessing radon in facilities and mitigating excessive radon levels are contained in Chapter 16 of Appendix B.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: No site-specific procedures exist.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

P. SPILL PREVENTION AND RESPONSE PLANNING.

1. Baseline Standards: Criteria to prevent, control and report spills of POL and hazardous substances are contained in Chapter 18 of Appendix B.

2. Waived/Modified Standards: None

3. Site-specific Procedures: The following spills will be reported through USCENTAF to USCENTCOM (CCJ4/7-E) within 24 hours of response/containment:

a. Any spill over 110 gallons;

b. Any spill of an acutely toxic substance

c. Any spill that results in an injury; or

d. Any spill involving the HN waters or water supply.

Q. UNDERGROUND STORAGE TANKS.

1. Baseline Standards: Criteria to control and abate pollution resulting from POL products and hazardous substances stored in underground storage tanks (UST) are contained in Chapter 19 of Appendix B. Standards for UST containing hazardous wastes are covered in Chapter 5 of Appendix B.

2. Waived/Modified Standards: None.

3. Site-specific Procedures:

a. NAMRU-3: Three UST are present on the compound. Two UST contain diesel No. 2 for the steam generators and the remaining UST contains MOGAS for the incinerator. Visual leak inspections are applied, however, UST must be tightness tested in accordance with Chapter 19 of Appendix B.

b. Hurghada: No site-specific procedures exist.

c. BRIGHT STAR: No site-specific procedures exist.

APPENDIX A

DEFINITIONS

Audit - Planned and documented investigations of a facility, item, or process to determine its adequacy and effectiveness, as well as compliance standing with established regulations, policies, specifications, and/or other pertinent documents. (Appendix B, Chapter 1)

CAS # - Chemical Abstract Service number. Since the 1890's, the Chemical Abstract Service has been assigned identification numbers to chemicals that companies register with them. Every year, CAS updates and writes new chemical abstracts on over a million different chemicals, including their composition, structure, characteristics, and all the different names of that chemical. Each abstract is accompanied by the CAS number. (Appendix D)

Criteria - Particular substantive provisions of the baseline guidance document that are used by the Executing Agent to develop final governing standards for a country. These factors are used to determine limits on allowable concentration levels, and to limit the number of violations per year. (Appendix B, Chapter 1)

DOD - Department of Defense

DRMS-I - Defense Reutilization Marketing Service - International. Defense Logisitic Agency office responsible for coordinating removal, reuse, and disposal of wastes from the United States Central Command area of responsibility.

DRMS - Defense Reutilization Marketing Service. See also DRMS-I.

Executive Agent - USCENTCOM is the executive agent for Southwest Asia and is responsible for oversight of the implementation of environmental policies and programs.

Executing Agent - Component responsible for development and implementation of a Final Governing Standard (FGS) on the environment. Also responsible for the coordination of all environmental policy and its changes and ensuring US forces comply with the FGS. The Executing Agent for Egypt is the United States Central Command Air Forces.

Existing - Any facility, source or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified. (Appendix B, Chapter 1)

Final Governing Standards (FGS) - Country-specific substantive provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice, with which DOD forces must comply.

Host Nation (HN) - Host Nation for this document is Egypt.

Installation - Those DOD facilities that have been assigned a unique DOD installation/station code as defined by military department regulations issued pursuant to DOD Instruction 4165.14.
(Appendix B, Chapter 1)

JTF - Joint Task Force

Major command - Subordinate commands under the control of the separate DOD components (i.e., Air Combat Command within the Air Force).

Major claimant - For the purposes of this document, major claimants will be defined as joint commands, and their components (e.g., United States Central Command, United States Central Command Air Force).

MCL - Maximum Contaminant Levels. The maximum permissible regulatory level of a contaminant considered to be harmless to humans in their living and working environments. MCLs are enforceable standards. (Appendix D)

Measurements -

BTU - British Thermal Unit - the quantity of heat required to raise the temperature of one pound of water one degree Fahrenheit at a specified temperature (at 39° F)

CU - Color Units. Used in water quality to measure the color of the water.

f/cc - Fiber per cubic centimeter

Mf/L - Million fibers per liter

mil - 1/1000 of an inch

mg/L - Milligrams per liter

pCi/L - PicoCuries per liter. The prefix pico denotes a value of 10^{-12} or one trillionth.

pH - Term used in expressing both acidity and alkalinity on a scale from 1 to 14 with 7 representing neutrality. Numbers less than 7 represent increasing acidity and those greater than 7 represent increasing alkalinity.

ppm - Parts per million

Mrem/yr - Million Roentgen Equivalent Man per year. REM is the dosage of ionizing radiation that will cause the same biological effect as one roentgen of X-ray or gamma-ray dosage. REM is used to measure to amount of radiation to which a person or part of the body has been exposed.

TU - Turbidity units. Measures clarity or purity of water.

NAMRU-3 - Naval Medical Research Unit 3

New - Any facility, source or project with a construction start date on, or after, 1 October 1994. (Appendix B, Chapter 1)

NRCC - Naval Regional Contracting Center. The NRCC for this region is located in Bahrain.

OMC - Office of Military Cooperation. The OMC is located in the United States Embassy in Cairo, Egypt. This office is responsible for coordinating US forces activities with the Egyptian government.

PPE - Personal Protective Equipment. Protective equipment, including, but not limited to, anticontamination clothing such as acid suits, lab coats, radiation suits, and dust masks; eye protection such as goggles, safety glasses, safety glasses with side shields; fall protection devices such as safety belts, safety lines, and nets; flame retardant clothing; safety boots; shoe covers; gloves; hard hats; hearing protection; respirators; seat belts.

Policy - Broad statement of a goal or theme that should be incorporated into requirements. (Appendix B, Chapter 1)

Standards, Final Governing - See Final Governing Standards.

Substantial modification - Any modification the cost of which exceeds $1 million, regardless of funding source. (Appendix B, Chapter 1)

USCENTCOM - OSD-appointed, DoD executive agent responsible for development of FGS and the oversight of environmental actions in assigned countries. The DoD environmental Executive Agent for the entire AOR is USCINCENT.

USARCENT - United States Army Forces Central Command; the US Army component to USCENTCOM

USCENTAF - United States Central Command Air Forces; the US Air Force component to USCENTCOM

USNAVCENT - United States Navy Forces Central Command; the US Navy component to USCENTCOM

USMARCENT - United States Marine Forces Central Command; the US Marines component to USCENTCOM

APPENDIX B

DEPARTMENT OF DEFENSE
OVERSEAS ENVIRONMENTAL BASELINE
GUIDANCE DOCUMENT

(Document available under separate cover)

APPENDIX C

SOURCES OF ASSISTANCE/POINTS OF CONTACT

Unified Command and DOD Executive Agent for the Central Region:

HQ USCENTCOM (CCJ4/7E)
7115 South Boundary Blvd.
MacDill AFB, FL 33621-5101

COMM	(813) 828-5833
DSN	968-6607
FAX	(813) 828-6428

Executing Agent for Egypt:

USCENTAF/A1-CEX
524 Shaw Drive
Shaw AFB, SC 29152-5029

COMM	(803) 668-3249
DSN	965-3249/3459/2678
FAX	(803) 668-3861
EMAIL	a1cexv@hq.centaf.af.mil

Component Commands:

HQ ARCENT
ATTN AFRD-EN-E
1881 Hardee Avenue SW
FT McPherson, GA 30330-1064

COMM	(404) 464-4895/2907/4893/2908
DSN	367-4895/2907/4893/2907
FAX	(404) 464-4894 or DSN 367-4894
EMAIL	Fletchjr@arcent.army.mil

For USNAVCENT
Atlantic Division, Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, VA 23511-2699

COMM	(804) 322-4767
DSN	262-4767
FAX	(804) 322-4805

Office of Military Cooperation, U.S. Embassy, Egypt:

U.S. Embassy Cairo

Attn: USOMC/MCS
Unit 64900
APO AE 09839-4900

COMM	011-202-357-2773
DSN	725-2773/1456/3157/2144
FAX	011-202-357-2586/2273
SEC FAX	011-202-357-3415

US Defense Logistics Agency

Southwest Asia Operations Liaison Officer
Samuel P. Swearingen
American Embassy Abu Dhabi
DRMS-I
Department of State
Washington, D.C. 20521-6010

COMM	011-971-243-6691 (ext 2439)
MOBILE	011-971-50-621-9611
PAGER	011-971-89-392-9576
FAX	011-971-245-3121
EMAIL	sswearingen@eurpoe.dla.mil Samuel_Swearingen@arms_post

Defense Reutilization and Marketing Service - International

(US Mailing Address)	(Europe Mailing Address)
DRMS-EH	DRMS-EH
Unit 29263, Box 2000	Postfach 2027
APO AE 09096	65010 Weisbaden, Germany

COMM	49-611-380-7326 (7345/7346)
DSN	314-338-7326 (7325)
FAX	49-611-380-7474

Contracting Points of Contact:

Naval Regional Contracting Center
PSC 451, Box 402
FPO AE 09834
COMM 973-724-670 (405)

USCENTAF/A4-LGC
524 Shaw Dr
Shaw AFB, SC 29152
COMM (803)-668-2021

DSN 965-2021
EMAIL a4lgc@hq.centaf.af.mil

LaidLaw (CONUS)
PO Box 140
Saukville, WI 53080

COMM (414) 284-3427

LaidLaw (AOR)

COMM 9663-827-1666 ext 247
FAX 9663-827-3939

Site Specific Points of Contact:

Naval Medical Research Unit 3
PSC 452 Box 5000
FPO AE 09835-0007

DSN 202-284-1375
FAX 202-282-0792

NAVLOGSUPDET "H", Hurghada
NAVLOGSUPDET"H"
FPO AE 09627-0006

COMM 00-20-65-442-361
FAX 00-20-65-442-361

Exercise BRIGHT STAR

DSN 302-420-1129
FAX 302-420-1933

Points of Contact for Host Nation Environmental Laws and International Environmental Conventions and Protocols:

U.S. Agency for International Development, Egypt
Attn: Environmental Special Projects Officer
106, Kasr El Aini St.
Cairo, Egypt

COMM 011-202-357-3065
FAX 011-202-356-2932

Middle East Library for Economic Services:
6 Soliman Abdel Aziz Soliman St
Agouza-Cairo

COMM: 011 360 6804-711141
FAX: 011 360 6804

World Heritage Committee
UNESCO
7 Place de Fontenoy
Paris-75700
France

URL: http://www.unesco.org/whc
http://www.cco.caltech.edu/%7ESalmon/world.heritage

University of Indiana Law School

URL: http://www.law.indiana.edu/law/v-lib/envlaw

Tufts University, Fletcher School of Diplomacy

URL: http://www.tufts.edu/department/fletcher/multilateral

Consortium for International Earth Science Information Network (CIESIN)
University Center, Michigan

URL: http://sedac.ciesin.org/entri

World Health Organization (WHO)
Regional Office for the Eastern Mediterranean (EMRO)
PO Box 1517
Alexandria-21511
Egypt

COMM: 011-203-48-202-23/202-24
FAX: 011-203-48-38-54684

Egyptian Points of Contact: (to be added at a later date)

Egyptian Environmental Affairs Agency (EEAA)

Ministry of Health

Ministry of Housing and Public Utilities (Solid Waste)

Ministry of Manpower (Occupational and Industrial Safety)

Ministry of Petroleum (EGPC)

Ministry of Public Works and Water Resources

National Organiztion of Potable Water and Sanitary Drainage

APPENDIX D

BOTTLED WATER STANDARDS

Chemical		CAS#	MCL (mg/L unless noted)
1. Inorganics			
	Antimony		0.006
	Arsenic		0.05
	Asbestos		7 Mf/L
	Barium		2
	Beryllium		0.004
	Cadmium		0.005
	Chromium		0.1
	Cyanide		0.1
	Hardness		500
	Hydrogen Sulfide		Non detectable
	Lead		0.005
	Mercury		0.001
	Nickel		0.1
	Nitrate		10
	Nitrite		1
	Nitrate+Nitrite (combined total)		10
	Selenium		0.05
	Sulfate		400
	Thallium		0.002
2. Organics			
	1,1,1 Trichloroethane	71-556	0.2
	1,1,2 Trichloroethane	79-005	0.005
	1,1 Dichloroethene	N/A	0.003
	1,1 Dichloroethane	75-343	0.005
	1,2 Dichloroethane	107-062	0.005
	1,1 Dichloroethylene	75-354	0.005
	1,2,4 Trichlorobenzene	120-821	0.07
	1,2 Dibromo 3 Chloropropane	96-128	0.0002
	1,2 Dichloropropane	78-875	0.005
	2,4,5 TP (Slivex)	93-721	0.01
	2,4,6 Trichlorophenol	88-062	0.01
	2,4 Dichlorophenoxyacetic	94-757	0.07

Chemical.	CAS#	MCL (mg/L unless noted)
Acrylamide	79-061	0.01
Alachlor	15972-608	0.002
Aldicarb	116-063	0.003
Aldicarb Sulfone	1646-884	0.002
Aldicarb Sulfoxide	1646-873	0.004
Aldrin	309-002	0.00003
Atrazine	1912-249	0.003
Benzene	71-432	0.005
Benzo(A) Pryene	50-328	0.00001
Carbofuran	4563-662	0.04
Carbon Tetrachloride	56-235	0.003
Chlorodane	57-749	0.002
Chloroform	67-663	0.03
Chlorobenzene	108-907	0.1
CIS-1,2 Dichloroethylene	156-592	0.07
Dalapon	N/A	0.2
DDT	50-293	0.001
Di(2-Ethlyhexyl) Adipate	N/A	0.001
Dichloromethane	75-092	0.005
Dieldrin	60-571	0.03
Dinoseb	88-857	0.007
Dioxin	1746-01-6	0.000000
Diquat	2764-729	0.02
Endothall	145-733	0.1
Endrin	72-208	0.0002
Epichlorohydrin	106-898	0.4
Ethylbenzene	100-414	0.7
Ethylenedibromide	106-934	0.00005
Glyphosphate	1071-836	0.7
Heptachlor	76-448	0.0004
Heptachloroepoxide	1024-573	0.0001
Heptachlorobenzene	118-741	0.00001
Hexachlorocyclopentadine	77-474	0.05
Lindane	58-899	0.0002
Methyloxychlor	72-435	0.03

Chemical	CAS#	MCL (mg/L unless noted)
Monochlorobenzene	108-907	0.1
Ortho-Dichlorobenzene	95-501	0.6
Oxymyl (Vydate)	N/A	0.2
Polycyclic Aromatic Hydrocarbons	N/A	0.002
Para-Dichlorobenzene	106-467	0.075
Polychlorinated Biphenyl (PCB)	1336-363	0.0005
Pentachlorphenol	87-865	0.001
Phenol	N/A	0.001
Phthalate	N/A	0.006
Picloram	1918-021	0.5
Simazine	122-349	0.004
Styrene	100-425	0.1
Tetrachloroethylene	127-184	0.005
Toluene	108-883	1
Toxaphene	8001-352	0.003
Trans-1,2 Dichloroethylene	127-184	0.1
Trichloroethylene	79-016	0.005
Total Trihalomethanes	N/A	0.1
Vinyl Chloride	75-014	0.002
Xylene	1330-207	10

3. Radiological

Beta (Photon) Emitters		4 Mrem/yr
Gross Alpha		15 pCi/L
Radium 226		20 pCi/L
Radium 228		20 pCi/L
Radon		300 pCi/L
Tritium		20 pCi/L
Uranium		0.02

4. Biological/ Surface

Giardia Lambia	0
Legionella	0
Total *Coliform*	0
Fecal *Coliform*	0
Turbidity	5 TU
Viruses	0

5. Secondary Standards

Aluminum	0.2
Chloride	250
Color	15 CU
Copper	1
Corrosivity	Non (Coupon Method)
Fluoride	1.5
Foaming Agents	0.5
Iron	0.3
Manganese	0.05
Odor	3 T.O.N.
pH	6.5-8.5
Silver	0.1
Total Dissolved Solids (TDS)	500
Zinc	5

APPENDIX E

EGYPT NATURAL, HISTORIC, CULTURAL RESOURCES AND ENDANGERED SPECIES

NATURAL PROTECTORATES IN EGYPT

DECLARED NATURAL PROTECTORATES:

1) Ras Mohamed, Tiran and Sanafir Islands (27 ' 40' N, 34' 15' E). Established in 1983 at the extreme southern extension of South Sinai in the Red Sea, Ras Mohamed is a peninsula of raised petrified coral reef that has cracked and filled with sea water. It features a sea water channel with tropical formation of mangrove trees and shrubs; and inland salt water pool; a series of volcanic cracks filled with sea water and populated by rare and interesting plants and animals, especially crustaceans; a canyon with the ruins of a Roman citadel, surrounded by a multitude of coral reefs and colorful reef fish. Tiran Island is the largest island at the opening of the Gulf of Aqaba. Sandy beaches, which provide nesting grounds for marine turtles, are nearly completely fringed with coral reefs. Ospreys, spoonbills, and the rare sooty falcon are among other bird species which breed on the island, which rises up to 509 meter peak at Gebel Tiran. Sanafir Island lying to the east of Tiran is smaller, lower in elevation and completely surrounded by coral reefs.

2) Lake Bardawil and El Ahrash El Shamalia (31' 10'N, 33'25'E). Established in 1985, Bardawil, in the northern Sinai, is a shallow, hypersaline lagoon with salinities much higher than the adjacent Mediterranean Sea due to the lack of fresh water entering the system and the high rate of evaporation. The lake is situated on a very important migration route of waterbirds and serves as an important staging area for other species of migrating birds as well. In addition many birds breed in the area. The El Ahrash area comprises the scrubland and coastal dunes between El Arish and the international border a Rafah.

3) El-Omayed (30'45'N, 29'15'E). Established in 1986 at the northern edge of the Western Desert about 80 Kilometers west of Alexandria, this tiny, one-kilometer square area is protected solely for its vegetation.

4) Elba (22'N, 36'E). (Four areas). Established in 1986, the Gebel Elba and adjacent area is a remote area in the extreme southeastern part of Egypt and northeast Sudan where the boundary between the two countries has not been mutually agreed. Marking the northern limit of many Afrotropical species, this area, although part of the Eastern Desert, receives considerable precipitation and contains a great diversity of plants and animals, marine and terrestrial.

5) Nile Islands, Saluga and Ghazal (24'05'N, 32'13'E). Established in 1986, this small group of nine islands (two large and seven small) in the Nile River at Aswan are interesting examples of island ecosystems. They are protected for their floral values as well as for the habitat they provide to birds, crustaceans, invertebrates, and aquatic organisms. Each island is an intricate complex of microenvironments created by the location of the islands and their surrounding climate.

6) Ashtum El Gamil, Lade Manzala (31'-20'N, 32'-10'E). Approximately 1200 hectares in the eastern portion of lake Manzala, in the Port Said Governorate, was declared a Natural Protectorate in June 1988. As the largest of the delta lakes, Lake Manzala provides an abundance of fish and waterfowl. The lake is an internationally important wintering area for waterbirds that include common shellduck (*Tadorna tadorna),* shoveler (*Anas clypeata),* and coot (*Fulica atra).* It is also an important staging area for migratory birds.

7) Saint Catherines (33'-57'E. 28'-30'N). Established in June 1988, this area in the South Sinai contains some of the highest mountains in Egypt (over 2500 meters). The rugged granite peaks encompass sites of historic, cultural, and religious significance: The 6th century Greek Orthodox monastery dedicated to St. Catherine; Mount Musa where Moses is believed to have received the ten commandments; and numerous monuments. The mountains also provide habitat for rare endemic plants and a variety of animals such as Nubian ibex, rock hyrax, striped hyena, red fox, and many species of birds.

TENTATIVELY DESIGNATED NATURAL PROTECTORATES:

1. Sinai

   a) Mount St. Catherine area
   b) Ras Mohamed and Tiran Island
   c) Bardawil Lake

2. Eastern Desert and Red Sea Coast

   a) Alaba Mountains
   b) Shayeb-el-Banat Mountains and adjacent mountains
   c) Hamata marine zone south of Marsa Alam (mangrove forests and coral reefs)
   d) Wadi El-Alaqi near its junction with the High Dam Lake

3. Western Desert and Northern Coast

   a) Ras El-Hikma peninsula
   b) Hettiat El-Mogharrah Oasis on the eastern tip of the Qattara Depression
   c) Oweinat Mountains and adjacent areas in the Southwest corner of the Republic

PROPOSED NATURAL PROTECTORATES:

1) Wadi El Rayan and part of Lake Qarun (El Fayoum Governate) Eastern Desert.

2) Part of El Farfra, El Dakhla and El Kharga, Oases - New New Valley, Western Desert.

3) Gebel El Khasheb Petrified Forest (El Maadi near Cairo).

4) Wadi Habib (Eastern Desert near Assiut).

5) Lake Nasser (Aswan Governorate).

6) Extension of El Omayed to include more land of Western Desert.

7) Nabq - Ras El Tantur mangrove sites (South Sinai).

8) Nile Delta Lakes.

WETLANDS OF EGYPT

1) Lake Maryut
2) Lake Idku
3) Lake Burullus
4) Lake Manzala
5) El Mahala
6) Lake Bardawil
7) Wadi Natrun
8) Lake Akyad
9) El Abbassa
10) Timsah
11) Bitter Lakes
12) Dahshur
13) Lake Quarun
14) Wadi Ruwayan
15) Lake Nasser

REPRESENTATIVE LIST OF ENDANGERED ANIMALS IN EGYPT

Mammals

Barbary sheep (*Ammotragus levia ornatus*)
Nubian ibex (*Capra ibex nubiana*)
Wild ass (*Equus asinus africanus*)
Cheetah (*Acinonyx jubatus*)
Slender-horned gazelle (*Gazella leptoceros leptoceros*)
Arabian gazelle (*Gazella gazella arabica*)
Fennec fox (*Vulpes (Fennecus) zerda*)
Sand cat (*Felis sylvestris*)
Wild cat (*Felis sylvestris*)
Dudong (*dudong dugon*)

Birds

White pelican (*Pelecanus onocrotalus*)
Dalmation pelican (*Pelecanus crispus*)
Great white egret (*Egretta alba*)
Spoonbill (*Platalea leucorodia*)
Glossy ibis (*Plegadis falcinellus*)
Greater flamingo (*Ploenicopterus ruber*)
Marbled teal (*Anas angustirostris*)
Imperial eagle (*Aquila helinca*)
Peregrine falcon (*Falco peregrinus*)
Sooty falcon (*Falco concolor*)
Houbara bustard (*Chlamydotis undulata*)
Ostrich (*Struthio*)
Demoiselle crane (*Anthropoides virgo*)
Slender-billed curlew (*Numenius tenuirostris*)
Corncrake (*Crex crex*)
Sociable plover (*Vanellus gregarius*)
Black stork (*Ciconia nigra*)
White stork (*Ciconia ciconia*)
Sacred ibis (*Threshkiornis aethiopicus*) probably extinct in Egypt
Egyptian plover (*Pluvianus aegyptius*) probably extinct in Egypt
White-faced duck (*Dendrocygna viduata*) probably extinct in Egypt
White-eyed gull (*Larus leucophthalmus*) is a common resident species; however, the Island off Egypt's Red Sea coast account for over 30% of the world's breeding population

Reptiles

Nile crocodile (*Crocodvlus niloticus*)
Green sea turtle (*Chelonia crispus*)
Hawksbill sea turtle (*Eretmochelys imbricata*)
Leatherback sea turtle (*Dermochelys coriacea*)
Dabb lizard (*Uromastix aegyptius*)
Desert monitor lizard (*Varanus griseus*)
Nile monitor (*Varanus niloticus*)

REPRESENTATIVE LIST OF ENDANGERED PLANTS IN EGYPT

Cyperus papyrus ssp. *Hadidii* -- This endemic subspecies if the once widespread papyrus was believed to have been extinct in Egypt for over 150 years until its rediscovery in 1968. Along with the lotus, this plant was one of the best known from Ancient Egypt, being used as the symbol of the Lower Kingdom. It was used for mats, boats, and sandals; funeral garlands or formal bouquets; as motifs on columns, paintings, and reliefs; and, most importantly, as a writing material. Its present occurrence is restricted to small areas of freshwater marsh around three saline soda lakes in the Wadi Natrun Depression in the Western Desert. The habitat is decreasing in size and is in danger of completely disappearing due to extraction of water from the Nile and changes in irrigation patterns.

Helianthemum sphaerocalyx -- Perhaps the best example of a distinct species found only in Egypt, this species, numbering in the low hundreds, is scattered along a 150-kilometer stretch of the Mediterranean coast between El Amria and Ras El Hekma, west of Alexandria. Tourism development, human settlement, and oil extraction have reduced the numbers of this species to less than a dozen small pockets in very rocky areas. Its large fragrant flowers and fleshy leaves are unusual features in the genus and of considerable botanical interest.

Medemia argun -- A palm tree that grows to about 10 meters high and was often depicted is Ancient Egyptian tombs as an offering, it is now known only from a few individual specimens in three widely separated localities within a 200 kilometer radius of Aswan. Although the fruits are barely edible, its leaves are popular construction materials, most often used for mats. This exploitation, along with changes in irrigation systems causing destruction to its Nile habitat, has led to its highly endangered status. Its natural habitat is riverbanks, wadis, and oases.

Avicennia marina -- (Mangrove) fringes the Red Sea shoreline in many areas but reaches its northernmost range extension in the world in Southern Sinai in the Gulf of Aqaba. Serving as shoreline stabilizer, nursery area for young fish and invertebrates, and nesting and resting sites for migratory and resident birds, mangroves are heavily impacted by shoreline pollution, particularly from oil. In the Sinai, Bedouin use of mangroves for firewood seriously threatens its status.

REPRESENTATIVE LIST OF ENDANGERED MARINE SPECIES IN EGYPT

There are some 500 species of fish in the Mediterranean of which 77 are probably endemic (found no where else in the world) plus another 20 which are essentially Mediterranean. There are also some 20 subspecies, which are endemic. Over 750 species of fish are represented in the Red Sea of which 10-30% are endemic. The reasons for the high endemism the Red Sea is different from the situation in the Mediterranean yet both are considered remarkable in terms of the degree of endemism. Most of the Red Sea; some are limited to particular localities. This makes them especially vulnerable to over-exploitation and to the increasing pollution of the coastal area.

Five species of marine turtles occur in the Mediterranean and Red Sea, with nesting sites or activity identified on North and South Sinai, the Red Sea coastline and various islands in the Red Sea. All of the marine turtles are listed as endangered throughout their range. Exploitation of turtles in Egyptian waters mainly for meat and eggs is slight, but oil pollution, marine explosions, and other habitat perturbations are intense. Unfortunately, lack of documented information on these sea turtles has prevented an accurate assessment of their status and management.

Dungongs occur in small numbers throughout the Red Sea where they feed on marine algae and seagrasses in sheltered bays and undersea deltas off large wadis. They are occasionally caught in gill nets set for sharks and drowned accidentally.

Manta rays and some whale sharks occur in the Red Sea and have important breeding areas in some of the large bays. Sport shooting of whale sharks and collisions with ships reportedly threaten their status.

UNESCO WORLD HERITAGE LIST

The following properties have been approved by the World Heritage Committee to be included in UNESCO's World Heritage List. The list currently contains 469 different properties worldwide as of December 1995.

EGYPT

1979 Abu Mena
1979 Ancient Thebes, including its Necropolis
1979 Islamic Cairo
1979 Memphis and its Necropolis, the Pyramid Fields from Giza to Dahshur

BRIEF EXPLANATION OF WORLD HERITAGE LIST

The World Heritage List was established under terms of the Convention Concerning the Protection of World Culture and Natural Heritage adopted in November, 1942 at the 17th General Conference of UNESCO.

The Convention states that a World Heritage Committee "will establish, keep up-to-date and publish" a World Heritage List of cultural and natural properties, submitted by the States and considered to be of outstanding universal value. Details on how it all works are available here.

One of the main responsibilities of this Committee is to provide technical cooperation under the World Heritage Fund for the safeguarding of World Heritage Sites to State Parties whose resources are insufficient. Emergency assistance is also available under the Fund in the case of properties severely damaged by specific natural or man-made disasters or threatened with imminent destruction.

The Committee named 12 sites in 1978, 44 in 1979, 26 in 1980, 28 in 1981, 24 in 1982, 28 in 1983, 22 in 1984, 31 in 1985, 18 in 1986, 42 in 1987, 36 in 1988, 7 in 1989, 17 in 1990, 23 in 1991, 21 in 1992, 32 in 1993, 29 in 1994, and 29 in 1995.

*Small discrepancies in numbers may be due to different methods of numbering sites, and overlapping of sites into two countries.

Additional links with information about the World Heritage List:
International Council on Monuments and Sites (ICOMOS)
The World Heritage Center
World Heritage Cities (OWHC)

APPENDIX F

DDRMS Form 1930 and DD Form 1348-1

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KUWAIT ENVIRONMENTAL FINAL GOVERNING STANDARD

15 March 2011

Prepared by
UNITED STATES
ARMY CENTRAL COMMAND

On behalf of
UNITED STATES CENTRAL COMMAND

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FOREWORD

This Department of Defense Publication is issued under the authority and requirements of DoD Instruction (DoDI) 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996. This guide provides criteria, standards, and management practices for environmental compliance at DoD installations in Kuwait.

This publication's predecessor, Final Governing Standards – Kuwait March 2001, is hereby canceled. This Final Governing Standard applies to all United States Forces operating in the State of Kuwait.

This FGS is effective immediately and its use is mandatory by all DoD Components. Commanders of U.S. Forces may only issue supplementary instructions when deemed necessary to provide for unique requirements within their organizations.

Send recommended changes to this document to:

HQ, United States Central Command
Attn: CCJ4-E
7115 South Boundary Blvd.
MacDill AFB, FL 33621-5101

FOR THE COMMANDER:

MICHAEL D. JONES
Major General, U.S. Army
Chief of Staff
USCENTCOM

METHODOLOGY

Chapters 2-19 of the FGS include the scope, definitions and criteria. Appendices and tables are also presented. The applicable Kuwait environmental regulations were compared to the May 2007 Overseas Environmental Baseline Guidance Document (OEBGD), and determinations were made as to whether a Kuwait environmental regulation was more or less stringent, equivalent to, or in addition to, the OEBGD standard. The standards of the government of Kuwiat and the OEBGD standards were combined into one document to create this FGS.

TABLE OF CONTENTS

APPENDICES

TABLES

REFERENCES

(a) DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996
(b) DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document," May 1, 2007
(c) Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982
(d) Section 7158 of title 42, United States Code
(e) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(f) DoD Instruction 4715.4 C1, "Pollution Prevention," July 6, 1998
(g) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
(h) DoD Instruction 6050.05 C1, "DoD Hazard Communication (HAZCOM) Program," August 25, 2008
(i) Defense Logistics Agency Instruction 4145.11, Army Technical Manual 38-410, Naval Supply Publication 573, Air Force Joint Manual 23-209, and Marine Corps Order 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999
(j) Air Force Manual 24-204 (Interservice), Army Technical Manual 38-250, Naval Supply Publication 505, Marine Corps Order P4030.19I, and Defense Logistics Agency Instruction 4145.3, "Preparing Hazardous Materials for Military Air Shipments," September 1, 2009
(k) DoD 4160.21-M, "Defense Materiel Disposition Manual," August 18, 1997
(l) DoD Instruction 4001.01, "Installation Support," January 10, 2008
(m) Naval Facility Manual of Operation-213, Air Force Regulation 91-8, and Army Technical Manual 5-634, "Solid Waste Management," May 1990
(n) DoD 4150.7-M, "DoD Pest Management Training and Certification," April 24, 1997
(o) Technical Guide No. 17, "Military Handbook - Design of Pest Management Facilities," August 2009
(p) DoD Instruction 6055.1, "DoD Safety and Occupational Health (SOH) Program," August 19, 1998
(q) DoD Instruction 6055.05, "Occupational and Environmental Health (OEH)," November 11, 2008
(r) Section 2643 of title 15, United States Code
(s) Title 40, Code of Federal Regulations, Part 763, "Asbestos-Containing Materials in Schools," current edition
(t) DoD Instruction 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998
(u) CJCSM 3122.03C "Joint Operational Planning and Execution System (JOPES) Volume II: Planning Formats," August 17, 2007

C1. CHAPTER 1

OVERVIEW

C1.1. PURPOSE

The primary purpose of this Final Governing Standard (FGS) is to provide criteria and management practices for United States (US) Forces in the State of Kuwait (Kuwait). It has been prepared in accordance with Department of Defense (DoD) Instruction 4715.5 (Reference (a)). Reference (b) is the basis for both the format and the default criteria of this FGS.

C1.2. APPLICABILITY. This FGS applies to actions of the DoD Components at installations in Kuwait.

C1.3. EXEMPTIONS. This FGS does not apply to:

C1.3.1. DoD installations that do not have more than de minimis potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices and other similar organizations), or for which the DoD Components exercise control only on a temporary or intermittent basis;

C1.3.2. Leased, joint use, and similar facilities to the extent that DoD does not control the instrumentality or operation that a criterion seeks to regulate;

C1.3.3. Operations of U.S. military vessels in international waters or the operations of U.S. military aircraft, or off-installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when United States forces are operating as part of a multi-national force not under full control of the United States. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DoD Directives and Instructions, and environmental annexes incorporated into operation plans or operation orders. However, this Final Governing Standard does apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DoD Components, including management or disposal of material or waste off-loaded in Kuwait;

C1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under E.O. 12344 (Reference (c)) and conducted pursuant to 42 U.S.C. 7158 (Reference (d));

C1.3.5. The determination or conduct of remediation to correct environmental problems caused by DoD's past activities; or,

C1.3.6. Environmental analyses conducted under E.O. 12114 (Reference (e)).

C1.4. DEFINITIONS. For purposes of this FGS, unless otherwise indicated, the following definition applies. Additional definitions are provided in subsequent chapters.

C1.4.1. Installation. A base, camp, post, station, yard, center, or other activity under the jurisdiction of the Secretary of a Military Department that is located outside the United States and outside any territory, commonwealth, or possession of the United States.

C1.5. RESPONSIBILITIES

C1.5.1. USCENTCOM as the Unified Command and DoD Environmental Executive Agent (EEA) for the Central Region will:

C1.5.1.1. Within its geographic area of responsibility, coordinate and maintain the oversight and implementation of DoD Instruction 4715.5 (Reference (a)) by all DoD Components.

C1.5.1.2. Coordinate with the Joint Staff, relevant Offices of the Secretary of Defense (OSD), Defense Agencies, and other federal agencies, as required, on environmental matters affecting Kuwait.

C1.5.1.3. Assist with coordination between service component commands and Defense Agencies in environmental matters.

C1.5.1.4. Develop and publish USCENTCOM policy guidance for environmental security by US Forces within Kuwait to ensure compliance with new and existing US Laws, DoD Directives, and Kuwaiti environmental laws, as applicable.

C1.5.1.5. Review the annual environmental security reports and take appropriate action on recommendations related to forces in Kuwait.

C1.5.1.6. Resolve differences between service component commands, Defense Agencies, and executing agent for Kuwait as necessary.

C1.5.1.7. When deemed necessary, direct DoD components to conduct an external environmental compliance audit of an activity or facility, in addition to those regularly scheduled every three years.

C1.5.1.8. Review and take appropriate action regarding component implementing regulations / operating instructions, checklists, and audit / inspection reports in order to oversee compliance with the FGS for Kuwait.

C1.5.1.9. Review requests for waivers and grant or deny the request for waiver in whole, in part or upon conditions in accordance with C1.6.3.

C1.5.2. USARCENT, as Lead Service Component for Kuwait, will:

C1.5.2.1. Review compliance with this FGS by US Forces operating in Kuwait.

C1.5.2.2. Ensure that coordination with the Defense Logistics Agency (DLA), other DoD components and the US Diplomatic Mission is done as necessary for appropriate disposal of hazardous waste generated by US Forces in Kuwait.

C1.5.2.3. Conduct a biennial review of the FGS for Kuwait and recommend changes as needed to ensure environmental compliance with appropriate regulations and laws.

C1.5.2.4. Review requests for waivers and advise USCENTCOM on the need for the waiver.

C1.5.3. USCENTCOM, Component Commands, and Defense Agencies having personnel operating in Kuwait will:

C1.5.3.1. Require compliance with this FGS.

C1.5.3.2. Conduct external environmental compliance audits every three years and internal audits each year when an external audit is not being performed. Submit a copy of the audit reports and instructions to USCENTCOM, (CCJ4-E) within 180 days of inspection or audit.

C1.5.3.3. Program and budget for environmental projects needed to meet requirements in the FGS and to correct each Environmental Compliance Assessment System (ECAS) audit deficiencies.

C1.5.3.4. Ensure that US contracts for services or construction and DoD contracts for the disposal of hazardous waste include provisions requiring the contractor to comply with the FGS, and are administered to enforce such compliance.

C1.5.3.5. Ensure host-tenant agreements require compliance with the FGS.

C1.5.3.6. Develop and conduct training / education programs to instruct all personnel in the environmental aspects of their jobs and the requirements of the FGS.

C1.5.3.7. Report to USCENTCOM Executive Agent any condition, event or practice that is not in conformity with the FGS.

C1.5.3.8. Coordinate with USARCENT's in-country executing authority for the appropriate turn-in requirements and disposal procedures of hazardous waste generated in Kuwait.

C1.5.3.9. Ensure that units deploying for exercises and contingencies include an environmental annex in their Plans and Orders in accordance with Reference (u).

ADDITIONAL INFORMATION

C1.5.4. Timing for Compliance. This FGS is effective immediately upon approval by USCENTCOM. This FGS is in effect until revoked or superseded.

C1.5.5. USCENTCOM Service Components, major / subordinate commands, and major claimants may issue supplementary criteria that are more protective of the environment than required by the FGS for their subordinates. A copy of all supplementary criteria will be forwarded to through USARCENT (ACEN-OME) to USCENTCOM (CCJ4-E).

C1.5.6. Waivers. A DoD Component may request a waiver of an otherwise applicable criterion in this FGS only if compliance with the criterion at particular installations or facilities would seriously impair their actions, adversely affect relations with Kuwait or would require substantial expenditure of funds for physical improvements at an installation that has been identified for closure or at an installation that has been identified for a realignment that would remove the requirement. Waivers may not be granted to criteria if noncompliance would constitute a breach of applicable U.S. law with extraterritorial effect or applicable international agreements.

C1.5.6.1. A DoD Component seeking a waiver shall:

C1.5.6.1.1. Submit the written request through USARCENT (ACEN-OME) to USCENTCOM (CCJ4-E);

C1.5.6.1.2. Identify the particular criterion for which a waiver is requested;

C1.5.6.1.3. Describe the extent of the relief requested and the period that the waiver will be in effect;

C1.5.6.1.4. Describe the anticipated impact of the waiver, if any, on human health and the environment over the period of the waiver; and,

C1.5.6.1.5. Describe the justification for the waiver and if a complete waiver of the criterion is requested, why a partial and/or temporary deviation would not be sufficient.

C1.5.6.2. Upon receipt of a request for waiver, USCENTCOM shall consult with the relevant CENTCOM Service Components. Where the waiver or deviation is from a standard from Kuwait law or statue, USCENTCOM should normally consult through the appropriate U.S. Diplomatic Mission (or other agencies established by applicable international agreements) with the responsible host-nation authority.

C1.5.6.3. USCENTCOM may grant or deny the request for waiver in whole, in part, or upon conditions.

C1.5.6.4. If, as a result of consultation with host-nation authorities by the Executive Agent, it is determined that the waiver or deviation from the applicable host-nation standards should not be approved, the DoD Environmental Executive Agent or the DoD Component requesting the waiver may forward the request along with a complete report to the DUSD(ES), who shall attempt to resolve the issue through consultation with relevant authorities and other Federal Agencies as appropriate.

C1.5.6.5. Where the Military Department or Defense Agency requesting the waiver is also the DoD Environmental Executive Agent, the waiver shall be referred to the Unified Combatant Commander for decision.

C1.5.6.6. USCENTCOM or the DUSD(ES), as appropriate, shall maintain a written record of its decision on each waiver requested.

C1.5.7. This FGS does not create any rights or obligations enforceable against the United States, the DoD, or any of its components, nor does it create any standard of care or practice for individuals. Although this FGS refers to other DoD publications, it is intended only to coordinate the requirements of those publications as required to implement the policies found in Reference (a). This FGS does not change other DoD Directives or Instructions or alter DoD policies.

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C2. CHAPTER 2
AIR EMISSIONS

C2.1. SCOPE

This chapter contains standards for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 15, "Asbestos."

C2.2. DEFINITIONS

C2.2.1. Coal Refuse. Waste products of coal mining, cleanings and coal preparation operations (e.g., culm, gob, etc.) containing coal, matrix material, clay, and other organic and inorganic material.

C2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soils and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, non-boiling solvent to clean the parts are classified as cold cleaning machines.

C2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

C2.2.4. Existing Municipal Waste Combustion Unit. Any Municipal Waste Combustion Unit (MWC) unit that is not a "New Municipal Waste Combustion Unit."

C2.2.5. Existing Steam/Hot Water Generating Unit. Any Steam/Hot Water Generating Unit that is not a "New Steam/Hot Water Generating Unit."

C2.2.6. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid or gaseous fuel derived from such material for the purpose of creating useful heat.

C2.2.7. Freeboard Ratio. The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

C2.2.8. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depleting Substances (ODS).

C2.2.9. Incinerator. Any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

C2.2.10. Motor Vehicle. Any commercially-available vehicle that is not adapted to military use which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to passenger cars, light duty vehicles, and heavy duty vehicles.

C2.2.11. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (MSW) including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

C2.2.12. Municipal Solid Waste (MSW). Any household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (nonmedical), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

C2.2.13. New Municipal Waste Combustion Unit. Any Municipal Waste Combustion Unit (MWC) unit that was constructed or substantially modified since 1 October 1994

C2.2.14. New Steam/Hot Water Generating Unit. Any Steam/Hot Water Generating unit that was constructed or substantially modified since 1 October 1994.

C2.2.15. Ozone-Depleting Substances (ODS). Those substances listed in Table C2.T2.

C2.2.16. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

C2.2.17. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

C2.2.18. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

C2.2.19. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

C2.2.20. Stack. Any point in a source covered by criteria contained in C2.3.1, C2.3.2, C2.3.3, C2.3.4, C2.3.5, and C2.3.9 designed to emit pollutants.

C2.2.21. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

C2.2.22. Substantially Modified. Modified in such a way that the project cost exceeds $1 million, regardless of funding source.

C2.2.23. Vapor Cleaning Machine. A batch or in-line solvent cleaning machine that boils liquid solvent generating solvent vapor that is used as a part of the cleaning or drying cycle.

C2.2.24. Wood Residue. Bark, sawdust, slabs, chips, shavings, mill trim, and other wood products derived from wood processing and forest management operations.

C2.3. CRITERIA

C2.3.1. Steam/Hot Water Generating Units

C2.3.1.1. Air Emission Standards. The following criteria apply to new Steam/Hot Water Generating Units with a maximum design heat input capacity greater than or equal to 10 million Btu/hr:

C2.3.1.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards for specific sized units shown in Table C2.T1 at all times, except during periods of start up, shut down, soot blowing, malfunction, or when emergency conditions exist.

C2.3.1.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight percent) and higher heating value will be measured and recorded for each new shipment of fuel. Use this data to calculate sulfur dioxide (SO_2) emissions and document compliance with the SO_2 limits using the equation in Table C2.T1. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for SO_2 and either oxygen (O_2) or carbon dioxide (CO_2).

C2.3.1.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or NO_X standards in C2.T1 must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

C2.3.1.2.1. For units with a maximum design heat input capacity greater than 30 million Btu/hr: Opacity, except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

C2.3.1.2.2. For fossil-fuel fired units with a maximum design heat input capacity greater than or equal to 100 million Btu/hr: Nitrogen oxides (NO_X) and either oxygen (O_2) or carbon dioxide (CO_2).

C2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration.

C2.3.2.1. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Table C2.T3 and operating limits in Table C2.T4.

C2.3.2.2. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table C2.T3 and operating limits in Table C2.T4.

C2.3.2.3. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that undergo substantial modification since 1 October 1994 and that burn more than 1 ton per day (tpd) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of start up, shut down, malfunction, or when emergency conditions exist.

C2.3.2.4. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

C2.3.2.4.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

C2.3.2.4.1.1. Unit design: dual chamber;

C2.3.2.4.1.2. Minimum temperature in primary chamber: 1400-1600°F;

C2.3.2.4.1.3. Minimum temperature in secondary chamber: 1800-2200°F;

C2.3.2.4.1.4. Minimum residence time in the secondary chamber: 2 seconds; and

C2.3.2.4.1.5. Incinerator operators must be trained in accordance with applicable Service requirements.

C2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. These requirements do not apply to coin-operated machines.

C2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than 2000 gallons per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed.

C2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at 45°F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that is most appropriate to suit local conditions:

C2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm). Control devices/methods must be operated according to manufacturer recommendations.

C2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

C2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet (ft^2); K = a conversion factor, 425 dscm/(ft^2-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

C2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains more than 5 percent by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), carbon tetrachloride (CAS No. 56-23-5), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents.

C2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 1-inch water layer or a freeboard ratio of at least 0.75.

C2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

C2.3.6. Units Containing ODS Listed in Table C2.T2. The following criteria apply to direct atmospheric emissions of ODS, HFCs, and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment.

C2.3.6.1. Refrigerant Recovery/Recycling. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or Kuwaiti equivalent.

C2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant shall not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners. *De minimis* releases associated with good faith attempts to recycle or recover ODS, HFC, and PFC refrigerants are not subject to this prohibition.

C2.3.6.3. Refrigerant Leak Monitoring and Repair. Monitor and repair refrigeration equipment for ODS leakage in accordance with the following criteria and repair, if found to be leaking.

C2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing more than 50 pounds of refrigerant and not covered by subparagraphs C2.3.6.3.1 or C2.3.6.3.2 must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period.

C2.3.6.3.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following halon releases:

C2.3.6.3.4.1. *De minimis* releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

C2.3.6.3.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

C2.3.6.3.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulation product cannot be used.

C2.3.7. Motor Vehicles. These criteria apply to DoD-owned motor vehicles as defined in paragraph C2.2.8.

C2.3.7.1. All vehicles shall be inspected every two years to ensure that no tampering with factory-installed emission control equipment has occurred.

C2.3.7.2. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

C2.3.8. Stack Heights. Hg is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures. Stacks shall be designed and constructed to heights at least equal to the largest Hg calculated from either of the following two criteria:

C2.3.8.1. Hg = H + 1.5L, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but not greater than 0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest Hg.

C2.3.8.2. Hg is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum ground-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40 percent in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means not greater than 0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height (Ht) of the feature, not to exceed 2 miles if such feature achieves a height (Ht) 0.8 km from the stack that is at least 40 percent of the good engineering practice stack height determined by the formulae provided in C2.3.8.1. above or 26 meters, whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

C2.3.9. Cement Production

C2.3.9.1. Suspended particulates emitted from cement furnaces shall not exceed 0.15 Kg/ton of product, and opacity of furnace flue gases -- not including opacity from water vapor – shall not exceed 20% more than 3 minutes per hour.

C2.3.9.2. Suspended particulates emitted from cement clinker chillers shall not exceed 0.15 Kg/ton of product, and opacity of flue gases from chiller chimneys shall not exceed 20% more than 3 minutes per hour.

C2.3.10. Storage Tanks

C2.3.10.1. Storage tanks of more than 1,000 barrel capacity that store POL or volatile organic compounds (VOC) shall be designed with external or internal floating roofs.

C2.3.10.2. Storage tanks of more than 1,000 barrel capacity that store POL or VOC with vapor pressure of more than 39 millimeters of mercury (mm Hg) shall have vapor recovery or equivalent system with a consistent seal inspection, repair, and reporting program, provided the available product supply network has facilities for accepting and reprocessing collected vapors.

C2.3.11. Industrial Emission Limits. No industrial operation – which includes steam generating units – shall produce stack gas emissions in excess of the following:

C2.3.11.1. Opacity 20%

C2.3.11.2. Particulate concentration 115 mg/m^3

Table C2.T1. Emission Standards for New Steam/Hot Water Generating Units[1]

Fuel Type	Maximum Design Heat Input Capacity						
	10 – 100 million BTU/hr			Size > 100 million BTU/hr			
	PM	Opacity[2]	SO_2[3]	PM	Opacity[2]	SO_2[3]	NO_x[4]
Gaseous	N/A	N/A	N/A	N/A	N/A	N/A	0.20
Gaseous – Coal Derived	N/A	N/A	N/A	N/A	N/A	N/A	0.50
Liquid Fossil Fuel	N/A	20%	0.50[5]	0.10	20%	0.80	0.30
Solid Fossil Fuel	0.10	20%	1.20	0.10	20%	1.20	0.70
Other Solid Fuel[6]	0.30	20%	N/A	0.20	20%	N/A	N/A

NOTES:

N/A = Not applicable

1. Standards do not apply during periods of startup, shutdown, malfunction, soot blowing, or when emergency conditions exist. Unless specified otherwise, emission standards are in lb/million BTU.
2. The opacity standards do not apply to units < 30 million BTU/hr. The 20% standard applies to the average opacity over a six-minute period.
3. SO_2 is best controlled and compliance documented by limiting fuel sulfur content.
   SO_2 emissions (lb/ million BTU) = 0.02 X sulfur content of fuel (%) / heat content of fuel (HHV, million BTU/lb fuel).
   [E.g., for fuel oil with 0.5% sulfur, SO_2 = 0.02 X 0.5 / 0.019 = 0.53 lb/million BTU.]

4. Emission limitation for NO_X is based on a 30-day rolling average. NO_X standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.
5. Instead of 0.5 lb/ million BTU of SO_2, fuel oil combustion units may comply with a 0.5% average fuel sulfur content limit (weight percent) which is statistically equivalent to 0.5 lb/million BTU.
6. Other solid fuels include wood or waste derived fuels.

Table C2.T2. Class I and II Ozone-Depleting Substances

Class I			
CFC-11	CFC- 114	CFC- 215	Halon – 1211
CFC-12	CFC- 115	CFC- 216	Halon – 1301
CFC-13	CFC- 211	CFC- 217	Halon – 2402
CFC- 111	CFC- 212		Carbon Tetrachloride
CFC- 112	CFC- 213		Methyl Chloroform
CFC- 113	CFC- 214		Methyl Bromide
$CHFBr_2$	$C_2H_2F_3Br$	C_3HF_6Br	$C_3H_3F_4Br$
HBFC-2201 (CHF_2Br)	$C_2H_3FBr_2$	$C_3H_2FBr_5$	$C_3H_4FBr_3$
CH_2FBr	$C_2H_3F_2Br$	$C_3H_2F_2Br_4$	$C_3H_4F_2Br_2$
C_2HFBr_4	C_2H_4FBr	$C_3H_2F_3Br_3$	$C_3H_4F_3Br$
$C_2HF_2Br_3$	C_3HFBr_6	$C_3H_2F_4Br_2$	$C_3H_5FBr_2$
$C_2HF_3Br_2$	$C_3HF_2Br_5$	$C_3H_2F_5Br$	$C_3H_5F_2Br$
C_2HF_4Br	$C_3HF_3Br_4$	$C_3H_3FBr_4$	C_3H_6FBr

Table C2.T2. Class I and II Ozone-Depleting Substances (continued)

$C_2H_2FBr_3$	$C_3HF_4Br_3$	$C_3H_3F_2Br_3$	Chlorobromomethane
$C_2H_2F_2Br_2$	$C_3HF_5Br_2$	$C_3H_3F_3Br_2$	
Class II			
HCFC - 21	HCFC – 133a	HCFC – 225cb	HCFC - 243
HCFC - 22	HCFC – 141b	HCFC – 226	HCFC - 244
HCFC - 31	HCFC – 142b	HCFC - 231	HCFC – 251
HCFC - 121	HCFC - 151	HCFC - 232	HCFC – 252
HCFC - 122	HCFC - 221	HCFC - 233	HCFC – 253
HCFC - 123	HCFC - 222	HCFC - 234	HCFC – 261
HCFC - 124	HCFC - 223	HCFC - 235	HCFC – 262
HCFC - 131	HCFC - 224	HCFC - 241	HCFC – 271
HCFC - 132b	HCFC - 225ca	HCFC - 242	

Note: All isomers of the above chemicals are ODS, except isomers of (1,1,1-trichloroethane (also known as methyl chloroform)) such as 1,1,2-trichloroethane.

Table C2.T3. Emission Standards for Incinerators[1]

Pollutant	**Emission Standards**				
Incinerator Type	**Existing Municipal Waste Combustion Units**		**New Municipal Waste Combustion Units**		**CISWI Units**
Rated Capacity	**35-250 tpd**	**> 250 tpd**	**35-250 tpd**	**> 250 tpd**	**All units**
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm
Opacity	10 percent		10 percent		10 percent
NOx	N/A	See Note 2	500 ppmv	150ppmv	388 ppmv
SO2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv
Dioxins/furans	125 ng/dscm	See Note 3	13 ng/dscm		0.41 ng/dscm
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.47 mg/dscm
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	62 ppmv
Fugitive Ash	5% of hourly observation period		5% of hourly observation period		N/A

Notes:

1 Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.

2 NOx limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall:250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.

3 Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

Table C2.T4. Carbon Monoxide Operating Limits for Incinerators[1]

Incinerator Type	**Existing Municipal Waste Combustion Units**		**New Municipal Waste Combustion Units**		**CISWI Units**
Rated Capacity	**35-250 tpd**	**> 250 tpd**	**35-250 tpd**	**> 250 tpd**	**All units**
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Fluidized bed, mixed fuel (wood/refuse-derived fuel)	200 ppmv (24-hour average)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)	100 ppmv (4-hravg)	100 ppmv (24-hr avg)		
Mass burn rotary waterwall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		157 ppmv
Mass burn rotary refractory and waterwall	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Mixed fuel-fired, (pulverized coal/refuse-derived fuel	150 ppmv (4-hr avg)		150 ppmv (4-hr avg)		
Modular starved-air and excess air	50 ppmv (4-hr avg)		50 ppmv (4-hr avg)		

Table C2.T4. Carbon Monoxide Operating Limits for Incinerators[1] (continued)

Spreader Stoker, mixed fuel-fired (coal/refuse-derived fuel)	200 ppmv (24-hr avg)	150 ppmv (24-hr avg)	
Stoker, refuse-derived fuel	200 ppmv (24-hr avg)	150 ppmv (24-hr avg)	

Notes:

1 Compliance is determined by continuous emission monitoring systems.

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C3. CHAPTER 3

DRINKING WATER

C3.1. SCOPE

This chapter contains criteria for providing potable water.

C3.2. DEFINITIONS

C3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

C3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the component's installations.

C3.2.3. Concentration/Time (CT). The product of residual disinfectant concentration, C, in mg/L determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables C3.T11 through C3.T24.

C3.2.4. Conventional Treatment. Water treatment including chemical coagulation, flocculation, sedimentation, and filtration.

C3.2.5. Diatomaceous Earth Filtration. A water treatment process of passing water through a pre-coat of diatomaceous earth deposited on a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the pre-coat, resulting in substantial particulate removal from the water.

C3.2.6. Direct Filtration. Water treatment including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

C3.2.7. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

C3.2.8. DoD Water System. A public water system or non-public water system.

C3.2.9. Emergency Assessment. An evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service from natural disasters, accidents, and sabotage.

C3.2.10. First Draw Sample. A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.

C3.2.11. Haloacetic Acids. The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

C3.2.12. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

C3.2.13. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

C3.2.14. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

C3.2.15. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

C3.2.16. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

C3.2.17. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

C3.2.18. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

C3.2.19. Potable Water. Water that has been examined and treated to meet the standards in this chapter, and has been approved as potable by the appropriate DoD medical authority.

C3.2.20. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

C3.2.20.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

C3.2.20.2. Non-Community Water System. A PWS that serves the public, but does not serve the same people year-round.

C3.2.20.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least six months per year, but not year-round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

C3.2.20.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least six months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

C3.2.21. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

C3.2.22. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (1.2 ft/hr), resulting in particulate removal by physical and biological mechanisms.

C3.2.23. Total Trihalomethanes. The sum of the concentration in mg/L of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

C3.2.24. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever a principle function of the well is the emplacement of any fluid.

C3.2.25. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities; and to provide a basis for determining measures that can protect personnel and assets from terrorist attacks.

C3.3. CRITERIA

C3.3.1. DoD water systems, regardless of whether they produce or purchase – to include bottled - water, will:

C3.3.1.1. Maintain a map/drawing of the complete potable water system;

C3.3.1.2. Update the potable water system master plan at least every 5 years;

C3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintenance of septic systems and on-site treatment units, and by appropriate land use management on DoD installations;

C3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years, for systems using surface water, and every 5 years, for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with Kuwait authorities;

C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, as a minimum, must be disinfected;

C3.3.1.6. Maintain a continuous positive pressure of at least 20 pounds per square inch in the water distribution system;

C3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

C3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority),

C3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing),

C3.3.1.7.3. An effective annual water main flushing program,

C3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs, and

C3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

C3.3.1.8. Establish an effective cross connection control and backflow prevention program;

C3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies;

C3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

C3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption;

C3.3.1.10.2. Identification of key personnel;

C3.3.1.10.3. Procedures to restore service;

C3.3.1.10.4. Procedures to isolate damaged lines;

C3.3.1.10.5. Identification of alternative water supplies; and

C3.3.1.10.6. Installation public notification procedures.

C3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken;

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years;

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least three years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years; and

C3.3.1.14. Conduct vulnerability assessments.

C3.3.2. DoD water systems, regardless of whether they produce or purchase water, to include bottled water, will, by independent testing or by validated supplier testing, ensure conformance with the following:

C3.3.2.1. Total Coliform Bacteria Requirements

C3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining 40 or more samples a month, and no more than one positive sample per month when a system analyzes less than 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms or *E. coli* or any repeat sample is positive for total coliforms.

C3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table C3.T2., "Total Coliform Monitoring Frequency."

C3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and a downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

C3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

C3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in paragraph C3.3.3 to:

C3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result; and

C3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

C3.3.2.2. Inorganic Chemical Requirements

C3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed to end-users does not exceed applicable limitations set out in Table C3.T3. Except for Nitrate, Nitrite, and Total Nitrate/Nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For Nitrate, Nitrite, and Total Nitrate/Nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

C3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table C3.T4., "Inorganics Monitoring Requirements."

C3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph C3.3.3 as soon as possible. If the Nitrate, Nitrite, or Total Nitrate and Nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

C3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table C3.T4, "Inorganics Monitoring Requirements," until authorities determine the system is reliable and consistent and remedial actions completed.

C3.3.2.2.4. The MCL for Arsenic applies only to Community Water Systems.

C3.3.2.3. Fluoride Requirements

C3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L stated in Table C3.T3, "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample at the entry point to the distribution system annually for surface water systems and one every three years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table C3.T5, "Recommended Fluoride Concentrations at Different Temperatures."

C3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.4. Lead and Copper Requirements

C3.3.2.4.1. DoD CWS and NTNC water systems will comply with action levels (distinguished from the MCL) of 0.010 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead and copper levels are exceeded in more than 10% of all sampled taps.

C3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table C3.T6, "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table C3.T6.

C3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table C3.T6. Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and Kuwait) within 60 days and will complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.5. Synthetic Organics Requirements

C3.3.2.5.1. An installation responsible for CWS and NTNC will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table C3.T7, "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

C3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table C3.T8, "Synthetic Organic Chemical Monitoring Requirements."

C3.3.2.5.3. If a system is out of compliance, complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation. The installation immediately will begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL as noted in Table C3.T8, and will continue until the installation commander determines the system is back in compliance, and any necessary remedial measures are implemented.

C3.3.2.6. Disinfectant/Disinfection Byproducts (DDBP) Requirements

C3.3.2.6.1. An installation responsible for a CWS and NTNC system that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

C3.3.2.6.1.1. Ensure that the MCL of 0.08 mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of 1.0 mg/L for chlorite, and the MCL of 0.01 mg/L for bromate are met in drinking water.

C3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of 4.0 mg/L for chlorine, the MRDL of 4.0 mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are met in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

C3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table C3.T9, "Disinfectant/Disinfection Byproducts Monitoring Requirements." Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone are also included in Table C3.T9.

C3.3.2.6.3. For TTHM and HAA5 a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table C3.T9 for chlorine, chloramines, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table C3.T9, the installation will accomplish the notification requirements outlined in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

C3.3.2.7. Radionuclide Requirements

C3.3.2.7.1. An installation responsible for a CWS and NTNC system will test the system for conformance with the applicable radionuclide limits contained in Table C3.T10, "Radionuclide MCLs and Monitoring Requirements."

C3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table C3.T10.

C3.3.2.7.3. If the average annual MCL for gross alpha activity for radium is exceeded, the installation will complete the notification according to the procedures in paragraph C3.3.3 within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

C3.3.2.8. Surface Water Treatment Requirements. DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table C3.T1. If the turbidity readings in Table C3.T1 are exceeded, the installation will complete the notification in paragraph C3.3.3 as soon as possible, but in no case later than 14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DDBP requirements (C3.3.2.6), will ensure that protection from microbial pathogens is not compromised.

C3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored as a minimum for total coliforms and disinfectant residuals periodically.

C3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

C3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct and conventional filtration processes. This requirement only applies to DoD PWSs that:

C3.3.2.11.1. Use surface water or GWUDISW;

C3.3.2.11.2. Use direct or conventional filtration processes; and

C3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

C3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and Kuwait) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps that the system is taking to correct the violation, the necessity for seeking alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.

C3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

Table C3.T1. Surface Water Treatment Requirements

1. Unfiltered Systems

   a. Systems which use unfiltered surface water or groundwater sources under the direct influence of surface water will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily for a minimum of one year. If the total coliforms and/or fecal coliforms exceed 100/100 mL and 20/100 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU).

   b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T11. through C3.T24.

   c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.

   d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made weekly.

   e. Disinfectant residual of water entering the distribution system must be maintained at a minimum of 0.2 mg/L for greater than four hours.

   f. Water in a distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.

   g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

2. Filtered Systems

   a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.

   b. The turbidity of filtered water will be monitored at least once every four hours. (USACHPPM/USAEC). The turbidity of filtered water will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.

   c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

   d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

*Proper conventional treatment typically removes 2.5 log Giardia/ 2.0 log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0 log Giardia/ 1.0 log viruses. Slow sand filtration removes typically removes 2.0 log Giardia/ 2.0 log viruses. Less log-removal may be assumed if treatment is not properly applied.

3. SW or GWUDISW systems will provide at least 99% (2-log) removal of *Cryptosporidium*. A system is considered to be compliant with the *Cryptosporidium* removal requirements if:

   a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU.

   b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs.

Table C3.T1. Surface Water Treatment Requirements (continued)

c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of *Giardia lamblia* cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of *Cryptosporidium* oocysts.

d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1a above to remain unfiltered.

4. Individual Filter Effluent Monitoring. Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for three months in a row (for the same filter), the installation must conduct a self assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.

5. Covers for Finished Water Storage Facilities. Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table C3.T2. Total Coliform Monitoring Frequency

Population Served	Number of Samples [1]	Population Served	Number of Samples [1]
25 to 1,000 [2]	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes

1. Minimum Number of Routine Samples Per Month
2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve less than 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table C3.T3. Inorganic Chemical MCLs

Contaminant	**MCL**	
Arsenic (CWS only)	0.010	mg/L
Antimony [1]	0.005	mg/L
Asbestos [1]	7 million	fibers/L (longer than 10 um)
Barium	0.700	mg/L
Boron	0.300	mg/L
Beryllium [1]	0.004	mg/L
Cadmium [1]	0.003	mg/L
Chromium [1]	0.050	mg/L
Copper	1.3	mg/L
Cyanide [1]	0.070	mg/L (as free cyanide)
Fluoride [2]	1.500	mg/L
Hydrogen Sulfide	Not detectable by consumer	mg/L
Lead	0.010	mg/L
Manganese	0.500	mg/L
Mercury [1]	0.001	mg/L
Molybdenum	0.070	mg/L
Nickel [1]	0.020	mg/L
Nitrate [3]	10	mg/L (as N)
Nitrite [3]	1	mg/L (as N)
Total Nitrite and Nitrate [3]	10	mg/L (as N)
Selenium [1]	0.010	mg/L
Silver	0.05	mg/L
Sodium [4]		
Thallium	0.002	mg/L
Hardness	500	mg/L
Foaming Agents	0.5	mg/L

Notes

1. MCLs apply to CWS and NTNC systems.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNC, and TNC systems.
4. No MCL established. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis.

Table C3.T4. Inorganic Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---
Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Hydrogen Sulfide	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Silver	1 sample / 3 yr	Annual sample	>MCL	
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos	1 sample every 9 years	1 sample every 9 years	>MCL	Yes [3]
Total Nitrate/Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [6]
Nitrite	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [7]
Corrosivity [8]	Once	Once	---	---
Hardness	(See Corrosivity)			
Foaming agents[8]	Once	Once		

Notes

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a vulnerability assessment conducted by the PWS.
4. Any sampling point with an analytical value greater than or equal to 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrite if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50% of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country specific final governing standards to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Index.

Table C3.T5. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (°F)	Control Limits (mg/L)		
	Lower	Optimum	Upper
50.0 - 53.7	0.9	1.2	1.7
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table C3.T6. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	No. of Sites for Standard Monitoring [1, 2]	No. of Sites for Reduced Monitoring [3]	No. of Sites for Water Quality Parameters [4]
>100,000	100	50	25
10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multifamily residences, with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNC systems, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6 month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every three years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table C3.T5 Recommended Fluoride Concentrations at Different Temperatures

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
Pesticides/PCBs		
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008

Table C3.T5 Recommended Fluoride Concentrations at Different Temperatures (continued)

Aldicarb sulfoxide	0.004	0.0005
Aldrin	0.00003	
Atrazine	0.003	0.0001
Benzo[a]pyrene	0.0002	
Carbofuran	0.04	0.0009
Chlordane	0.0002	0.0002
Dalapon	0.2	
2,4-D	0.03	0.0001
dichloro-diphenyl-trichloroethane (DDT) (total isomers)	0.002	
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
1,1-dichloroethene	0.003	
Di (2-ethylhexyl) adipate	0.	
Di (2-ethylhexyl) phthalate	0.006	
Dieldrin	0.00003	
Dinoseb	0.007	
Diquat	0.02	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.00001
Glyphosphate	0.7	
Heptachlor	0.0004	0.00004
Heptachlorepoxide	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Lindane	0.0002	0.00002
Methoxychlor	0.02	0.0001
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.0001
Pentachlorophenol	0.001	0.00004
Picloram	0.5	
Simazine	0.004	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Toxaphene	0.003	0.001
2,4,5-TP (Silvex)	0.05	0.0002
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Carbon tetrachloride	0.005	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1,2-Dichloroethylene	0.07	0.0005
trans-1,2-Dichloroethylene	0.1	0.0005
1,1-Dichloroethylene	0.007	0.0005
1,1,1-Trichloroethane	0.20	0.0005
1,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.0005	
2,3,7,8-TCDD (Dioxin)	0.00000003	
1,1,2-Trichloroethane	0.005	
Trichloro-benzenes (Total)	0.02	
1,2-Dichloropropane	0.005	0.0005

Table C3.T5 Recommended Fluoride Concentrations at Different Temperatures (continued

Ethylbenzene	0.3	0.0005
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Styrene	0.02	0.0005
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	0.7	0.0005
Vinyl chloride	0.002	0.0005
Xylene (total)	0.5	0.0005
Other Organics		
Acrylamide	0.05% dosed at 1 ppm [1]	
Epihydrochlorin	treatment technique 0.01% dosed at 20 ppm [1]	

Note

[1] Only applies when adding these polymer flocculants to the treatment process. No sampling is required, the system certifies that dosing is within specified limits.

Table C3.T8. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement [1]		Trigger for more monitoring [2]	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes [3,4]
Pesticides/PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit [5]	Yes [4,6]

Notes

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNC, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a vulnerability assessment by the PWS.
5. Detection limits noted in Table C3.T7., or as determined by the best available testing methodology.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection; systems >3,300 reduce to 2 samples/year every 3 years, or systems <3,300 reduce to 1 sample every 3 years.

Note: Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements

Source Water Type	Population Served by System	Analyte & Frequency of Samples	Number of Samples
Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW)	10,000 or more	TTHM & HAA5 - Quarterly[1].	4[1,2,3]
SW or GWUDISW	500 to 9,999	TTHM & HAA5 - Quarterly[4]	1[5,6]
SW or GWUDISW	499 or less	TTHM & HAA5 - Yearly	1[7,8]
Ground Water (GW)	10,000 or more	TTHM & HAA5 - Quarterly[9]	1[10,11]
GW	9,999 or less	TTHM & HAA5 - Yearly[12]	1[13,14]
		Chlorite - Daily & Monthly[15,16,17,18]	
		Bromate - Monthly[19,20]	
		Chlorine[21,22]	
		Chloramines[23,24]	
		Chlorine Dioxide[25,26,27] TOC[28]	

Notes

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.
2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least one year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to one sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.
5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to one sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.
6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to one sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HHA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.
10. System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to one sample per three-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A three-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of one year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least one sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is less than 0.05 mg/L based upon monthly measurements for one year.
20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, three additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take three samples in the distribution system as close as possible to the first customer at intervals of not less than 6 hours
26. If any daily sample from the distribution system exceeds the MRDL and if one or more of the three samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any two consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following an exceedance of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce TOC and alkalinity to one paired sample per plant per quarter.

Table C3.T10. Radionuclide MCLs and Monitoring Requirements

MCLs Contaminant	**pCi/L**
Gross Alpha [1]	15 pCi/L
Combined Radium-226 and -228	5 pCi/L
Beta Particle and Photon Radioactivity[2]	4 mrem/yr
Uranium	30 µg/L

Notes

1. Gross alpha activity includes radium-226, but excludes radon and uranium.
2. Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides.

Monitoring Requirements:

All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed if activity is ≤5 pCi/L. Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the maximum contaminant level, analysis of a single sample may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Table C3.T11. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 0.5°C or Lower*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	23	46	69	91	114	137
0.6	24	47	71	94	118	141
0.8	24	48	73	97	121	145
1	25	49	74	99	123	148
1.2	25	51	76	101	127	152
1.4	26	52	78	103	129	155
1.6	26	52	79	105	131	157
1.8	27	54	81	108	135	162
2	28	55	83	110	138	165
2.2	28	56	85	113	141	169
2.4	29	57	86	115	143	172
2.6	29	58	88	117	146	175
2.8	30	59	89	119	148	178
3	30	60	91	121	151	181

Chlorine Concentration (mg/L)	pH = 6.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	27	54	82	109	136	163
0.6	28	56	84	112	140	168
0.8	29	57	86	115	143	172
1	29	59	88	117	147	176
1.2	30	60	90	120	150	180
1.4	31	61	92	123	153	184
1.6	32	63	95	126	158	189
1.8	32	64	97	129	161	193
2	33	66	99	131	164	197
2.2	34	67	101	134	168	201
2.4	34	68	103	137	171	205
2.6	35	70	105	139	174	209
2.8	36	71	107	142	178	213
3	36	72	109	145	181	217

Chlorine Concentration (mg/L)	pH = 7.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	33	65	98	130	163	195
0.6	33	67	100	133	167	200
0.8	34	68	103	137	171	205
1	35	70	105	140	175	210
1.2	36	72	108	143	179	215
1.4	37	74	111	147	184	221
1.6	38	75	113	151	188	226
1.8	39	77	116	154	193	231
2	39	79	118	157	197	236
2.2	40	81	121	161	202	242
2.4	41	82	124	165	206	247
2.6	42	84	126	168	210	252
2.8	43	86	129	171	214	257
3	44	87	131	174	218	261

Chlorine Concentration (mg/L)	pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	40	79	119	158	198	237
0.6	40	80	120	159	199	239
0.8	41	82	123	164	205	246
1	42	84	127	169	211	253
1.2	43	86	130	173	216	259
1.4	44	89	133	177	222	266
1.6	46	91	137	182	228	273
1.8	47	93	140	186	233	279
2	48	95	143	191	238	286
2.2	50	99	149	198	248	297
2.4	50	99	149	199	248	298
2.6	51	101	152	203	253	304
2.8	52	103	155	207	258	310
3	53	105	158	211	263	316

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	46	92	139	185	231	277
0.6	48	95	143	191	238	286
0.8	49	98	148	197	246	295
1	51	101	152	203	253	304
1.2	52	104	157	209	261	313
1.4	54	107	161	214	268	321
1.6	55	110	165	219	274	329
1.8	56	113	169	225	282	338
2	58	115	173	231	288	346
2.2	59	118	177	235	294	353
2.4	60	120	181	241	301	361
2.6	61	123	184	245	307	368
2.8	63	125	188	250	313	375
3	64	127	191	255	318	382

Chlorine Concentration (mg/L)	pH = 8.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	55	110	165	219	274	329
0.6	57	114	171	228	285	342
0.8	59	118	177	236	295	354
1	61	122	183	243	304	365
1.2	63	125	188	251	313	376
1.4	65	129	194	258	323	387
1.6	66	132	199	265	331	397
1.8	68	136	204	271	339	407
2	70	139	209	278	348	417
2.2	71	142	213	284	355	426
2.4	73	145	218	290	363	435
2.6	74	148	222	296	370	444
2.8	75	151	226	301	377	452
3	77	153	230	307	383	460

Chlorine Concentration (mg/L)	pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	65	130	195	260	325	390
0.6	68	136	204	271	339	407
0.8	70	141	211	281	352	422
1	73	146	219	291	364	437
1.2	75	150	226	301	376	451
1.4	77	155	232	309	387	464
1.6	80	159	239	318	398	477
1.8	82	163	245	326	408	489
2	83	167	250	333	417	500
2.2	85	170	256	341	426	511
2.4	87	174	261	348	435	522
2.6	89	178	267	355	444	533
2.8	91	181	272	362	453	543
3	92	184	276	368	460	552

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T12. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 5.0°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH=6.5 Log Inactivations						pH=7.0 Log Inactivations						pH=7.5 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2 5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1 5	2.0	2.5	3.0
<=0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139	28	55	83	111	138	166
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	114	143	171
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149	30	60	90	119	149	179
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152	31	61	92	122	153	183
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155	31	62	94	125	156	187
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158	32	64	96	128	160	192
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162	33	65	98	131	163	196
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165	33	67	100	133	167	200
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169	34	68	102	136	170	204
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172	35	70	105	139	174	209
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175	36	71	107	142	178	213
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178	36	72	109	145	181	217
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182	37	74	111	147	184	221

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH=8.5 Log Inactivations						pH=9.0 Log Inactivations					
	0 5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2 5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	33	66	99	132	165	198	39	79	118	157	197	236	47	93	140	186	233	279
0.6	34	68	102	136	170	204	41	81	122	163	203	244	49	97	146	194	243	291
0.8	35	70	105	140	175	210	42	84	126	168	210	252	50	100	151	201	251	301
1	36	72	108	144	180	216	43	87	130	173	217	260	52	104	156	208	260	312
1.2	37	74	111	147	184	221	45	89	134	178	223	267	53	107	160	213	267	320
1.4	38	76	114	151	189	227	46	91	137	183	228	274	55	110	165	219	274	329
1.6	39	77	116	155	193	232	47	94	141	187	234	281	56	112	169	225	281	337
1.8	40	79	119	159	198	238	48	96	144	191	239	287	58	115	173	230	288	345
2	41	81	122	162	203	243	49	98	147	196	245	294	59	118	177	235	294	353
2.2	41	83	124	165	207	248	50	100	150	200	250	300	60	120	181	241	301	361
2.4	42	84	127	169	211	253	51	102	153	204	255	306	61	123	184	245	307	368
2.6	43	86	129	172	215	258	52	104	156	208	260	312	63	125	188	250	313	375
2.8	44	88	132	175	219	263	53	106	159	212	265	318	64	127	191	255	318	382
3	45	89	134	179	223	268	54	108	162	216	270	324	65	130	195	259	324	389

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T13. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 10°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH=6.5 Log Inactivations						pH=7.0 Log Inactivations						pH=7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104	21	42	63	83	104	125
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107	21	43	64	85	107	128
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112	22	45	67	89	112	134
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114	23	46	69	91	114	137
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116	23	47	70	93	117	140
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	96	120	144
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122	25	49	74	98	123	147
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124	25	50	75	100	125	150
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129	26	52	79	105	131	157
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131	27	53	80	107	133	160
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134	27	54	82	109	136	163
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137	28	55	83	111	138	166

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH=8.5 Log Inactivations						pH=9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	35	70	105	139	174	209
0.6	26	51	77	102	128	153	31	61	92	122	153	183	36	73	109	145	182	218
0.8	26	53	79	105	132	158	32	63	95	126	158	189	38	75	113	151	188	226
1	27	54	81	108	135	162	33	65	98	130	163	195	39	78	117	156	195	234
1.2	28	55	83	111	138	166	33	67	100	133	167	200	40	80	120	160	200	240
1.4	28	57	85	113	142	170	34	69	103	137	172	206	41	82	124	165	206	247
1.6	29	58	87	116	145	174	35	70	106	141	176	211	42	84	127	169	211	253
1.8	30	60	90	119	149	179	36	72	108	143	179	215	43	86	130	173	216	259
2	30	61	91	121	152	182	37	74	111	147	184	221	44	88	133	177	221	265
2.2	31	62	93	124	155	186	38	75	113	150	188	225	45	90	136	181	226	271
2.4	32	63	95	127	158	190	38	77	115	153	192	230	46	92	138	184	230	276
2.6	32	65	97	129	162	194	39	78	117	156	195	234	47	94	141	187	234	281
2.8	33	66	99	131	164	197	40	80	120	159	199	239	48	96	144	191	239	287
3	34	67	101	134	168	201	41	81	122	162	203	243	49	97	146	195	243	292

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T14. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 15°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH=6.5 Log Inactivations						pH=7.0 Log Inactivations						pH=7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	16	25	33	41	49	10	20	30	39	49	59	12	23	35	47	58	70	14	28	42	55	69	83
0.6	8	17	25	33	42	50	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
0.8	9	17	26	35	43	52	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88
1	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75	15	30	45	60	75	90
1.2	9	18	27	36	45	54	11	21	32	43	53	64	13	25	38	51	63	76	15	31	46	61	77	92
1.4	9	18	28	37	46	55	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
1.6	9	19	28	37	47	56	11	22	33	44	55	66	13	26	40	53	66	79	16	32	48	64	80	96
1.8	10	19	29	38	48	57	11	23	34	45	57	68	14	27	41	54	68	81	16	33	49	65	82	98
2	10	19	29	39	48	58	12	23	35	46	58	69	14	28	42	55	69	83	17	33	50	67	83	100
2.2	10	20	30	39	49	59	12	23	35	47	58	70	14	28	43	57	71	85	17	34	51	68	85	102
2.4	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86	18	35	53	70	88	105
2.6	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88	18	36	54	71	89	107
2.8	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89	18	36	55	73	91	109
3	11	21	32	42	53	63	13	25	38	51	63	76	15	30	46	61	76	91	19	37	56	74	93	111

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH=8.5 Log Inactivations						pH=9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	17	33	50	66	83	99	20	39	59	79	98	118	23	47	70	93	117	140
0.6	17	34	51	68	85	102	20	41	61	81	102	122	24	49	73	97	122	146
0.8	18	35	53	70	88	105	21	42	63	84	105	126	25	50	76	101	126	151
1	18	36	54	72	90	108	22	43	65	87	108	130	26	52	78	104	130	156
1.2	19	37	56	74	93	111	22	45	67	89	112	134	27	53	80	107	133	160
1.4	19	38	57	76	95	114	23	46	69	91	114	137	28	55	83	110	138	165
1.6	19	39	58	77	97	116	24	47	71	94	118	141	28	56	85	113	141	169
1.8	20	40	60	79	99	119	24	48	72	96	120	144	29	58	87	115	144	173
2	20	41	61	81	102	122	25	49	74	98	123	147	30	59	89	118	148	177
2.2	21	41	62	83	103	124	25	50	75	100	125	150	30	60	91	121	151	181
2.4	21	42	64	85	106	127	26	51	77	102	128	153	31	61	92	123	153	184
2.6	22	43	65	86	108	129	26	52	78	104	130	156	31	63	94	125	157	188
2.8	22	44	66	88	110	132	27	53	80	106	133	159	32	64	96	127	159	191
3	22	45	67	89	112	134	27	54	81	108	135	162	33	65	98	130	163	195

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T15. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 20°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH=6.5 Log Inactivations						pH=7.0 Log Inactivations						pH=7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54	11	21	32	43	53	64
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57	12	23	35	46	58	69
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58	12	23	35	47	58	70
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59	12	24	36	48	60	72
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61	12	25	37	49	62	74
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62	13	25	38	50	63	75
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63	13	26	39	51	64	77
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66	13	27	40	53	67	80
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67	14	27	41	54	68	81
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68	14	28	42	55	69	83

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH=8.5 Log Inactivations						pH=9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	18	35	53	70	88	105
0.6	13	26	39	51	64	77	15	31	46	61	77	92	18	36	55	73	91	109
0.8	13	26	40	53	66	79	16	32	48	63	79	95	19	38	57	75	94	113
1	14	27	41	54	68	81	16	33	49	65	82	98	20	39	59	78	98	117
1.2	14	28	42	55	69	83	17	33	50	67	83	100	20	40	60	80	100	120
1.4	14	28	43	57	71	85	17	34	52	69	86	103	21	41	62	82	103	123
1.6	15	29	44	58	73	87	18	35	53	70	88	105	21	42	63	84	105	126
1.8	15	30	45	59	74	89	18	36	54	72	90	108	22	43	65	86	108	129
2	15	30	46	61	76	91	18	37	55	73	92	110	22	44	66	88	110	132
2.2	16	31	47	62	78	93	19	38	57	75	94	113	23	45	68	90	113	135
2.4	16	32	48	63	79	95	19	38	58	77	96	115	23	46	69	92	115	138
2.6	16	32	49	65	81	97	20	39	59	78	98	117	24	47	71	94	118	141
2.8	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	95	119	143
3	17	34	51	67	84	101	20	41	61	81	102	122	24	49	73	97	122	146

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T16. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 25°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH=6.5 Log Inactivations						pH=7.0 Log Inactivations						pH=7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	28	35	42
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39	8	16	24	31	39	47
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40	8	16	24	32	40	48
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41	8	16	25	33	41	49
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41	8	17	25	33	42	50
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42	9	17	26	34	43	51
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43	9	17	26	35	43	52
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44	9	18	27	35	44	53
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45	9	18	27	36	45	54
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46	9	18	28	37	46	55

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH=8.5 Log Inactivations						pH=9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	12	23	35	47	58	70
0.6	9	17	26	34	43	51	10	20	31	41	51	61	12	24	37	49	61	73
0.8	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75
1	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
1.2	9	18	28	37	46	55	11	22	34	45	56	67	13	27	40	53	67	80
1.4	10	19	29	38	48	57	12	23	35	46	58	69	14	27	41	55	68	82
1.6	10	19	29	39	48	58	12	23	35	47	58	70	14	28	42	56	70	84
1.8	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
2	10	20	31	41	51	61	12	25	37	49	62	74	15	29	44	59	73	88
2.2	10	21	31	41	52	62	13	25	38	50	63	75	15	30	45	60	75	90
2.4	11	21	32	42	53	63	13	26	39	51	64	77	15	31	46	61	77	92
2.6	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
2.8	11	22	33	44	55	66	13	27	40	53	67	80	16	32	48	64	80	96
3	11	22	34	45	56	67	14	27	41	54	68	81	16	32	49	65	81	97

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T17. CT Values for Inactivation of Viruses by Free Chlorine

	Log Inactivation		Log Inactivation		Log Inactivation	
	2.0 pH		3.0 pH		3.0 pH	
Temperature (C)	**6-9**	**10**	**6-9**	**10**	**6-9**	**10**
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table C3.T18. CT Values for Inactivation of Giardia Cysts by Chlorine Dioxide

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	10	4.3	4	3.2	2.5	2
1-log	21	8.7	7.7	6.3	5	3.7
1.5-log	32	13	12	10	7.5	5.5
2-log	42	17	15	13	10	7.3
2.5-log	52	22	19	16	13	9
3-log	63	26	23	19	15	11

Table C3.T19. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

	Temperature (C)					
Removal	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	8.4	5.6	4.2	2.8	2.1	1.4
3-log	25.6	17.1	12.8	8.6	6.4	4.3
4-log	50.1	33.4	25.1	16.7	12.5	8.4

Table C3.T20. CT Values for Inactivation of Giardia Cysts by Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	0.48	0.32	0.23	0.16	0.12	0.08
1-log	0.97	0.63	0.48	0.32	0.24	0.16
1.5-log	1.5	0.95	0.72	0.48	0.36	0.24
2-log	1.9	1.3	0.95	0.63	0.48	0.32
2.5-log	2.4	1.6	1.2	0.79	0.60	0.40
3-log	2.9	1.9	1.43	0.95	0.72	0.48

Table C3.T21. CT Values for Inactivation of Viruses by Free Ozone

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
2-log	0.9	0.6	0.5	0.3	0.25	0.15
3-log	1.4	0.9	0.8	0.5	0.4	0.25
4-log	1.8	1.2	1.0	0.6	0.5	0.3

Table C3.T22. CT Values for Inactivation of Giardia Cysts by Chloramine pH 6-9

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
0.5-log	635	365	310	250	185	125
1-log	1,270	735	615	500	370	250
1.5-log	1,900	1,100	930	750	550	375
2-log	2,535	1,470	1,230	1,000	735	500
2.5-log	3,170	1,830	1,540	1,250	915	625
3-log	3,800	2,200	1,850	1,500	1,100	750

Table C3.T23. CT Values for Inactivation of Viruses by Chloramine

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
2-log	1,243	857	643	428	321	214
3-log	2,063	1,423	1,067	712	534	356
4-log	2,883	1,988	1,491	994	746	497

Table C3.T24. CT Values for Inactivation of Viruses by UV

Log Inactivation	
2.0	3.0
21	36

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C4. CHAPTER 4

WASTEWATER

C4.1. SCOPE

This chapter contains criteria to control and regulate discharges of wastewaters into surface waters and also into maritime waters, both defined herein. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges and pollutants from indirect dischargers.

C4.2. DEFINITIONS

C4.2.1. 7-day Average. The arithmetic mean of pollutant parameters values for samples collected in a period of seven consecutive days.

C4.2.2. 30-day Average. The arithmetic mean of pollutant parameters value for samples collected in a period of 30 consecutive days.

C4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

C4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

C4.2.5. Best Management Practices (BMPs). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into surface waters or maritime waters.

C4.2.6. Biochemical Oxygen Demand (BOD_5). The five-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

C4.2.7. Carbonaceous BOD_5 ($CBOD_5$). The five-day measure of the pollutant parameter, carbonaceous biochemical oxygen demand. This test can substitute for the BOD_5 testing which suppresses the nitrification reaction/component in the BOD_5 test.

C4.2.8. Conventional Pollutants. BOD_5, total suspended solids (TSS), oil and grease, fecal coliforms, and pH.

C4.2.9. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g. concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

C4.2.10. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

C4.2.11. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to surface waters or to maritime waters from any "point source."

C4.2.12. Domestic Wastewater Treatment System (DWTS). Any DoD or Kuwait facility designed to treat wastewater before its discharge to surface waters or maritime waters and in which the majority of such wastewater is made up of domestic sewage.

C4.2.13. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into surface waters or maritime waters.

C4.2.14. Existing Source. Any source, including but not limited to Domestic Wastewater Treatment Systems, Industrial Wastewater Treatment Systems, and direct dischargers, that directly or indirectly discharges pollutants to the wastewater system and that is not a "New Source."

C4.2.15. Indirect Discharge. An introduction of pollutants in wastewater to a domestic wastewater treatment system (DWTS).

C4.2.16. Industrial Activities Associated with Storm Water. Activities that during wet weather events may contribute pollutants to storm water runoff or drainage. (See Table C4.T3.)

C4.2.17. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to surface waters or maritime waters.

C4.2.18. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

C4.2.19. Maritime Waters. Coastal waters and the Kuwait territorial seas recognized under customary international law.

C4.2.20. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

C4.2.21. New Source. Any source, including but not limited to Domestic Wastewater Treatment Systems, Industrial Wastewater Treatment Systems, and direct dischargers, that is built or substantially modified on or after 1 October 1994 and that directly or indirectly discharges pollutants to the wastewater system.

C4.2.22. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft or any conveyance that merely collects natural surface flows of precipitation.

C4.2.23. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical wastes; biological materials; radioactive materials; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

C4.2.24. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

C4.2.25. Regulated Facilities. Those facilities for which criteria are established under this chapter, such as DWTS, IWTS, or industrial discharges.

C4.2.26. Storm Water. Run-off and drainage from wet weather events such as rain, snow, ice, sleet or hail.

C4.2.27. Substantially Modified. Modified in such a way that the project cost exceeds $1 million, regardless of funding source.

C4.2.28. Surface Waters. Surface waters are identified in subparagraphs C4.2.28.1 through C4.2.28.6. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this chapter, are not surface waters, unless they were originally surface waters or were created by impoundment of surface waters. Surface waters do not include maritime waters, but otherwise include the following:

C4.2.28.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce;

C4.2.28.2. Waters which are or could be used for recreation or other purposes;

C4.2.28.3. Waters from which fish or shellfish are or could be taken and sold;

C4.2.28.4. Waters which are used or could be used for industrial purposes by industries;

C4.2.28.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds; and

C4.2.28.6. Tributaries of waters identified in subparagraphs C4.2.28.1 through C4.2.28.5 of this definition.

C4.2.29. Total Suspended Solids (TSS). The pollutant parameter total filterable suspended solids.

C4.2.30. Total Toxic Organics (TTO). The summation of all quantifiable values greater than 0.01 mg/L for the toxic organics in Table C4.T1, "Components of Total Toxic Organics."

C4.3. CRITERIA

C4.3.1. Effluent Limits for Direct Discharges of Conventional Pollutants to Surface Waters

C4.3.1.1. All new sources of pollutants directly discharged to surface waters will comply with the following effluent limitations:

C4.3.1.1.1. BOD_5

C4.3.1.1.1.1. The 30-day average BOD_5 will not exceed 30 mg/L.

C4.3.1.1.1.2. The 7-day average BOD_5 will not exceed 45 mg/L.

C4.3.1.1.1.3. $CBOD_5$ may be substituted for BOD_5. The $CBOD_5$ limit, if substituted for the parameter BOD_5, should be at least 5 mg/L less than each numerical limit for the 30 day and 7 day average for the BOD_5 limit. The $CBOD_5$ test procedure suppresses the nitrification component in the BOD_5 test procedure, thereby reducing the value or effects and lowering the oxygen demand. When $CBOD_5$ is substituted for BOD_5, the following limits will apply:

C4.3.1.1.1.3.1. 30-day average will not exceed 25 mg/L.

C4.3.1.1.1.3.2. The 7-day average will not exceed 40 mg/L.

C4.3.1.1.2. TSS

C4.3.1.1.2.1. The 30-day average will not exceed 30 mg/L.

C4.3.1.1.2.2. The 7-day average will not exceed 45 mg/L.

C4.3.1.1.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.1.2. All existing sources of pollutants directly discharged to the surface waters will comply with the following effluent limitations:

C4.3.1.2.1. BOD_5

C4.3.1.2.1.1. The 30-day average will not exceed 45 mg/L.

C4.3.1.2.1.2. The 7-day average will not exceed 65 mg/L.

C4.3.1.2.2. TSS

C4.3.1.2.2.1. The 30-day average will not exceed 45 mg/L.

C4.3.1.2.2.2. The 7-day average will not exceed 65 mg/L.

C4.3.1.2.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.1.3. Monitoring. The monitoring requirements for direct discharges to surface waters are set out in Table C4.T2. The monitoring frequency given (including both sampling and analysis) includes three regulated parameters (BOD_5, TSS and pH). Samples shall be collected at the point of discharge to surface waters prior to any mixing with receiving waters.

C4.3.1.4. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities discharging directly to surface waters. Retain records for three years.

C4.3.1.4.1. The effluent, concentration, or other measurement specified for each regulated parameter.

C4.3.1.4.2. The daily volume of effluent discharge from each point source.

C4.3.1.4.3. Test procedures for the analysis of pollutants.

C4.3.1.4.4. The date, exact place and time of sampling and/or measurements.

C4.3.1.4.5. The person who performed the sampling and/or measurements.

C4.3.1.4.6. The date of analysis.

C4.3.1.5. Complaint System. A system for investigating water pollution complaints from individuals or Kuwaiti water pollution control authorities will be established, involving USCENTCOM, as appropriate.

C4.3.1.6. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 0.049 million gallons per day (MGD), monthly conventional pollutant samples must comply with level for 30-day average.

C4.3.2. Effluent Limitations for Categorical Industrial Discharges (Direct or Indirect) to Surface Waters. Activities that fall into any of the industrial categories listed below and which discharge (directly or indirectly) to surface waters must comply with the following effluent limits.

C4.3.2.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

C4.3.2.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

C4.3.2.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

C4.3.2.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

C4.3.2.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

C4.3.2.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

C4.3.2.1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

C4.3.2.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

C4.3.2.1.8. The following discharge standards apply to new and existing facilities in the above electroplating subparts that discharge less than 38,000 liters per day (10,000 gallons per day):

Pollutant	**Daily Maximum (mg/L)**	**4-Day Average (mg/L)**
Cyanide, amenable	5.0	2.7
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Toxic Organics	4.57	---

C4.3.2.1.9. The following discharge standards apply to new and existing facilities in the above electroplating subparts that discharge 38,000 liters per day (10,000 gallons per day) or more:

Pollutant	Daily Maximum (mg/L)	4-Day Average (mg/L)
Cyanide, total	1.9	1.0
Copper	4.5	2.7
Nickel	4.1	2.6
Chrome	7.0	4.0
Zinc	4.2	2.6
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Metals	10.5	6.8
Total Toxic Organics	2.13	---

C4.3.2.1.10. In addition to the above standards, new and existing facilities that electroplate precious metals and that discharge 38,000 liters per day (10,000 gallons per day) or more must comply with the following standard:

Pollutant	Daily Maximum (mg/L)	4-Day Average (mg/L)
Silver	1.2	0.7

C4.3.2.2. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters specified in C4.3.2.1.8, C4.3.2.1.9, or C4.3.2.1.10, according to the size and type of facility. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan. (See Table C4.T2, "Monitoring Requirements.")

C4.3.3. Effluent Limits for Direct Discharges to Maritime Waters. All discharges of a pollutant to maritime waters shall conform to the following criteria:

C4.3.3.1. The point of discharge shall be at least 500 meters from the coast (mean sea level).

C4.3.3.2. The point of discharge shall not be in fishing areas, swimming areas, or natural sanctuaries (which areas and sanctuaries must documented and delineated in Kuwait national law).

C4.3.3.3. Pollutant discharge concentrations shall not exceed the limits set in Table C4.T4.

C4.3.4. Limits for Indirect Discharges. All indirect discharges shall comply with the following limits:

C4.3.4.1. Pollutant concentrations shall not exceed the limits set in Table C4.T5.

C4.3.4.2. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater treatment system (DWTS) flow is prohibited.

C4.3.4.3. Ignitability and Explosivity

C4.3.4.3.1. The discharge of wastewater with a closed cup flashpoint of less than 60°C (140°F) is prohibited.

C4.3.4.3.2. The discharge of waste with any of the following characteristics is prohibited:

C4.3.4.3.2.1. A liquid solution that contains more than 24% alcohol by volume and has a flash point less than 60°C (140°F);

C4.3.4.3.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction;

C4.3.4.3.2.3. An ignitable compressed gas;

C4.3.4.3.2.4. An oxidizer, such as peroxide.

C4.3.4.4. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

C4.3.4.4.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

C4.3.4.4.2. Wastes that react violently with water;

C4.3.4.4.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water;

C4.3.4.4.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

C4.3.4.4.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

C4.3.4.4.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material"; and

C4.3.4.4.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

C4.3.4.5. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 is allowed, unless the DWTS is specifically designed to handle that type of wastewater.

C4.3.4.6. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin.

C4.3.4.7. Spills and Batch Discharges (slugs). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

C4.3.4.7.1. Description of discharge practices, including non-routine batch discharges;

C4.3.4.7.2. Description of stored chemicals;

C4.3.4.7.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this chapter, including procedures for subsequent written notification within five days;

C4.3.4.7.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training;

C4.3.4.7.5. Proper procedures for building containment structures or equipment;

C4.3.4.7.6. Necessary measures to control toxic organic pollutants and solvents; and

C4.3.4.7.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

C4.3.4.8. Authorized Discharge Locations. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

C4.3.4.9. Heat. Indirect discharges shall be cool enough to ensure that biological activity in the DWTS is not inhibited. In no case shall an indirect discharge be permitted that would cause the temperature of the process water at the DWTS to exceed 40°C (104°F).

C4.3.4.10. Complaint System. A system for investigating water pollution complaints from Kuwaiti water pollution control authorities will be established, involving USCENTCOM as appropriate.

C4.3.5. Storm Water Management

C4.3.5.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table C4.T3, "Best Management Practices for Controlling Storm Water." Update the SWPPP annually using in-house resources.

C4.3.5.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

C4.3.6. Septic System. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

C4.3.7. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate.

Table C4.T1. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1,2-Dichloropropane
Methyl bromide (bromomethane)	1,3-Dichloropropylene (1,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1,2-Trichloroethane
1,1-Dichloroethene	Benzene
1,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1,2-Dichloroethane	Bromoform (tribromomethane)
1,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1,2-Diphenylhydrazine
1,3-Dichlorobenzene	N-nitrosodiphenylamine
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate
Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractables Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	
Pesticides/PCBs	
Alpha-Endosulfan	Endrin

Table C4.T1. Components of Total Toxic Organics (continued)

Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor
Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)
Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and metabolites)	PCB-1016 (Arochlor 1016)
Dieldrin	

Table C4.T2. Monitoring Requirements for Direct Discharges to Surface waters

Plant Capacity (MGD)	**Monitoring Frequency**
0.001 - 0.99	Monthly
1.0 - 4.99	Weekly
> 5.0	Daily

Table C4.T3. Best Management Practices For Controlling StormWater Pollution

Activity	**Best Management Practice**
Aircraft Ground Support Equipment Maintenance	Perform maintenance/repair activities inside Use drip pans to capture drained fluids Cap hoses to prevent drips and spills
Aircraft/runway deicing	Perform anti-icing before the storm Put critical aircraft in hangars/shelters
Aircraft/vehicle fueling operations	Protect fueling areas from the rain Provide spill response equipment at fueling station
Aircraft/vehicle maintenance & repair	Perform maintenance/repair activities inside Use drip pans to capture drained fluids
Aircraft/vehicle washing	Capture wash water and send to wastewater treatment plant Treat wash water with oil water separator before discharge
Bulk fuel storage areas	Use dry camlock connectors to reduce fuel loss Capture spills with drip pans when breaking connections Curb fuel transfer areas, treat with oil water separator
Construction activities	Construct sediment dams/silt fences around construction sites
Corrosion control activities	Capture solvent/soaps used to prepare aircraft for painting Perform corrosion control activities inside
Hazardous material storage	Store hazardous materials inside or under cover Reduce use of hazardous materials
Outdoor material storage areas	Cover and curb salt, coal, urea piles Store product drums inside or under cover Reduce quantity of material stored outside
Outdoor painting/depainting operations	Capture sandblasting media for proper disposal Capture paint clean up materials (thinners, rinsates)
Pesticide operations	Capture rinse water when mixing chemicals Store spray equipment inside
Power production	Capture leaks and spills from power production equipment using drip pans, etc.
Vehicle storage yards	Check vehicles in storage for leaks and spills Use drip pans to capture leaking fluids

Table C4.T4 Effluent Limits for Direct Discharges to Maritime Waters

Pollutant	Units	Limit (Maximum unless otherwise noted)
Color		Clear
pH		Min 6.0, Max 8.0
Temperature	°C	10
Biological Oxygen Demand (BOD5)	mg/L (5 days, at 20°C)	30
Chemical Oxygen Demand (COD)	mg/L	200
Oil/grease	mg/L	10
Total Suspended Solids (TSS)	mg/L	10
Total Soluable Solids	mg/L	10
Phosphate (PO4)	mg/L	2
Ammonia (NH3-N)	mg/L	3
Nitrate	mg/L	30
Total Kjeldahl Nitrogen (TKN)	mg/L	5
Total Nitrogen (N)	mg/L	30
Total Recoverable Phenol	mg/L	1
Fluorides	mg/L	25
Sulfides	mg/L	0.5
Chlorine	mg/L	0.5
Dissolved Oxygen	mg/L	> 2
Turbidity	NTU	50
Floatables	mg/L	Nil
Aluminum	mg/L	5
Arsenic	mg/L	0.1

Table C4.T4 Effluent Limits for Direct Discharges to Maritime Waters (continued)

Barium	mg/L	2
Boron	mg/L	0.75
Beryllium	mg/L	0.1
Cadmium	mg/L	0.01
Cyanides	mg/L	0.1
Chromium	mg/L	0.2
Nickel	mg/L	0.2
Mercury	mg/L	0.001
Cobalt	mg/L	0.2
Iron	mg/L	5
Antimony	mg/L	1.0
Copper	mg/L	0.2
Manganese	mg/L	0.2
Zinc	mg/L	2.0
Lead	mg/L	0.5
Lithium	mg/L	2.5
Molybdenum	mg/L	0.01
Vanadium	mg/L	0.1
Silver	mg/L	0.1
All herbicides	mg/L	0.2
Most probable number of total coliform	MPN/100 mL	1,000

Table C4.T5. Effluent Limits for Indirect Discharges

Pollutant	Units	Maximum
Biological Oxygen Demand (BOD_5)	mg/L (5 days, at 20ºC)	500
Chemical Oxygen Demand (COD)	mg/L	750
Total Suspended Solids (TSS)	mg/L	300
Total Recoverable Phenol	mg/L	1
Fluorides	mg/L	1000
Sulfides	mg/L	10
Arsenic	mg/L	0.1
Cadmium	mg/L	0.1
Cyanides	mg/L	0.1
Chromium	mg/L	1.0
Nickel	mg/L	0.2
Mercury	mg/L	0.002
Copper	mg/L	0.5
Zinc	mg/L	2.0
Lead	mg/L	0.5
Silver	mg/L	4.0
Tar and Tar Oil	mg/L	Nil
Floating Oil & Grease	mg/L	5
Emulsified Oil/grease	mg/L	5
Most Probable Number of total coliform	MPN/100 ml	1000
Most Probable Number of fecal coliform	MPN/100 ml	100
Egg parasites		Nil
Worm parasites		Nil

C5. CHAPTER 5

HAZARDOUS MATERIAL

C5.1. SCOPE

This chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements. These matters are covered under other Chapters. This Final Governing Standard does not cover munitions.

C5.2. DEFINITIONS

C5.2.1. Hazardous Chemical Warning Label. A label, tag, or marking on a container which provides the following information:

C5.2.1.1. Identification/name of hazardous chemicals,

C5.2.1.2. Appropriate hazard warnings, and

C5.2.1.3. The name and address of the manufacturer, importer or other responsible party; and which is prepared in accordance with DoDI 6050.05 (Reference (h)).

C5.2.2. Hazardous Material. Any material that is capable of posing an unreasonable risk to health, safety, or environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table C5.T1., "Typical Hazardous Materials Characteristics," or the material is listed in Table AP1.T4. Munitions are excluded.

C5.2.3. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with Reference (h).

C5.2.4. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

C5.2.5. Material Safety Data Sheet (MSDS). A form used by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

C5.3. CRITERIA

C5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and

Marine Corps Order (MCO) 4450.12A (Reference (i)) provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Manual 24-204 (Interservice), Army TM 38-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, Ch3.4 (HM24) (Reference (j)).

C5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

C5.3.3. Installations will ensure that for each hazardous material shipment:

C5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material and which include an MSDS;

C5.3.3.2. All drivers are briefed on the hazardous material included in the shipment, including health risks of exposure and the physical hazards of the material including potential for fire, explosion and reactivity;

C5.3.3.3. Drivers will be trained on spill control and emergency notification procedures.

C5.3.3.4. For any hazardous material categorized on the basis of section AP1.1, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes;

C5.3.3.5. The transport vehicles are subjected to a walk-around inspection by supervisory personnel before and after the material is loaded; and,

C5.3.3.6. Packages are labeled in accordance with paragraph C5.3.7.

C5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material and an inventory of all hazardous materials contained therein (see paragraph C18.3.2).

C5.3.5. Each material safety data sheet shall be in English or Arabic, and shall contain at least the following information:

C5.3.5.1. <u>The identity used on the label</u>

C5.3.5.1.1. If the hazardous chemical is a single substance, its chemical and common name; or

C5.3.5.1.2. If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or, C5.3.5.1.3. If the hazardous chemical is a mixture which has not been tested as a whole:

C5.3.5.1.3.1. The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

C5.3.5.1.3.2. The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit, or could present a health hazard to employees; and,

C5.3.5.1.3.3. The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture.

C5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

C5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

C5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;

C5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

C5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;

C5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen;

C5.3.5.8. Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

C5.3.5.9. Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;

C5.3.5.10. Emergency and first aid procedures;

C5.3.5.11. The date of preparation of the material safety data sheet or the last change to it; and, C5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

C5.3.6. Each work center will maintain a file of Material Safety Data Sheets (MSDS) for each hazardous material procured, stored or used at the work center. MSDSs which are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site.

C5.3.7. All hazardous materials on DoD installations in Kuwait will have an English and Arabic Hazardous Chemical Warning Label in accordance Reference (h) (or Kuwaiti equivalent) and will have MSDS information either available or in HMIRS in accordance with Reference (h) and other Component instructions. These requirements apply throughout the life-cycle of these materials.

C5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

C5.3.9. All excess hazardous material will be processed through the Defense Logistics Agency (DLA) Disposition Services in accordance with the procedures in DoD 4160.21-M (Reference (k)). DLA Disposition Services will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable HM between DoD activities participating in a regional or local pharmacy or exchange program.

C5.3.10. All personnel who use, handle or store hazardous materials will be trained in accordance with Reference (h) and other DoD Component instructions.

C5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

Table C5.T1. Typical Hazardous Materials Characteristics

1.	The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials which damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gasses, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive materials.
2.	The item and/or its disposal is regulated by the State of Kuwait because of its hazardous nature.
3.	The item contains asbestos, mercury, or polychlorinated biphenyls.
4.	The item has a flashpoint below 93 °C (200 °F) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control.
5.	The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of greater than 1.0 volt or less than -1.0 volt.
6.	In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics.
7.	The item has special characteristics which in the opinion of the manufacturer or the DoD Components could cause harm to personnel if used or stored improperly.

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C6. CHAPTER 6

HAZARDOUS WASTE

C6.1. SCOPE

This chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed and recycled in an environmentally sound manner.

C6.2. DEFINITIONS

C6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4. with a U.S. EPA waste number with the "P" designator, or those hazardous wastes in Table AP1.T4. with Hazard Code "H".

C6.2.2. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into, or on any land or water so that the waste or constituent thereof may enter the environment. Proper disposal effectively mitigates hazards to human health and the environment.

C6.2.3. DoD Hazardous Waste Generator. In DoD, a generator is considered to be the installation, or activity on an installation, that produces a hazardous waste.

C6.2.4. Hazardous Constituent. A chemical compound that is listed by name in Table AP1.T4. or possesses the characteristics described in paragraph AP1.1 of Appendix 1.

C6.2.5. Hazardous Waste (HW). A discarded material that may be solid, semi-solid, liquid, or contained gas and exhibits a characteristic of a hazardous waste defined in section AP1.1. or is listed as a hazardous waste in Tables AP1.T1. through AP1.T4. Excluded from this definition are domestic sewage sludge, household wastes and medical wastes.

C6.2.6. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area (HWSA) or shipped for treatment or disposal. A HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

C6.2.7. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending or other treatment is also hazardous waste fuel.

C6.2.8. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this Final Governing Standard.

C6.2.9. Hazardous Waste Profile Sheet (HWPS). A document which identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

C6.2.10. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. A HWSA may store more than 55 gallons of a HW stream and more than one quart of an acute HW stream.

C6.2.11. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

C6.2.12. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

C6.2.13. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

C6.2.14. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The generator's Unit Identification Code (UIC) is used as the unique identification number in this Final Governing Standard.

C6.2.15. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending or other treatment. "Used oil," means any oil or other waste POL product that has been refined from crude oil, or is synthetic oil, has been used, and as a result of such use, is contaminated by physical or chemical impurities. Although used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, it is still considered used oil, unless it has been mixed with hazardous waste. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

C6.2.16. Hazardous Waste Log. A listing of HW deposited and removed from a HWSA. Information such as the waste type, volume, location and storage removal dates should be recorded.

C6.2.17. Elementary Neutralization. A process of neutralizing a HW, which is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

C6.3. CRITERIA

C6.3.1. DoD Hazardous Waste Generators

C6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using their knowledge of the materials and processes that generated the waste, or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name) and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics should be measurable by standardized and available testing protocols.

C6.3.1.2. Hazardous Waste Profile Sheet (HWPS). A HWPS will be used to identify each hazardous waste stream. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams or process modifications that change the character of the hazardous waste being handled at the storage area.

C6.3.1.3. Audit Trail. Each generator will use its Unit Identification Code for the unique identification number for all recordkeeping, reports and manifests for hazardous waste. Generators will maintain an audit trail of hazardous waste from the point of generation to disposal. Generators using the Defense Logistics Agency (DLA) Disposition Services will obtain a signed copy of the manifest from the initial DLA Disposition Services recipient of the waste, at which time DLA assumes responsibility. A generator, as provided in a host-tenant agreement, that uses the hazardous waste management and/or disposal program of a DoD component that has a different unique identification number (see definition C6.2.14), will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer and disposal of the waste. Activities desiring to dispose of their waste without using DLA Disposition Services will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal. All manifests will be kept for a minimum of five years by the shipper.

C6.3.1.4. Management Plans. Facilities engaged in operations where hazardous wastes are generated will develop written plans and procedures for the following:

C6.3.1.4.1. Waste identification and analysis to be applied to each waste stream generated by the facility.

C6.3.1.4.2. Procedures for inspection and operations of security, safety and emergency response systems operated by the facility. The plan should include a chart indicating inspection times and results of inspections.

C6.3.1.4.3. Training of facility employees in proper waste management operations and inspection procedures.

C6.3.1.4.4. Proper and safe storage and handling of hazardous waste.

C6.3.1.4.5. Identification of personnel and equipment available, training procedures and records, evacuation routes and exits, and procedures for containing and controlling explosions, fires, or spills of HW.

C6.3.1.4.6. Closure of all HW storage areas, as stated in C6.3.3.11.

C6.3.2. Hazardous Waste Accumulation Points (HWAP)

C6.3.2.1. A HWAP is defined in paragraph C6.2.6. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those which are chemically incompatible. Each HWAP will have warning signs appropriate for the waste being accumulated at that site.

C6.3.2.2. Each HWAP will comply with the storage limits in paragraph C6.2.6. When these limits have been reached, the generator will make arrangements within five working days to move the hazardous waste to a HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348-1A) to appropriate authorities responsible for removing the HW (e.g., DLA Disposition Services). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-Quart) volume accumulation limits, but must be transported off-site to a final destination facility within one year.

C6.3.2.3. All provisions of paragraph C6.3.4, "Use and Management of Containers," apply to HWAPs with the exception of subparagraph C6.3.4.1.5 (weekly inspections).

C6.3.2.4. The following provisions of paragraph C6.3.5, "Recordkeeping Requirements," apply to HWAPs: C6.3.5.1 ("Turn-in Documents"), C6.3.5.5 ("Manifests"), and C6.3.5.6 ("Waste Analysis/Characterization Records").

C6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate hazardous waste training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph C6.3.9.

C6.3.3. Hazardous Waste Storage Areas (HWSA)

C6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

C6.3.3.2. Design and Operation of HWSA. HWSAs must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, groundwater or surface water that could threaten human health or the environment. Hazardous waste should not be stored longer than one year in an HWSA.

C6.3.3.3. Waste Analysis and Verification

C6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served, will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

C6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, a hazardous waste profile sheet (HWPS) for each waste stream that is stored at each HWSA.

C6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

C6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided;

C6.3.3.3.3.2. Ensure that no waste is accepted for storage unless a HWPS is provided, or available and properly referenced;

C6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

C6.3.3.3.3.4. Analyze waste shipments in accordance with the waste analysis plan to determine whether it matches the waste description on the accompanying manifest and documents; and

C6.3.3.3.3.5. Reject shipments which do not match the accompanying waste descriptions unless the generator provides an accurate description.

C6.3.3.4. Security

C6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the hazardous waste storage area grounds.

C6.3.3.4.2. Security System Design. An acceptable security system for a hazardous waste storage area consists of either:

C6.3.3.4.2.1. A 24-hour surveillance system (e.g. television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the hazardous waste storage area; or

C6.3.3.4.2.2. An artificial or natural barrier (e.g. a fence in good repair or a fence combined with a cliff) that completely surrounds the hazardous waste storage area, combined with a means to control entrance at all times (e.g. an attendant, television monitors, locked gate, or controlled roadway access).

C6.3.3.4.3. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the hazardous waste storage area, and at other locations, in sufficient numbers to be seen from any approach to the hazardous waste storage area. Signs must be written in English and Arabic, and must be legible from a distance of at least 25 feet.

C6.3.3.5. Required Aisle Space. Aisle space must allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency. Containers must not obstruct an exit.

C6.3.3.6. Access to Communications or Alarm System

C6.3.3.6.1. Whenever hazardous waste is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

C6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

C6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

C6.3.3.7.1. An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel;

C6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams;

C6.3.3.7.3. Portable fire extinguishers, fire control equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment;

C6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam producing equipment, automatic sprinklers, or water spray systems; and

C6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, eyewash and shower facilities.

C6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA communications alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its proper operation in time of emergency.

C6.3.3.8. General Inspection Requirements

C6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of hazardous waste constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

C6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of hazardous waste, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

C6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems (e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, eroding dike, etc.).

C6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in subparagraph C6.3.4.1.5. Minimum frequencies for inspecting tank systems are found in subparagraph C6.3.7.5. For equipment not covered by those sections, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

C6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

C6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep these records for at least three years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

C6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate hazardous waste training program in accordance with the training requirements in paragraph C6.3.9.

C6.3.3.10. Storage Practices

C6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion and generation of toxic gases.

C6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No smoking" signs, or appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "no smoking" legend must be written in English and Arabic. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

C6.3.3.11. Closure and Closure Plans

C6.3.3.11.1. Closure. At closure of a HWSA, hazardous waste and hazardous waste residues must be removed from the containment system including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of hazardous waste and according to the Closure Plan.

C6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA also will develop a closure plan. Concurrent with the decision to close the HWSA the plan will be implemented. The closure plan will include: estimates of the storage capacity of hazardous waste, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

C6.3.4. Use and Management of Containers

C6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following guidelines will apply when handling and storing hazardous waste containers.

C6.3.4.1.1. Containers holding hazardous waste will be in good condition, free from severe rusting, bulging or structural defects.

C6.3.4.1.2. Containers used to store hazardous waste, including over pack containers, must be compatible with the materials stored.

C6.3.4.1.3. Management of Containers

C6.3.4.1.3.1. A container holding hazardous waste must always be closed during storage, except when it is necessary to add or remove waste.

C6.3.4.1.3.2. A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

C6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

C6.3.4.1.4. Containers holding hazardous waste will be marked with a hazardous waste marking, and a label indicating the hazard class of the waste contained (i.e., flammable, corrosive, etc.).

C6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

C6.3.4.2. Containment

C6.3.4.2.1. Container storage areas must have a secondary containment system meeting the following:

C6.3.4.2.1.1. Must be sufficiently impervious to contain leaks, spills and accumulated precipitation until the collected material is detected and removed,

C6.3.4.2.1.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

C6.3.4.2.2. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in subparagraph C6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

C6.3.4.2.3. Rainwater captured in secondary containment areas should be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the hazardous waste in the containers. Contaminated water shall be treated as hazardous waste until determined otherwise.

C6.3.4.3. Special Requirements for Ignitable or Reactive Waste. Areas which store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

C6.3.4.4. Special Requirements for Incompatible Wastes

C6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

C6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

C6.3.4.4.3. A storage container holding a hazardous waste that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

C6.3.5. Recordkeeping Requirements

C6.3.5.1. Turn-in documents, e.g., DD 1348-1A or manifests, must be maintained for three (3) years.

C6.3.5.2. Hazardous Waste Log. A written Hazardous Waste Log will be maintained at the HWSA to record all hazardous waste handled and should consist of the following:

C6.3.5.2.1. Name/address of generator;

C6.3.5.2.2. Description and hazard class of the hazardous waste;

C6.3.5.2.3. Number and types of containers;

C6.3.5.2.4. Quantity of hazardous waste;

C6.3.5.2.5. Date stored;

C6.3.5.2.6. Storage location; and

C6.3.5.2.7. Disposition data, to include: dates received, sealed and transported and transporter used.

C6.3.5.3. The Hazardous Waste Log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

C6.3.5.4. Inspection Logs. Records of inspections should be maintained for a period of three (3) years.

C6.3.5.5. Manifests. Manifests of incoming and outgoing hazardous wastes will be retained for a period of three (3) years.

C6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until three (3) years after closure of the HWSA.

C6.3.5.7. The installation will maintain records, identified in paragraphs C6.3.5.1, C6.3.5.5, and C6.3.5.6, for HWAPs on the installation.

C6.3.6. Contingency Plan

C6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of hazardous waste in accordance with the provisions of Chapter 18, "Spill Prevention and Response Planning."

C6.3.6.2. A current copy of the installation contingency plan must be:

C6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan which are pertinent to their facilities and operation.), and;

C6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and which the plan relies upon to provide emergency services. Plans should be available in both English and Arabic.

C6.3.7. Tank Systems. The following criteria apply to all storage tanks containing hazardous wastes. See Chapter 19 for criteria dealing with underground storage tanks containing petroleum, oil and lubricants and hazardous substances.

C6.3.7.1. Application. The requirements of this part apply to HWSAs that use tank systems for storing or treating hazardous waste. Tank systems that are used to store or treat hazardous waste which contains no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in subparagraph C6.3.7.4, "Containment and Detection of Releases." Tank systems, including sumps that serve as part of a secondary containment system to collect or contain releases of hazardous wastes, are exempted from the requirements in subparagraph C6.3.7.4.

C6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of subparagraph C6.3.7.4, installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

C6.3.7.3. Design and Installation of New Tank Systems or Components. Managers of HWSAs installing new tank systems or components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

C6.3.7.4. Containment and Detection of Releases. To prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment that meets the requirements of this section must be:

C6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

C6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

C6.3.7.4.3. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

C6.3.7.4.4. Constructed to include one or more of the following; a liner external to the tank, a vault, or double-walled tank.

C6.3.7.5. General Operating Requirements

C6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

C6.3.7.5.2. The installation must inspect and log at least once each operating day:

C6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

C6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

C6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of hazardous waste (e.g., wet spots, dead vegetation).

C6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA.

C6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or which is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

C6.3.7.6.1. The installation must immediately stop the flow of hazardous waste into the tank system or secondary containment system and inspect the system to determine the cause of the release.

C6.3.7.6.2. The installation must immediately conduct an inspection of the release and undertake the following actions, based upon that inspection:

C6.3.7.6.2.1. Prevent further migration of the leak or spill to soils or surface water;

C6.3.7.6.2.2. Remove and properly dispose of any contamination of the soil or surface water;

C6.3.7.6.2.3. Remove free product to the maximum extent possible; and

C6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

C6.3.7.6.3. Make required notifications and reports.

C6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate hazardous waste residues, contaminated containment system components (liners, etc.), contaminated soils to the extent practicable, and structures and equipment.

C6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

C6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

C6.3.8.1.1. Industrial furnaces

C6.3.8.1.2. Boilers that are identified as follows:

C6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

C6.3.8.1.2.2. Utility boilers used to produce electric power, steam or heated or cooled air or other gases or fluids;

C6.3.8.1.2.3. Used oil-fired space heaters provided that:

C6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

C6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.5 million BTU per hour; and

C6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

C6.3.8.2. Prohibitions on Dust Suppression or Road Treatment. Used oil, hazardous waste, or used oil contaminated with any hazardous waste will not be used for dust suppression or road treatment.

C6.3.8.3. Lead-acid batteries that are to be recycled will be managed as hazardous material. Lead-acid batteries which are not recycled will be managed as hazardous waste.

C6.3.9. Hazardous Waste Training

C6.3.9.1. Application. Personnel and their supervisors that are assigned duties involving actual or potential exposure to hazardous waste must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty after the effective date of this FGS must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05, "DoD Hazard Communication (HAZCOM) Program" (Reference (h)).

C6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher hazardous waste training.

C6.3.9.3. Training Contents and Requirements. The training program must:

C6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements;

C6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience;

C6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems; and

C6.3.9.3.4. Address the following areas in particular for personnel whose duties include hazardous waste handling and management:

C6.3.9.3.4.1. Emergency procedures (response to fire/explosion/ spills; use of communications/alarm systems; body and equipment clean up);

C6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures:

C6.3.9.3.4.3. Employee protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

C6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

C6.3.9.4. Documentation of Training. Installations must document all hazardous waste training for each individual assigned duties involving actual or potential exposure to hazardous waste. Updated training records on personnel assigned duties involving actual or potential exposure to hazardous waste must be kept by the HWSA manager or the responsible installation office and retained for at least three years after termination of duty of these personnel.

C6.3.10. HW Transported from an Installation

C6.3.10.1.1.1. Prior to shipment of HW from the HWAP's or HWSA's installation, all intended treatment or disposal facilities must be approved in accordance with C6.3.11, "Treatment and Disposal Procedures."

C6.3.10.1.1.2. When transporting hazardous waste via commercial transportation on public roads and highways, hazardous waste generators will prepare off-installation hazardous waste shipments in compliance with applicable Kuwaiti transportation regulations. In the absence of Kuwaiti regulations, international standards will be used. Requirements may include placarding, marking, containerization, and labeling. All signage shall be in English and Arabic. Hazardous waste designated for international transport will be prepared in accordance with applicable international regulations.

C6.3.10.1.1.3. When transporting hazardous waste via military vehicle on Kuwait public roads and highways, the shipping organization (generator, HWSA, DLA, etc.) will ensure compliance with References (h), (i), (j), and (k), and requirements specified in applicable international agreements (i.e., SOFA, basing, etc.).

C6.3.10.1.1.4. All international shipments of HW will comply with the requirements of the Basel Convention. HW shipments must not depart from any DoD installation in Kuwait without written approval from all countries through which the HW will travel.

C6.3.10.1.1.5. Transporters / shippers of HW must prepare an emergency plan to respond to spills.

C6.3.10.1.2. Manifesting. All hazardous waste leaving the installation will be accompanied by a manifest to ensure a complete audit trail from point of origin to ultimate disposal. The manifest will be in English and Arabic, and will include the information listed below. DD Form 1348-1A, Issue Release/Receipt Document, or DD Form 1348-2, Issue Release/Receipt Document with Address Label, may be used. This manifest should include:

C6.3.10.1.2.1. Generator's name, address, and telephone number;

C6.3.10.1.2.2. Generator's unique identification number (i.e. the Unit Identification Code);

C6.3.10.1.2.3. Transporter's name, address, and telephone number;

C6.3.10.1.2.4. Destination name, address, and telephone number;

C6.3.10.1.2.5. Description of waste;

C6.3.10.1.2.6. Total quantity of waste;

C6.3.10.1.2.7. Date of shipment; and

C6.3.10.1.2.8. Date of receipt.

C6.3.11. Treatment and Disposal Procedures

C6.3.11.1. Hazardous waste will be recycled or reused to the maximum extent practical. Safe and environmentally acceptable methods will be used to identify, store, prevent leakage, and dispose of hazardous waste, to minimize risks to health and the environment.

C6.3.11.2. All DoD hazardous waste shall be disposed of through the DLA) Disposition Services. A decision to not use DLA Disposition Services for hazardous waste disposal may be made in accordance with DoD Instruction 4001.01 (Reference (l)) for best accomplishment of the installation mission. This decision to not use DLA Disposition Services requires review and approval by USCENTCOM. USCENTCOM will require that installation contracts and disposal criteria be at least as protective as criteria used by DLA Disposition Services.

C6.3.11.3. Kuwait Treatment and Disposal. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or Kuwaiti law are not treated or disposed in Kuwait unless:

C6.3.11.3.1. the treatment/disposal will be conducted in accordance with C6.3.11.5, "Treatment and Disposal Facilities Criteria,"

C6.3.11.3.2. the treatment/disposal facility is properly permitted by Kuwait's Environment Public Authority, and

C6.3.11.3.3. USCENTCOM has approved the treatment/disposal in coordination with the unified combatant commander, the Director of Defense Logistics Agency (DLA), or other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

C6.3.11.4. Other Nation Treatment and Disposal. Shipments of DoD hazardous waste out of Kuwait must comply with the following standards:

C6.3.11.4.1. The shipping installation or HWSA must have written approval by, at a minimum, the Deputy Under Secretary of Defense for Environmental Security (DUSD(ES)), prior to the shipment,

C6.3.11.4.2. International HW shipments must comply with the requirements of the Basel Convention, and

C6.3.11.4.3. Facilities that treat and/or dispose of Hazardous Waste must comply with the requirements of C6.3.11.5, "Treatment and Disposal Facilities Criteria."

C6.3.11.5. Treatment and Disposal Facilities Criteria. The determination of whether hazardous wastes may be treated or disposed at a non-US, non-DoD controlled facility, including Kuwaiti facilities, must include consideration of the following:

C6.3.11.5.1. The facility design and the means of treatment or disposal employed at the facility and whether they effectively mitigate the hazards of such waste to human health and the environment, including the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface water, or groundwater;

C6.3.11.5.2. The degree of training and reliability of persons in the waste management process;

C6.3.11.5.3. The quality and quantity of inspections, monitoring, and recordkeeping; and

C6.3.11.5.4. The HW regulatory program in the facility's country, which should include the following:

C6.3.11.5.4.1. An effective system for tracking the movement of HW to its ultimate destination;

C6.3.11.5.4.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW; and

C6.3.11.5.4.3. Appropriate standards and limitations on the methods which may be used to treat and dispose of HW.

C6.3.11.6. Land Disposal Requirements. Hazardous wastes will only be land disposed when there is a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal site for as long as the wastes remain hazardous. Hazardous waste may be land disposed only in facilities meeting the following criteria:

C6.3.11.6.1. The land disposal facility has a liner and a leachate collection system. The liner will be of natural or man-made materials and restrict the downward or lateral escape of hazardous waste, hazardous constituents, or leachate. The permeability of such liners will be no greater than 10^{-7} cm/sec;

C6.3.11.6.2. The land disposal facility has a groundwater monitoring program capable of determining the facility's impact on the quality of water in the aquifers underlying the facility; and

C6.3.11.6.3. The land disposal facility must be located no less than 2 kilometers from the nearest water supply well.

C6.3.11.6.4. The requirements of subparagraph C6.3.11.6.1 or subparagraph C6.3.11.6.2, may be waived by USCENTCOM for a particular land disposal facility if a written determination is made by a qualified geologist or geotechnical engineer that there is a low potential for migration of hazardous waste, hazardous constituents, or leachate from the facility to water supply wells, irrigation wells, or surface water. This determination will be based on an analysis of local precipitation, geologic conditions, physical properties, depth to groundwater, and proximity of water supply wells or surface water, as well as use of alternative design and operating practices. Methods for preventing migration will be at least as effective as liners and leachate collection systems required in subparagraph C6.3.11.6.1.

C6.3.11.7. Incinerator Standards. This paragraph applies to incinerators that incinerate hazardous waste as well as boilers and industrial furnaces that burn hazardous waste for any recycling purposes.

C6.3.11.7.1. Incinerators used to dispose of hazardous waste must be licensed or permitted by a competent regulatory authority or approved by USCENTCOM. This license, permit, or approval must comply with the criteria listed in subparagraph C6.3.11.7.2.

C6.3.11.7.2. A license, permit, or approval by USCENTCOM for incineration of hazardous waste must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) so as to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme which would require an incinerator to achieve the standards set forth in either subparagraphs C6.3.11.7.2.1 or C6.3.11.7.2.2 is acceptable.

C6.3.11.7.2.1. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents which represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission or particulate matter and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

C6.3.11.7.2.2. The incinerator has demonstrated, as a condition for obtaining a license, permit, or approval by USCENTCOM, the ability to effectively destroy the organic hazardous constituents which represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the competent regulatory authority or USCENTCOM to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

C6.3.11.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes which are categorized as hazardous on the basis of section AP1.1 and which, after treatment as described in this chapter no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix AP1 will continue to be managed as hazardous wastes under the criteria of this FGS, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of disposal alternatives. These technologies should not be implemented without consultation with USCENTCOM.

C6.3.11.8.1. Organics

C6.3.11.8.1.1. Incineration in accordance with the requirements of subparagraphs C6.3.11.7.1 and C6.3.11.7.2

C6.3.11.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

C6.3.11.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentration of a representative compound or indicator parameter (e.g., total organic carbon) has been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the hazardous waste being biodegraded.

C6.3.11.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction; liquid extraction; precipitation/crystallization or phase separation techniques, such as decantation, filtration and centrifugation when used in conjunction with one of the above techniques.

C6.3.11.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner so as to destroy hazardous constituents and control harmful emissions.

C6.3.11.8.2. Heavy Metals

C6.3.11.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

C6.3.11.8.2.2. Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals.

C6.3.11.8.3. Reactives. Any treatment which changes the chemical or physical composition of a material such that it no longer exhibits the characteristic for reactivity defined in Appendix AP1.

C6.3.11.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3, will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

C6.3.11.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with subparagraphs C6.3.11.8.2.1 or C6.3.11.8.2.2 to stabilize, fix or recover heavy metals, as appropriate, and in accordance with subparagraph C6.3.11.8.4 to neutralize any corrosives before disposal.

C6.3.11.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accordance with subparagraphs C6.3.11.7 and C6.3.11.8.

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C7. CHAPTER 7

SOLID WASTE

C7.1. SCOPE

This chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4, "Pollution Prevention," (Reference (f)) and service solid waste management manuals. The criteria in this chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are located in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste," Chapter 11, "Pesticides," and Chapter 14, "Polychlorinated Biphenyls."

C7.2. DEFINITIONS

C7.2.1. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing or disposal methods.

C7.2.2. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

C7.2.3. Collection. The act of consolidating solid wastes (or materials which have been separated for the purpose of recycling) from various locations.

C7.2.4. Collection Frequency. The number of times collection is provided in a given period of time.

C7.2.5. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

C7.2.6. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that conveys solid waste into the main compartment of the body and compresses it into a smaller volume of greater density.

C7.2.7. Construction and Demolition Waste. The waste building materials, packaging and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings and other structures.

C7.2.8. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

C7.2.9. Curb Collection. Collection of solid waste placed adjacent to a street.

C7.2.10. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day in order to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

C7.2.11. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

C7.2.12. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

C7.2.13. Generation. The act or process of producing solid waste.

C7.2.14. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

C7.2.15. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

C7.2.16. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities.

C7.2.17. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

C7.2.18. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25 degrees Celsius and atmospheric pressure.

C7.2.19. Municipal Solid Waste (MSW). Normally, residential and commercial solid waste generated within a community, not including yard waste. (See also definition in Chapter 2, "Air Emissions.")

C7.2.20. Municipal Solid Waste Landfill Unit (MSWLF). A discrete area of land or an excavation, on or off the installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. A MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

C7.2.21. Open Burning. Burning of solid wastes in the open, such as in an open dump.

C7.2.22. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors and scavengers.

C7.2.23. Residential Solid Waste. The wastes generated by the normal activities of households, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

C7.2.24. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments and institutions.

C7.2.25. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

C7.2.26. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

C7.2.27. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

C7.2.28. Service Solid Waste Management Manual. Navy NAVFAC MO-213, Air Force AFR 91-8, Army TM 5-634 (Reference (m)), or their successor documents.

C7.2.29. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.30. Solid Wastes. Garbage, refuse, sludge and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows or other common water pollutants.

C7.2.31. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

C7.2.32. Stationary Compactor. A powered machine which is designed to compact solid waste or recyclable materials, and which remains stationary when in operation.

C7.2.33. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

C7.2.34. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

C7.2.35. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

C7.2.36. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

C7.2.37. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

C7.3. CRITERIA

C7.3.1. DoD solid wastes will be treated and stored in facilities that have been evaluated against paragraphs C7.3.12, C7.3.15, and C7.3.16 of this chapter. These evaluated facilities will be used to the maximum extent practical, and disposed of in Kuwaiti approved landfills or by a USCENTCOM approved recycling or incineration program.

C7.3.2. Installations will cooperate with Kuwait officials, to the extent possible, in the solid waste management planning process.

C7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting and waste minimization efforts.

C7.3.4. All solid wastes or materials which have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled so as not to result in spillage.

C7.3.4.1. Batteries will be disposed of in accordance with TB 43-0134. Batteries that are considered, as hazardous waste in TB 43-0134 will be disposed of as a hazardous waste.

C7.3.4.2. Steel and poly drums will be cleaned, tripled rinsed and recycled on the installation or turned in to the local property disposal office for sale. Damaged drums that cannot be sold as scrap can be disposed of at local Kuwaiti approved landfills, once they have been properly cleaned and crushed to prevent reuse by local populations. All US identification markings will be painted over or sanded off prior to sale or disposal of the drums.

C7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2 or hazardous constituents as defined in Chapter 6. Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 14, and 15.

C7.3.6. In the design of all buildings or other facilities which are constructed, modified, or leased after the effective date of this FGS, there will be provisions for storage in accordance with these guidelines which will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

C7.3.7. Storage containers should be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking or deforming in a manner that would impair serviceability. Storage containers should be designed and maintained to minimize attraction of insects, other pests and other health hazards.

C7.3.8. Containers should be stored on a firm, level, well drained surface which is large enough to accommodate all of the containers and which is maintained in a clean, spillage-free condition.

C7.3.9. Recycling programs will be instituted on DoD installations and sites/camps in accordance with the policies in Reference (f).

C7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located, and only after justification that unique circumstances mandate a new unit.

C7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

C7.3.11.1. Location restrictions in regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, and unstable areas; minimum of 2 kilometers separation between the MSWLF and water wells;

C7.3.11.2. Procedures for excluding hazardous waste;

C7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions and record keeping requirements; and

C7.3.11.4. Inspection program.

C7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

C7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with USCENTCOM, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

C7.3.12. Installations operating MSWLF units will:

C7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day. Daily cover soil must be at least 25 cm thick.

C7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

C7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, polychlorinated biphenyl (PCB) wastes, and wastes determined unsuitable for the specific MSWLF.

C7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling.

C7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

C7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

C7.3.12.7. Operate in a manner to protect the health and safety of personnel associated with the operation.

C7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding and breeding of disease vectors.

C7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

C7.3.12.10. Operate in an aesthetically acceptable manner.

C7.3.12.11. Operate in a manner to protect aquifers.

C7.3.12.12. Control public access to landfill facilities.

C7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

C7.3.12.14. Maintain records on the preceding criteria.

C7.3.13. During closure and post-closure operations, installations will:

C7.3.13.1. Install a final cover system that is designed to minimize infiltration and erosion;

C7.3.13.2. Ensure that the infiltration layer is comprised of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than .00005 cm/sec, whichever is less;

C7.3.13.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earth material that is capable of sustaining native plant growth;

C7.3.13.4. If possible, revegetate the final cap with native plants that are compatible with the landfill design, including the liner;

C7.3.13.5. Complete final grading of the MSWLF to no greater than 10 degrees slope; and

C7.3.13.6. Prepare a written closure plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, ground-water monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. Post closure period will be a minimum of five (5) years.

C7.3.14. Solid waste will not be buried or burned in open pits. Where burning is the method, incinerators meeting air quality requirements in Chapter 2 will be used.

C7.3.15. A composting facility which is located on a DoD installation and which processes annually more than 5,000 tons of sludge from a domestic wastewater treatment plant (See Chapter 4), will comply with the following criteria:

C7.3.15.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge and other materials, such as nutrient or bulking agents being composted including the source and volume or weight of the material;

C7.3.15.2. Access to the facility must be controlled. All access points must be secured when the facility is not in operation;

C7.3.15.3. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically;

C7.3.15.4. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system;

C7.3.15.5. The temperature and retention time for the material being composted must be monitored and recorded;

C7.3.15.6. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury and polychlorinated biphenyls; and

C7.3.15.7. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

C7.3.15.7.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing such that aerobic conditions are maintained during the composting process; and

C7.3.15.7.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55 degrees Celsius. A stabilization period of at least seven days must follow the decomposition period.

C7.3.16. Classification and Use of Compost from DoD Composting Facilities. Compost produced at a composting facility which is located on a DoD installation and which processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (See Chapter 4), must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

C7.3.16.1. Class A compost must be stored until the compost is matured, i.e., 60 percent decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated below. The compost must be stabilized and contain no greater amounts of inert material than indicated. Maximum allowable average contaminant concentrations in milligrams per kilogram on a dry weight basis are:

PCB	1
Cadmium	10
Chromium	1,000
Copper	500
Lead	500
Mercury	5
Nickel	100
Zinc	1,000

C7.3.16.2. Class B compost consists of any compost generated which fails to meet Class A standards.

C7.3.16.3. Compost distribution and end use

C7.3.16.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

C7.3.16.3.2. Class B compost may not be distributed for agricultural applications.

C8. CHAPTER 8

MEDICAL WASTE MANAGEMENT

C8.1. SCOPE

This chapter contains criteria for the management of medical waste at medical, dental, research and development and, veterinary facilities generated in the diagnosis, treatment or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

C8.2. DEFINITIONS

C8.2.1. Infectious Agent. Any organism (such as a virus or a bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

C8.2.2. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitological laboratory.

C8.2.3. Infectious Medical Waste. Solid waste produced by medical and dental treatment facilities which is specially managed because it has the potential for causing disease in man and may pose a risk to both individuals or community health if not managed properly, and which includes the following classes:

C8.2.3.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration are known to cause disease in humans.

C8.2.3.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery or autopsy procedures. Animal carcasses, body parts, blood and bedding are also included.

C8.2.3.3. Human blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products that are capable of releasing these materials during handling.

C8.2.3.4. Potentially infectious materials including human body fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

C8.2.3.5. Sharps, including hypodermic needles, syringes, biopsy needles and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste.

C8.2.3.6. Infectious waste from isolation rooms, but only including those items which were contaminated or likely to be contaminated with infectious agents or pathogens to include excretion exudates and discarded materials contaminated with blood.

C8.2.4. Noninfectious Medical Waste. Solid waste created that does not require special management because it has been determined to be incapable of causing disease in man or which has been treated to render it noninfectious.

C8.2.5. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste Management."

C8.2.6. Treatment. Any method, technique or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed.

C8.3. CRITERIA

C8.3.1. Infectious medical waste will be separated, if practical, from other solid waste at the point of origin.

C8.3.2. Infectious medical waste must not be transported from an installation to a Kuwait facility unless the destination treatment/disposal facility is operating under a permit or other official approval from Kuwait's Environmental Public Authority, and such permit or official approval allows the facility to accept DoD infectious medical waste.

C8.3.3. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M (Reference (k)) and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. The Defense Logistics Agency (DLA) Disposition Services has no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

C8.3.4. Solid waste that is classified as a hazardous waste in accordance with Appendix AP1 will be managed in accordance with the criteria in Chapter 6.

C8.3.5. Mixtures of other solid waste and infectious medical waste will be handled as infectious medical waste.

C8.3.6. Radioactive medical waste will be managed in accordance with Service Directives.

C8.3.7. Infectious medical waste will be segregated, transported and stored in bags or receptacles a minimum of 3 mils thick having such durability, puncture resistance and burst strength as to prevent rupture or leaks during ordinary use.

C8.3.8. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in

English and Arabic, and will include markings that identify the generator, date of generation, and the contents.

C8.3.9. Sharps will only be discarded into approved rigid and puncture proof receptacles. Needles shall not be clipped, cut, bent or recapped before disposal.

C8.3.10. Infectious medical waste will be transported and stored to minimize human exposure, and will not be placed in chutes or dumbwaiters.

C8.3.11. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph C8.3.18. Containers holding sharps will not be compacted.

C8.3.12. All anatomical pathology waste (i.e., large body parts) must be placed in containers lined with plastic bags that comply with paragraph C8.3.7, and may only be disposed of by burial after being treated for disposal by incineration or cremation.

C8.3.13. Blood, blood products and other liquid infectious wastes will be handled as follows:

C8.3.13.1. Bulk blood or blood products may only be decanted into clinical sinks and the emptied containers will continue to be managed as infectious medical waste.

C8.3.13.2. Suction canister waste from operating rooms will either be decanted into a clinical sink or will be sealed into leak-proof containers and incinerated.

C8.3.14. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, mask, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

C8.3.15. If infectious medical waste cannot be treated on-site, it will be managed during storage as follows:

C8.3.15.1. Infectious medical waste will be maintained in a nonputrescent state, using refrigeration as necessary.

C8.3.15.2. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste, or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

C8.3.16. Storage sites must be:

C8.3.16.1. Specifically designated;

C8.3.16.2. Constructed and operated to prevent entry of insects, rodents and other pests;

C8.3.16.3. Constructed and operated to prevent access by unauthorized personnel; and

C8.3.16.4. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and Arabic.

C8.3.17. Bags and receptacles containing infectious medical waste must be placed into rigid or semi-rigid, leak-proof containers before being transported off-site.

C8.3.18. Infectious medical waste treated must be treated in accordance with Table C8.T1 and the following before disposal:

C8.3.18.1. Sterilizers must maintain the temperature at 121℃ (250℉) for at least 30 minutes at 15 psi.

C8.3.18.2. The effectiveness of sterilizers must be checked at least weekly using Bacillus stearo thermophilus spore strips or an equivalent biological performance test.

C8.3.18.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens, and must meet applicable criteria in Chapter 2 for air emissions.

C8.3.18.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6. Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7.

C8.3.18.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

C8.3.19. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

C8.3.20. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

C8.3.20.1. Response personnel must comply with paragraph C8.3.14;

C8.3.20.2. Blood, body fluid and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste; and

C8.3.20.3. Surfaces contacted by infectious medical waste must be washed with soap and water and chemically decontaminated in accordance with paragraph C8.3.18.

C8.3.21. Installations will keep records, for at least three years after the date of disposal, of the following information concerning infectious medical waste:

C8.3.21.1. Type of waste;

C8.3.21.2. Amount of waste (volume or weight);

C8.3.21.3. Treatment, if any, including date of treatment; and

C8.3.21.4. Disposition, including date of disposition, and if the waste is transferred to Kuwait facilities, receipts acknowledging details descrdibed in subparagraphs C8.3.21.1 - C8.3.21.3 for each transfer.

Table C8.T1. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	Method of Treatment	Method of Disposal
Microbiological	[1] Steam sterilization	[2] Municipal solid waste landfill (MSWLF)
	Chemical disinfection	MSWLF
	Incineration	MSWLF
Pathological	[3] Incineration	MSWLF
	[3] Cremation	Burial
	[4] Chemical Sterilization	[5] Domestic wastewater treatment plant (DWTP)
	[4] Steam sterilization	DWTP
Bulk blood & suction canister waste	[6] Steam sterilization	DWTP
	[6] Incineration	MSWLF
Sharps in sharps containers	*Steam sterilization*	*MSWLF*
	Incineration	MSWLF

Notes

1. Preferred method for cultures and stocks because they can be treated at point of generation
2. See Chapter 7 for criteria for solid waste landfills.
3. Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.
4. This only applies to placentas, small organs and small body parts which may be steam sterilized or chemically sterilized, ground, and discharged to a domestic wastewater treatment plant.
5. See Chapter 4 for criteria for domestic wastewater treatment plants.
6. Bulk blood or suction canister waste known to be infectious must be treated by incineration or steam sterilization before disposal.

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C9. CHAPTER 9

PETROLEUM, OIL AND LUBRICANTS

C9.1. SCOPE

This chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 18, "Spill Prevention and Response Planning."

C9.2. DEFINITIONS

C9.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

C9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs, that are exempt from all criteria in Chapter 19, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 19 are counted toward the aggregate thresholds in subparagraph C9.2.7.2 below.

C9.2.3. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

C9.2.4. Loading/ Unloading Areas. Any location where POL is authorized to be loaded to or unloaded from a POL storage container.

C9.2.5. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

C9.2.6. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

C9.2.7. POL Facility. An installation with:

C9.2.7.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

C9.2.7.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

C9.2.7.3. A pipeline facility as identified in paragraph C9.2.5.

C9.2.8. POL Storage Container. POL containers with capacities GREATER than 55 gallons (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 19 are EXCLUDED from the definition of POL storage containers.

C9.3. CRITERIA

C9.3.1. Applicability. The below criteria apply only at POL Facilities as defined in paragraph C9.2.7.

C9.3.2. General POL Storage Container Criteria

C9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

C9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criterion for below ground storage containers.

C9.3.2.3. Permeability. Permeability for containment areas will be a maximum of 10^{-7} cm/sec.

C9.3.2.4. Containment Area Drainage. Drainage of stormwater from containment areas will be controlled by a valve that is locked closed when not in active use. Stormwater will be inspected for petroleum sheen before being drained from containment areas. If a petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, "Hazardous Waste."

C9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

C9.3.3. Additional POL Storage Container Criteria

C9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

C9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

C9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

C9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

C9.3.4.1. POL container cleaning wastes (sludge and washwaters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

C9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

C9.3.5. General Transport and Distribution Criteria

C9.3.5.1. Loading/Unloading Racks and Areas

C9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

C9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

C9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

C9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and/or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL, which reasonably could be expected to cause a sheen on waters of Kuwait defined in Chapter 4, "Wastewater."

C9.3.5.2. POL Pipeline Facilities

C9.3.5.2.1. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

C9.3.5.2.2. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

C9.3.5.2.2.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies; and

C9.3.5.2.2.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

C9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; and the applicable contents of the facility Spill Plan.

C10. CHAPTER 10

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C11. CHAPTER 11

PESTICIDES

C11.1. SCOPE

This chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

C11.2. DEFINITIONS

C11.2.1. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides, and who have been formally certified in accordance with the Department of Defense Manual, DoD Pest Management Training and Certification (DoD 4150.7-M) (Reference (n)) (which accepts host-nation certification in appropriate circumstances).

C11.2.2. Integrated Pest Management (IPM). A planned program, incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control, and where necessary, the judicious use of least-hazardous pesticides.

C11.2.3. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the well being of humans or animals, attack real property, supplies, equipment or vegetation, or are otherwise undesirable.

C11.2.4. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities who provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

C11.2.5. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

C11.2.6. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

C11.2.6.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or Kuwaiti authority;

C11.2.6.2. Any pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

C11.2.6.3. Any material used to clean up a pesticide spill; or

C11.2.6.4. Any containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are not considered hazardous waste, and can be disposed of as normal solid waste.

C11.2.7. Registered Pesticide. A pesticide that has been registered and approved for sale or use within the United States or Kuwait.

C11.3. CRITERIA

C11.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1, "Pest Management Maintenance Report," or a computer-generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910.1-M (Reference (g)).

C11.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

C11.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

C11.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

C11.3.3.2. Arthropod skin and clothing repellents; and

C11.3.3.3. Pesticides applied as part of an installation's self help program.

C11.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

C11.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed.

C11.3.6. Installations will only use registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan.

C11.3.7. Pesticides will be included in the installation spill contingency plan (see Chapter 18).

C11.3.8. Pest management facilities, including mixing and storage areas, will comply with Reference (o).

C11.3.9. All pesticide applications will be in accordance with the guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If foreign nationals will be using the pesticides, the precautionary messages and use instructions will be in English and Arabic.

C11.3.10. Material Safety Data Sheets (MSDSs) and labels for all pesticides will be available at the storage and holding facility. Applicators will have the relevant product MSDS and label on hand at the time of the application.

C11.3.11. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

C11.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below.

C11.3.13. Disposal

C11.3.13.1. The generator of pesticide wastes will determine if waste is considered hazardous or not in accordance with Chapter 6 of this Final Governing Standard.

C11.3.13.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of this Final Governing Standard.

C11.3.13.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through Defense Logistics Agency (DLA) Disposition Services, as a solid waste. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

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C12. CHAPTER 12

HISTORIC AND CULTURAL RESOURCES

C12.1. SCOPE

This chapter contains criteria for required plans and programs needed to ensure proper protection and management of historic and cultural resources, such as properties on the World Heritage List or on the Kuwaiti list equivalent to the U.S. National Register of Historic Places.

C12.2. DEFINITIONS

C12.2.1. Adverse Effect. A change that diminishes the quality or significant value of historic or cultural resources.

C12.2.2. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal materials, or any portion of any of the foregoing items.

C12.2.3. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

C12.2.3.1. Limiting the magnitude of the action;

C12.2.3.2. Relocating the action in whole or in part;

C12.2.3.3. Repairing, rehabilitating, or restoring the affected resources, effected property; and

C12.2.3.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered.

C12.2.4. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

C12.2.5. Historic or Cultural Resource. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object and also includes natural resources (plants, animals, landscape features, etc) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or Kuwait's equivalent of the National Register of Historic Places.

C12.2.6. Inventory. To determine the location of historic and cultural resources that may have world, national or local significance.

C12.2.7. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

C12.2.7.1. Surface or subsurface structures;

C12.2.7.2. Surface or subsurface artifact concentrations or scatters;

C12.2.7.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments;

C12.2.7.4. By-products, waste products, or debris resulting from manufacture or use;

C12.2.7.5. Organic waste;

C12.2.7.6. Human remains;

C12.2.7.7. Rock carvings, rock paintings, and intaglios;

C12.2.7.8. Rock shelters and caves;

C12.2.7.9. All portions of shipwrecks; or

C12.2.7.10. Any portion or piece of any of the foregoing.

C12.2.8. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

C12.2.9. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

C12.3. CRITERIA

C12.3.1. All efforts will be made to avoid damage to all protected areas and cultural sites on the World Heritage List or on Kuwait's equivalent of the National Register of Historic Places. The majority of these are listed in Tables C12.T1 and C12.T2. The list of cultural sites in Table C12.T2 identifies critical historical and cultural areas, cities, and buildings. All efforts will be made to preserve these areas and prevent damage from military operations in these areas.

C12.3.2. Installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on Kuwait's equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

C12.3.3. Installations shall have access to the World Heritage List and Kuwait's equivalent of the National Register of Historic Places.

C12.3.4. Installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resource management.

C12.3.5. Installations shall, after coordination with the Kuwaiti installation commander or similar appropriate Kuwaiti authorities, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

C12.3.6. Installations shall, after coordination with the Kuwaiti installation commander or similar appropriate Kuwaiti authorities, and if financially and otherwise practical:

C12.3.6.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

C12.3.6.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

C12.3.6.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

C12.3.7. Installations shall, after coordination with the Kuwait installation commander or similar Kuwait authorities, and if financially and otherwise practical:

C12.3.7.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

C12.3.7.2. Develop a plan for the protection and preservation of historic and cultural resources identified on the installation inventory and for mitigation of any adverse effects.

C12.3.7.3. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

C12.3.7.4. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

C12.3.8. Installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of Kuwaiti authorities.

C12.3.9. Installation commanders will establish liaison with the local Kuwaiti curators of historical and cultural sites. In coordination with the site curator, the installation commander will establish policies and procedures for military personnel visiting the local sites.

C12.3.10. Installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

C12.3.11. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly-discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the Kuwait installation commander or similar appropriate authorities.

C12.T1: Protected Areas

No.	Official Name	Location	Area	Type	Reason
1	Al Doha Reserve	29o22'N, 47o49'E on S side of Kuwait Bay	4.5 km2	Nature Reserve – Wetland	Endangered Birds
2	Al-Jahra Reserve	29o22'N, 47o49'E near W end of Kuwait Bay	2.5 km2	Nature Reserve – Freshwater Wetland	Endangered Birds
3	Jal-Az-zor	29o33'N, 47o47'E	250 km2	Kuwait National Park – Desert Coast Ecology	Endangered Birds
4	Sulaybia Experimental Station	29o21'N, 47o51'E	48.45 km2	Nature Reserve – Coastal Mud Flats	Crab-Cleistotoma kuwaitense

C12.T2: Cultural Sites

No.	Official Name	Location	Type
1	Al Sabiyya		Archeological Sites
2	Al Shuwaikh Island	Kuwait Bay	Archeological Sites
3	Umm Al Naml Island	Kuwait Bay	Archeological Sites
4	Al Awara (Wara)	S of Kuwait City	Nomadic/Tribal meeting Place
5	Failaka Island	Kuwait Bay	Archeological Sites

C13. CHAPTER 13

NATURAL RESOURCES AND ENDANGERED SPECIES

C13.1. SCOPE

This chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the United States or Kuwait governments.

C13.2. DEFINITIONS

C13.2.1. Adverse Effect. A change that diminishes the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance and fitness.

C13.2.2. Conservation. Planned management, use and protection; continued benefit for present and future generations; and prevention of exploitation, destruction and/or neglect of natural resources.

C13.2.3. Kuwaiti Protected Species. Any species of flora or fauna listed or designated by Kuwait, because the species' continued existence is threatened, or is likely to be threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

C13.2.4. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

C13.2.5. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific or other value.

C13.2.6. Natural Resources Management. Actions taken that combine science, economics, and policy to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

C13.2.7. Significant Land or Water Areas. Land or water area that is normally 500 or more acres outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

C13.2.8. Threatened and Endangered Species. Any species of fauna or flora, listed in Tables C13.T1, "Threatened and Endangered Fauna" and C13.T2, "Threatened and Endangered Flora," respectively. This also includes any species of fauna or flora listed on an equivalent Kuwait protected species list.

C13.3. CRITERIA

C13.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and Kuwait-protected species and their habitat.

C13.3.2. Installations shall maintain, or have access to, Table C13.T1, "Threatened and Endangered Fauna" and Table C13.T2, "Threatened and Endangered Flora," as well as a current list of Kuwait-protected species.

C13.3.3. Installations with significant land or water areas shall, after coordination with the Kuwait installation commander or similar appropriate Kuwait authorities, develop natural resources management plans.

C13.3.4. Installations with natural resources management plans shall, after coordination with the Kuwait installation commander or similar appropriate Kuwait authorities, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

C13.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or Kuwait-protected species, or support Kuwait surveys.

C13.3.4.2. Implement natural resources management plans.

C13.3.5. The Kuwait installation commander or, if there is no Kuwait installation commander, the U.S. Ambassador will be notified of the discovery of any endangered or threatened species and Kuwait-protected species not previously known to be present on the installation.

C13.3.6. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent Kuwait facilities where practical.

C13.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, Kuwait-protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

C13.3.8. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna.

C13.3.9. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

C13.3.10. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

Table C13.T1. Threatened and Endangered (T&E) Animals

Common Name	Scientific Name	Range (Countries)
************	Mammals	************
Ass, Asian wild	Equus hemionus	Southwestern and Central Asia
Cheetah	Acinonyx jubatus	Africa to India
Dugong	Dugong dugon	East Africa to southern Japan, including U.S.A. (Trust Territories)
Gazelle, Arabian	Gazella gazella	Arabian Peninsula, Palestine, Sinai
Gazelle, sand	Gazella subgutturosa marica	Jordan, Arabian Peninsula
Gazelle, Saudi Arabian	Gazella dorcas saudiya	Israel, Iraq, Jordan, Syria, Arabian Peninsula
Oryx, Arabian	Oryx leucoryx	Arabian Peninsula
Tahr, Arabian	Hemitragus jayakari	Oman
Whale, blue	Balaenoptera musculus	Oceanic
Whale, finback	Balaenoptera physalus	Oceanic
Whale, humpback	Megaptera novaeangliae	Oceanic
Whale, right	Balaena glacialis (incl. australis)	Oceanic
Whale, Sei	Balaenoptera borealis	Oceanic
Whale, sperm	Physeter catodon (=macrocephalus)	Oceanic
************	Birds	************
Falcon, Eurasian peregrine	Falco peregrinus peregrinus	Europe, Eurasia south to Africa and Mideast
Ostrich, Arabian	Struthio camelus syriacus	Jordan, Saudi Arabia
************	Reptiles	************
Crocodile, Nile	Crocodylus niloticus	Africa, Middle East
Sea turtle, loggerhead	Caretta caretta	Circumglobal in tropical and temperate seas and oceans
Sea turtle, olive ridley	Lepidochelys olivacea	Circumglobal in tropical and temperate seas
************	Amphibians	************
************	Fishes	************
************	Clams	************
************	Insects	************

Table C13.T2. Threatened and Endangered (T&E) Plants

Common Name	Scientific Name	Range (Countries)
************	Flowering Plants	************
************	Conifers and Cycads	************
************	Fern and Allies	************

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C14. CHAPTER 14

POLYCHLORINATED BIPHENYLS

C14.1. SCOPE

This chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage and disposal of polychlorinated biphenyls (PCBs). These criteria include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers and cables.

C14.2. DEFINITIONS

C14.2.1. Capacitor. A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

C14.2.2. Chemical Waste Landfill. A landfill at which a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.

C14.2.3. In or Near Commercial Buildings. Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters of a non-industrial, non-substation building.

C14.2.4. Incinerator. An engineered device using controlled flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.

C14.2.5. Leak or Leaking. Any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

C14.2.6. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to this Final Governing Standard.

C14.2.7. Marked. PCB items and PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

C14.2.8. Non-PCB Transformers. Any transformer that contains less than 50 ppm PCB.

C14.2.9. PCB Article. Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

C14.2.10. PCB Article Container. Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.

C14.2.11. PCB Container. Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.

C14.2.12. PCB-Contaminated Electrical Equipment. Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain 50 ppm or greater PCB, but less than 500 ppm PCB.

C14.2.13. PCB Equipment. Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

C14.2.14. PCB Item. Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of 50 ppm or greater.

C14.2.15. PCB Transformer. Any transformer that contains 500 ppm PCB or greater.

C14.2.16. Restricted Access Area. Areas where access by unauthorized personnel is controlled by fences, other man-made structures or naturally-occurring barriers such as mountains, cliffs, or rough terrain.

C14.2.17. Substantial Contact Area. An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

C14.2.18. PCB Large High Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at 2,000 volts (alternating current (ac) or direct current (dc)) or above.

C14.2.19. PCB Large Low Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates below 2,000 volts (ac or dc).

C14.3. CRITERIA

C14.3.1. General

C14.3.1.1. The installation spill contingency plan will address PCB items, including, temporary storage items. Chapter 18, "Spill Prevention and Response Planning," provides criteria on how to prepare these plans.

C14.3.1.2. Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up in accordance with the following:

C14.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms per 100 square centimeters.

C14.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 micrograms per 100 square centimeters.

C14.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing less than 1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling and a reference to any reports documenting the site conditions.

C14.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing less than 1 ppm PCBs.

C14.3.1.3. All PCB transformers, PCB large high voltage capacitors, PCB containers, and certain PCB items containing PCBs at concentrations 50 ppm or greater (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and Arabic. The marking must identify the item as containing PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criteria also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB large low voltage capacitors and equipment containing a PCB Transformer or PCB large high voltage capacitor.

C14.3.1.4. Each installation having PCB items will maintain a written inventory that includes a current list by type of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of for that year. Inventory records should be maintained for a period of time at least 3 years after the last item on the list is disposed of. Commanders are responsible for doing a PCB equipment inventory for their installations, camps and facilities.

C14.3.1.5. Disposal of PCB items will only be through the servicing office of the Defense Logistics Agency (DLA) Disposition Services in accordance with DoD 4160.21-M, or paragraph C14.3.5.

C14.3.1.6. All periodic inspections as required in this chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for three years after disposal of the transformer.

C14.3.2. <u>PCB transformers (500 ppm PCB or greater)</u>

C14.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

C14.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

C14.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

C14.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed one year.

C14.3.2.5. PCB transformers will be serviced as follows:

C14.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C14.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

C14.3.2.5.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of in accordance with paragraph C14.3.5 of this chapter;

C14.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

C14.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing less than 500 ppm PCB that are mixed with fluids that contain 500 ppm or greater PCB will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be greater than 500 ppm PCB; and

C14.3.2.5.6. Dielectric fluids containing 500 ppm or greater will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

C14.3.2.6. All in-service PCB transformers (greater than 500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100 percent of dielectric fluid or PCB transformers tested and found to contain less than 60,000 ppm PCBs will be inspected at least every 12 months.

C14.3.2.7. If any PCB transformer is involved in a fire such that it was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and treated if required.

C14.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

C14.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

C14.3.3. <u>Other PCB Items</u>

C14.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

C14.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C14.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of 500 ppm or greater which requires the removal and rework of the internal components is prohibited;

C14.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

C14.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of 500 ppm or greater will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

C14.3.3.1.5. Dielectric fluids containing 500 ppm or greater will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

C14.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

C14.3.3.2.1. Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors which pose an exposure risk to food or feed is prohibited;

C14.3.3.2.2. Use of PCB large high-voltage and PCB large low-voltage capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have an adequate roof, walls, and floor to contain any release of PCBs.

C14.3.3.3. Any PCB item removed from service will be marked with the date it is removed from service.

C14.3.4. <u>Storage</u>

C14.3.4.1. PCBs and PCB items at concentrations 50 ppm or greater that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

C14.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

C14.3.4.1.2. A containment berm, at least 6 inches high, sufficient to contain twice the internal volume of the largest PCB article or 25 percent of the total internal volume of all PCB articles or containers stored, whichever is greater;

C14.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines or other openings constructed to prevent any release from the bermed area;

C14.3.4.1.4. Continuous, smooth and impervious flooring material; and

C14.3.4.1.5. To the maximum extent possible, a new PCB storage area will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan will address the risk.

C14.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

C14.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

C14.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

C14.3.4.2.3. PCB containers in which non-liquid PCBs have been placed;

C14.3.4.2.4. PCB containers in which PCBs at a concentration between 50-499 ppm have been placed, and whose containers are marked to indicate there is less than 500 ppm PCB.

C14.3.4.3. Non-leaking and structurally-undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting paragraph C14.3.4 criteria if they are inspected weekly.

C14.3.4.4. All other PCB storage areas will be inspected at least monthly.

C14.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing office of DLA Disposition Services.

C14.3.5. Disposal

C14.3.5.1. Installations that generate PCB waste of 50 ppm or greater PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6. Installations will coordinate and obtain concurrence with the authorities in Kuwait for in-country PCB disposal as for hazardous waste disposal.

C14.3.5.2. PCB-contaminated dielectric fluid of concentrations of greater than 500 ppm will only be disposed of in an incinerator with 99.9 percent combustion efficiency.

C14.3.5.3. PCB-contaminated dielectric fluid of concentrations of 50 ppm or greater, but less than 500 ppm, will only be disposed of as follows:

C14.3.5.3.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.3.2. In a high efficiency boiler that is rated at a minimum of 50 MBtu/hr and which is fueled by natural gas, oil, or coal.

C14.3.5.4. Rags, soils and other debris contaminated with PCBs at concentrations of 50 ppm or greater will be disposed of:

C14.3.5.4.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.4.2. In a chemical waste landfill.

C14.3.5.5. PCB transformers will be disposed of:

C14.3.5.5.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.5.2. In a chemical waste landfill, provided the transformers, and all their inner workings, are first drained of all free-flowing liquids.

C14.3.5.6. PCB capacitors will be disposed of as follows:

C14.3.5.6.1. PCB capacitors will be disposed of in an incinerator with 99.9 percent combustion efficiency, except;

C14.3.5.6.2. Intact non-leaking small PCB capacitors may be disposed of in a solid waste landfill unless large quantities (more than 100 pounds) are identified at the same time.

C14.3.5.7. PCB hydraulic machines containing PCBs may be disposed of as municipal solid waste if:

C14.3.5.7.1. The machines containing PCBs at concentrations of 50 ppm or greater are drained of all free-flowing liquid.

C14.3.5.7.2. The machines containing PCB liquid of 1,000 ppm or greater are flushed prior to disposal with a solvent containing less than 50 ppm PCB.

C14.3.5.8. PCB-contaminated electrical equipment, except capacitors, will be disposed of as municipal solid waste only after draining off all free-flowing liquid.

C14.3.5.9. PCB articles, other than those already described, will be disposed of:

C14.3.5.9.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.9.2. In a chemical waste landfill, provided the articles are first drained of all free-flowing liquids.

C14.3.5.10. PCB containers with concentrations of 500 ppm or greater may be disposed of:

C14.3.5.10.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.10.2. In a chemical waste landfill, provided the containers are first drained of all free-flowing liquids.

C14.3.5.11. Where PCB fluids, items or articles are disposed of in a high temperature boiler, the following procedures will be followed:

C14.3.5.11.1. The boiler must be rated at a minimum of 50 million BTU hours;

C14.3.5.11.2. If the boiler uses natural gas or oil as the primary fuel, the carbon monoxide concentration in the stack must be 50 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C14.3.5.11.3. If the boiler uses coal as the primary fuel, the carbon monoxide concentration in the stack is 100 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C14.3.5.11.4. The mineral oil dielectric fluid does not comprise more than 10 percent, by volume, of the total fuel feed rate;

C14.3.5.11.5. The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start up or shut down operations;

C14.3.5.11.6. The performance of the boiler is continuously monitored for carbon monoxide and excess oxygen percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning less than 112,500 liters (30,000 gallons) of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes;

C14.3.5.11.7. The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes; and

C14.3.5.11.8. The flow of mineral oil dielectric fluid is stopped if the criteria respecting carbon monoxide or excess oxygen are exceeded.

C14.3.5.12. Where PCB fluids, items, or articles are disposed of in an incinerator, the following procedures will be followed:

C14.3.5.12.1. Combustion criteria shall maintain the introduced liquids for a 2 second dwell time at 1,200°C, plus or minus 100°C (2,200°F +/- 212°F), and 3 percent excess oxygen in the stack gas or maintenance of the introduced liquids for a 1 - 1/2 second dwell time at 1,600°C, plus or minus 100°C (3,050°F +/- 212°F) and 2 percent excess oxygen in the stack gas;

C14.3.5.12.2. Combustion efficiency, measured by the ratio of the concentration of carbon dioxide to the total concentration of both carbon dioxide and carbon monoxide, will be maintained at least 99.9 percent;

C14.3.5.12.3. The rate and quantity of PCBs which are fed to the combustion system shall be measured and recorded at regular intervals not greater than 15 minutes;

C14.3.5.12.4. The temperatures of the incineration process shall be continuously measured and recorded;

C14.3.5.12.5. The flow of PCBs to the incinerator shall stop automatically if temperature criteria are not met;

C14.3.5.12.6. Monitoring shall be conducted sufficient to determine that an incinerator to be used for disposal the first time will operate within the criteria above; and

C14.3.5.12.7. Continuous monitoring shall be conducted during incineration of PCBs for oxygen and carbon monoxide and periodic monitoring for carbon dioxide.

C14.3.5.13. PCB containers used to contain only PCBs at a concentration less than 500 ppm may be disposed of as municipal solid waste only after draining off all free-flowing liquid.

C14.3.5.14. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the U.S. will be returned to CONUS for delivery to a permitted disposal facility if host country or third country disposal is not possible, is prohibited or will not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with criteria in subparagraph C14.3.1.3.

C14.3.6. Elimination of PCB Products

C14.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

C14.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

C14.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs (less than 2 ppm) at the time of shipment.

C14.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

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C15. CHAPTER 15

ASBESTOS

C15.1. SCOPE

This chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1, "DoD Safety and Occupational Health (SOH) Program," (Reference (p)) and DoDI 6055.05, " Occupational and Environmental Health," (Reference (q)) and concomitant service instructions.

C15.2. DEFINITIONS

C15.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions are observed coming from ACM, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

C15.2.2. Asbestos. Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated and/or altered.

C15.2.3. Asbestos - Containing Material (ACM). Any material containing more than one percent asbestos by weight.

C15.2.4. Friable Asbestos. Any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized or reduced to powder by hand pressure.

C15.2.5. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos.

C15.2.6. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing more than one percent asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.7. Regulated ACM. Means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

C15.3. CRITERIA

C15.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

C15.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

C15.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

C15.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

C15.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

C15.3.2.4. Work control/permit systems to control activities which might disturb ACM;

C15.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM;

C15.3.2.6. Record keeping to document O&M activities related to asbestos identification, management, and abatement;

C15.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

C15.3.2.8. Procedures to assess and prioritize identified hazards for abatement; and

C15.3.2.9. Procedures to prevent the use of ACM in new construction.

C15.3.3. Prior to the demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

C15.3.4. Prior to the demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

C15.3.5. Installations will remove friable ACM when it poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

C15.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all friable ACM, and ACM with a high degree of probability of becoming friable once disturbed during demolition.

C15.3.7. When disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leak proof container, and properly dispose of it in a municipal solid waste landfill as defined in Chapter 7. Containers will be labeled in English and Arabic: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD." Permanent records documenting the disposal action and site will be maintained.

C15.3.8. DoD schools will comply with applicable requirements 15 U.S.C. 2643(l) (Reference (r)) and implementing regulations in 40 CFR Part 763, Subpart E (Reference (s)).

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C16. CHAPTER 16

RESERVED

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C17. CHAPTER 17

LEAD-BASED PAINT

C17.1. SCOPE

This chapter contains criteria to establish and implement a lead hazard management program to identify, control or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this chapter. To protect personnel from lead exposure, refer to DoDI 6055.1, "DoD Safety and Occupational Health (SOH) Program," (Reference (p)) and DoDI 6055.05, "Occupational and Environmental Health" (Reference (q)) and concomitant service instructions.

C17.2. DEFINITIONS

C17.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead-contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

C17.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

C17.2.3. Bare Soil. Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

C17.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least two different days within any week, provided that each day's visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.

C17.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exists in a facility in which children under the age of 6 frequent.

C17.2.6. Deteriorated Paint. Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking or is otherwise damaged or separated from the substrate.

C17.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 μg/dl (micrograms of lead per deciliter) for a single test, or of 15-19 μg/dl in two tests taken at least 3 months apart.

C17.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

C17.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate in order to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

C17.2.10. Evaluation. A visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, lead-based paint, or a lead-based paint hazard.

C17.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

C17.2.12. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through methods including interim controls or abatement or a combination of the two.

C17.2.13. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

C17.2.14. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.

C17.2.15. Lead-Based Paint. Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per square centimeter, or 0.5 percent by weight or 5,000 parts per million (ppm) by weight.

C17.2.16. Lead-Based Paint Hazard includes paint-lead hazard, dust-lead hazard, or soil-lead hazard as identified below:

C17.2.16.1. Paint-Lead Hazard. A paint-lead hazard is any of the following:

C17.2.16.1.1. Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill, or floor) are equal to or greater than the dust-lead hazard levels identified in subparagraph C17.2.16.2.

C17.2.16.1.2. Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe).

C17.2.16.1.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

C17.2.16.1.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

C17.2.16.2. Dust-Lead Hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

C17.2.16.3. Soil-Lead Hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm (µg/g) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

C17.2.17. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint and the provision of a report explaining the results of the investigation.

C17.2.18. Permanent. An expected design life of at least 20 years.

C17.2.19. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

C17.2.20. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

C17.2.21. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

C17.2.22. Risk Assessment Screen. A sampling protocol that is used in dwellings that are in relatively good condition and where the probability of finding lead-based hazards are low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.

C17.3. CRITERIA

C17.3.1. Installations will:

C17.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

C17.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement.

C17.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

C17.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 $\mu g/ft^2$ for floors, >125 $\mu g/ft^2$ for interior window sills, a lead-based paint risk assessment should be performed.

C17.3.1.3.2. Lead-based paint risk assessments.

C17.3.1.3.3. Routine facility inspection for fire and safety.

C17.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

C17.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

C17.3.1.3.6. Lead-based paint reevaluations.

C17.3.1.3.7. Review of construction, painting, and maintenance histories.

C17.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

C17.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-base paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

C17.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

C17.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, "Hazardous Waste," paragraph C6.2.5.

C18. CHAPTER 18

SPILL PREVENTION AND RESPONSE PLANNING

C18.1. SCOPE

This chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8 (Reference (t)).

C18.2. DEFINITIONS

C18.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

C18.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

C18.2.3. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in Appendix 1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

C18.2.3.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

C18.2.3.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C18.2.4. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

C18.2.5. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

C18.2.6. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

C18.2.7. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

C18.2.8. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

C18.2.8.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

C18.2.8.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 400 liters (110 gallons);

C18.2.8.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

C18.2.8.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

C18.2.8.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

C18.2.9. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

C18.3. CRITERIA

C18.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT.

C18.3.1.1. The plan will be updated at least every 5 years and:

C18.3.1.1.1. When there have been two significant spills to navigable waters in any 12-month period; and

C18.3.1.1.2. When there has been a spill of 1,000 gallons or greater.

C18.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification.

C18.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

C18.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate.

C18.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in subparagraph C18.3.2.3, critical water resources, land uses, and possible migration pathways.

C18.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure.

C18.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in subparagraph C18.3.2.3.

C18.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of non-destructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

C18.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," subparagraph C9.3.2.5.

C18.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

C18.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

C18.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground storage tanks, pesticides, and polychlorinated biphenyls provide specific criteria for containment structure requirements.

C18.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

C18.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

C18.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

C18.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

C18.3.2.14. Written procedures for:

C18.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

C18.3.2.14.2. Inspections; and

C18.3.2.14.3. Record keeping requirements.

C18.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

C18.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and

C18.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills;

C18.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered;

C18.3.3.3. The responsibilities, composition, and training requirements of the FRT;

C18.3.3.4. The command structure that will be established to manage a worst-case discharge. Include an organization chart and the responsibilities and composition of the organization;

C18.3.3.5. Procedures for FRT alert and response to include provisions for:

C18.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill; and

C18.3.3.5.2. Public affairs involvement.

C18.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours;

C18.3.3.7. Procedures for notifying the FIC, installation commander, and local authorities in the event of hazard to human health or environment;

C18.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers;

C18.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills;

C18.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill;

C18.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation;

C18.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation;

C18.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations;

C18.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions; and

C18.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

C18.3.4. Reporting Section. The reporting section of the spill plan will address the following:

C18.3.4.1. Recordkeeping when emergency procedures are invoked;

C18.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill;

C18.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency and the USCENTCOM (CCJ4-E) and submit a follow-up written report when:

C18.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

C18.3.4.3.2. The spill exceeds 400 liters (110 gallons) of POLs;

C18.3.4.3.3. A water resource has been polluted; or

C18.3.4.3.4. The FIC has determined that the spill is significant.

C18.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local drinking water resource, the appropriate in-theater component commander and/or Defense Agency, USCENTCOM (CCJ4-E), and Kuwaiti authorities will be notified immediately; and

C18.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in subparagraph C18.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

C18.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment.

C19. CHAPTER 19

UNDERGROUND STORAGE TANKS

C19.1. SCOPE

This chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing hazardous wastes are covered in Chapter 6, "Hazardous Waste." Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, "Petroleum, Oil, and Lubricants."

C19.2. DEFINITIONS

C19.2.1. POL. Refined petroleum, oils, and lubricants.

C19.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, "Hazardous Material." The term does not include:

C19.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

C19.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C19.2.3. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

C19.2.4. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, larger than 416 liters (110 gallons), that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10 percent or more beneath the surface of the ground, but does not include:

C19.2.4.1. Tanks containing heating oil used for consumption on the premises where it is stored;

C19.2.4.2. Septic tanks;

C19.2.4.3. Stormwater or wastewater collection systems;

C19.2.4.4. Flow through process tanks;

C19.2.4.5. Surface impoundments, pits, ponds, or lagoons;

C19.2.4.6. Field constructed tanks;

C19.2.4.7. Hydrant fueling systems;

C19.2.4.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

C19.2.4.9. UST containing *de minimis* concentrations of regulated substances, except where subparagraph C19.3.2.7 is applicable; or

C19.2.4.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

C19.2.5. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

C19.2.6. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

C19.2.6.1. A hydrant fuel distribution system; or

C19.2.6.2. A field-constructed tank.

C19.3. CRITERIA

C19.3.1. All installations will maintain a UST inventory.

C19.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

C19.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

C19.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fill pipe. Overfill prevention will be provided by one of the following methods:

C19.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity); or

C19.3.2.2.2. High level alarm (set at 90% of tank capacity).

C19.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or one percent of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

C19.3.2.3.1. USTs will use at least one of the following leak detection methods:

C19.3.2.3.1.1. Automatic tank gauging;

C19.3.2.3.1.2. Vapor monitoring;

C19.3.2.3.1.3. Groundwater monitoring; or

C19.3.2.3.1.4. Interstitial monitoring.

C19.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

C19.3.2.3.3. Suction piping will either have a line tightness test conducted every three years or use monthly monitoring.

C19.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

C19.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

C19.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.8 (Reference (t)). Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

C19.3.2.7. When a UST has not been used for one year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.3.

C19.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

C19.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

C19.3.2.9.1. Vent lines must be left open and functioning; and

C19.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

C19.3.3. UST Recordkeeping. Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

C19.3.4. Hazardous material USTs

C19.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults.

C19.3.4.2. Leak Detection. The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

C19.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in subparagraph C19.3.4.1 shall be immediately removed from service and upgraded or replaced as necessary.

C19.3.5. Deferred USTs. Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

AP1. APPENDIX 1

CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

AP1.1. CHARACTERISTICS OF HAZARDOUS WASTE

AP1.1.1. General

AP1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

AP1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

AP1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

AP1.1.2. Characteristic of Ignitability

AP1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

AP1.1.2.1.1. It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

AP1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

AP1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

AP1.1.2.1.4. It is an oxidizer.

AP1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

AP1.1.3. Characteristic of Corrosivity

AP1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

AP1.1.3.1.1. It is aqueous and has a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter.

AP1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

AP1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

AP1.1.4. Characteristic of Reactivity

AP1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

AP1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

AP1.1.4.1.2. It reacts violently with water.

AP1.1.4.1.3. It forms potentially explosive mixtures with water.

AP1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

AP1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

AP1.1.4.1.8. It is a forbidden explosive.

AP1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

AP1.1.5. Toxicity Characteristic

AP1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste contains any of the contaminants listed in Table AP1.T1., "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section AP1.1. at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself is considered to be the extract for the purpose of this section.

AP1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table AP1.T1 or section AP1.2, which corresponds to the toxic contaminant causing it to be hazardous.

AP1.2. LISTS OF HAZARDOUS WASTES

AP1.2.1. General

AP1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

AP1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

Ignitable Waste (I)
Corrosive Waste (C)
Reactive Waste (R)
Toxicity Characteristic Waste (E)
Acute Hazardous Waste (H)
Toxic Waste (T)

AP1.2.1.3. Each hazardous waste listed in section AP1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

AP1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table AP1.T3, "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

AP1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table AP1.T4, annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

AP1.2.4. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.

AP1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel.

AP1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

AP1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table AP1.T4, annotated "P" or "U" as the first character in the USEPA HW#, such waste will be listed in paragraph AP1.2.2 above or will be identified as a hazardous waste by the characteristics set forth in section AP1.1 of this Appendix.]

AP1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4, annotated "P" as the first character in the USEPA HW# are hereby identified as acute hazardous waste (H). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA HW#s are listed in Table AP1.T4., annotated "P" as the first character in the USEPA HW#.

AP1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table AP1.T4., subparagraphs AP1.2.4.1.1.1. through AP1.2.4.1.1.4. of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

Table AP1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

USEPA HW No.[1]	Contaminant	CAS No. [2]	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-2	1.0
D007	Chromium	7440-47-3	5.0
D016	2,4-D	94-75-7	10.0
D012	Endrin	72-20-8	0.02
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D015	Toxaphene	8001-35-2	0.5
D017	2,4,5-TP (Silvex)	93-72-1	1.0

Table AP1.T2. Maximum Concentration of Contaminants for Non-Wastewater

USEPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/kg)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
DO33	Hexachlorobutadiene	87-68-3	0.5
DO34	Hexachloroethane	67-72-1	3.0
DO35	Methyl Ethyl Ketone	78-93-3	200.0
DO36	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl Chloride	75-01-4	0.2

Notes

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spend halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)[2]
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Spent cyanide plating bath solutions from electroplating operations.	(R,T)
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process.	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in Sec26131 or Sec26132).	(T)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (This listing does not include formulations containing Hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, and F027.	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that have had the F032 waste code deleted in accordance with Sec 26135 of this chapter or potentially cross- contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F037	Petroleum refinery primary oil/water/solids separation sludge—Any sludge generated from the gravitational separation of oil/water/ solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/ solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non- contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in Sec 26131(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge—Any sludge and/or float generated from the physical and/or chemical separation of oil/water/ solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in Sec 26131(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028)	(T)

Notes

1. U.S. EPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table AP1.T4. List of Hazardous Waste/Substances/Materials

(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Acenaphthene	83329			100
Acenaphthylene	208968			5,000
Acetaldehyde (I)	75070		U001	1,000
Acetaldehyde, chloro-	107200		P023	1,000
Acetaldehyde, trichloro-	75876		U034	5,000
Acetamide	60355			100
Acetamide, N-(aminothioxomethyl)-	591082		P002	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442		U187	100
Acetamide, 2-fluoro-	640197		P057	100
Acetamide, N-9H-fluoren-2-yl-	53963		U005	1
Acetic acid	64197			5,000
Acetic acid (2,4-dichlorophenoxy)-salts and esters	94757		U240	100
Acetic acid, lead(2+) salt	301042		U144	10
Acetic acid, thallium(1+) salt	563688		U214	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765		U232	1,000
Acetic acid, ethyl ester (I)	141786		U112	5,000
Acetic acid, fluoro-, sodium salt	62748		P058	10
Acetic anhydride	108247			5,000
Acetone (I)	67641		U002	5,000
Acetone cyanohydrin	75865	1,000	P069	10
Acetone thiosemicarbazide	1752303	1,000/10,000		1
Acetonitrile (I,T)	75058		U003	5,000
Acetophenone	98862		U004	5,000
2-Acetylaminofluorene	53963		U005	1
Acetyl bromide	506967			5,000
Acetyl chloride (C,R,T)	75365		U006	5,000
1-Acetyl-2-thiourea	591082		P002	1
Acrolein	107028	500	P003	1
Acrylamide	79061	1,000/10,000	U007	5,000
Acrylic acid (I)	79107		U008	5,000
Acrylonitrile	107131	10,000	U009	100
Acrylyl chloride	814686	100		1
Adipic acid	124049			5,000
Adiponitrile	111693	1,000		1
Aldicarb	116063	100/10,000	P070	1
Aldrin	309002	500/10,000	P004	1
Allyl alcohol	107186	1,000	P005	100
Allylamine	107119	500		1
Allyl chloride	107051			1,000
Aluminum phosphide (R,T)	20859738	500	P006	100
Aluminum sulfate	10043013			5,000
4-Aminobiphenyl	92671			1
5-(Aminomethyl)-3-isoxazolol	2763964		P007	1,000
Aminopterin	54626	500/10,000		1
4-Aminopyridine	504245		P008	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Amiton	78535	500		1
Amiton oxalate	3734972	100/10,000		1
Amitrole	61825		U011	10
Ammonia	7664417	500		100
Ammonium acetate	631618			5,000
Ammonium benzoate	1863634			5,000
Ammonium bicarbonate	1066337			5,000
Ammonium bichromate	7789095			10
Ammonium bifluoride	1341497			100
Ammonium bisulfite	10192300			5,000
Ammonium carbamate	1111780			5,000
Ammonium carbonate	506876			5,000
Ammonium chloride	12125029			5,000
Ammonium chromate	7788989			10
Ammonium citrate, dibasic	3012655			5,000
Ammonium fluoborate	13826830			5,000
Ammonium fluoride	12125018			100
Ammonium hydroxide	1336216			1,000
Ammonium oxalate	6009707			5,000
	5972736			
	14258492			
Ammonium picrate (R)	131748		P009	10
Ammonium silicofluoride	16919190			1,000
Ammonium sulfamate	7773060			5,000
Ammonium sulfide	12135761			100
Ammonium sulfite	10196040			5,000
Ammonium tartrate	14307438			5,000
	3164292			
Ammonium thiocyanate	1762954			5,000
Ammonium vanadate	7803556		P119	1,000
Amphetamlne	300629	1,000		1
Amyl acetate	628637			5,000
Iso-Amyl acetate	123922			
Sec-Amyl acetate	626380			
Tert-Amyl acetate	625161			
Aniline (I,T)	62533	1,000	U012	5,000
Aniline, 2,4,6- trimethyl	88051	500		1
o-Anisidine	90040			100
Anthracene	120127			5,000
Antimony++	7440360			5,000
Antimony pentachloride	7647189			1,000
Antimony pentafluoride	7783702	500		1
Antimony potassium tartrate	28300745			100
Antimony tribromide	7789619			1,000
Antimony trichloride	10025919			1,000
Antimony trifluoride	7783564			1,000
Antimony trioxide	1309644			1,000
Antimycin A	1397940	1,000/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

ANTU (Thiourea 1-Naphthalenyl)	86884	500/10,000		100
Argentate(1-), bis(cyano-C)-, potassium	506616		P099	1
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
Aroclors	1336363			1
Arsenic++	7440382			1
Arsenic acid H_3AsO_4	1327522		P010	1
	7778394			
Arsenic disulfide	1303328			1
Arsenic oxide As_2O_3	1327533		P012	1
Arsenic oxide As_2O_5	1303282		P011	1
Arsenic pentoxide	1303282	100/10,000	P011	1
Arsenic trichloride	7784341			1
Arsenic trioxide	1327533		P012	1
Arsenic trisulfide	1303339			1
Arsenous oxide	1327533	100/10,000	P012	1
Arsenous trichloride	7784341	500		5,000
Arsine	7784421	100		1
Arsine, diethyl-	692422		P038	1
Arsinic acid, dimethyl-	75605		U136	1
Arsorous dichloride, phenyl-	696286		P036	1
Asbestos+++	1332214			1
Auramine	492808		U014	100
Azaserine	115026		U015	1
Aziridine	151564		P054	1
Azindine, 2-methyl-	75558		P067	1
Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1a-alpha, 8-beta, 8a-alpha, 8b-alpha)]-	50077		U010	10
Azinphos-ethyl	2642719	100/10,000		100
Azinphos-methyl	86500	10/10,000		1
Barium cyanide	542621		P013	10
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495		U157	10
Benz[c]acridine	225514		U016	100
Benzal chloride	98873	500	U017	5,000
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23950585		U192	5,000
Benz[a]anthracene	56553		U018	10
1,2-Benzanthracene	56553		U018	10
Benz[a]anthracene, 7,12-dimethyl-	57976		U094	1
Benzenamine (I,T)	62533		U012	5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Benzenamine, 3-(Trifluoromethyl)	98168	500		1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808		U014	100
Benzenamine, 4-chloro-	106478		P024	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933		U049	100
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117		U093	10
Benzenamine, 2-methyl-	95534		U328	100
Benzenamine, 4-methyl-	106490		U353	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		U158	10
Benzenamine, 2-methyl-, hydrochloride	636215		U222	100
Benzenamine, 2-methyl-5-nitro-	99558		U181	100
Benzenamine, 4-nitro-	100016		P077	5,000
Benzene (I,T)	71432		U109	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	500/10,000		1
Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156		U038	10
Benzene, 1-bromo-4-phenoxy-	101553		U030	100
Benzenearsonic Acid	98055	10/10,000		1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033		U035	10
Benzene, chloro-	108907		U037	100
Benzene, chloromethyl-	100447		P028	100
Benzenediamin, ar-methyl-	25376458		U221	10
	95807			
	496720			
	823405			
1,2-Benzenedicarboxylic acid, dioctyl ester	117840		U107	5,000
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817		U028	100
1,2-Benzenedicarboxylic acid, dibutyl ester	84742		U069	10
1,2-Benzenedicarboxylic acid, diethyl ester	84662		U088	1,000
1,2-Benzenedicarboxylic acid, dimethyl ester	131113		U102	5,000
Benzene, 1,2-dichloro-	95501		U070	100
Benzene, 1,3-dichloro-	541731		U071	100
Benzene, 1,4-dichloro-	106467		U072	100
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548		U060	1
Benzene, dichloromethyl-	98873		U017	5,000
Benzene, 1,3-diisocyanotomethyl- (R,T)	584849		U223	100
	91087			
	264716254			
Benzene, dimethyl (I,T)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
1,3-Benzenediol	108463		U201	5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- (R) -	51434		P042	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098		P046	5,000
Benzene, hexachloro-	118741		U127	10
Benzene, hexahydro- (I)	110827		U056	1,000
Benzene, hydroxy-	108952		U188	1,000
Benzene, methyl-	108883		U220	1,000
Benzene, 2-methyl-1,3-dinitro-	606202		U106	100
Benzene, 1-methyl-2,4-dinitro-	121142		U105	10
Benzene, 1-methylethyl- (I)	98828		U055	5,000
Benzene, nitro-	98953		U169	1,000
Benzene, pentachloro-	608935		U183	10
Benzene, pentachloronitro-	82688		U185	100
Benzenesulfonic acid chloride (C,R)	98099		U020	100
Benzenesulfonyl chloride	98099		U020	100
Benzene, 1,2,4,5-tetrachloro-	95943		U207	5,000
Benzenethiol	108985		P014	100
Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro-	50293		U061	1
Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435		U247	1
Benzene, (trichloromethyl)-	98077		U023	10
Benzene, 1,3,5-trinitro-	99354		U234	10
Benzidine	92875		U021	1
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	500/10,000		1
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072		U202	100
Benzo[a]anthracene	56553		U018	10
Benzo[b]fluoranthene	205992			1
Benzo[k]fluoranthene	207089			5,000
Benzo[j,k]fluorene	206440		U120	100
1,3-Benzodioxole, 5-(1-propenyl)-	120581		U141	100
1,3-Benzodioxole, 5-(2-propenyl)-	94597		U203	100
1,3-Benzodioxole, 5-propyl-	94586		U090	10
Benzoic acid	65850			5,000
Benzonitrile	100470			5,000
Benzo[rst]pentaphene	189559		U064	10
Benzo[ghi]perylene	191242			5,000
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812		P001	100
Benzo[a]pyrene	50328		U022	1
3,4-Benzopyrene	50328		U022	1
p-Benzoquinone	106514		U197	10
Benzotrichloride (C,R,T)	98077	500	U023	10
Benzoyl chloride	98884			1,000
1,2-Benzphenanthrene	218019		U050	100
Benzyl chloride	100447	500	P028	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Benzyl cyanide	140294	500		1
Beryllium++	7440417		P015	10
Beryllium chloride	7787475			1
Beryllium fluoride	7787497			1
Beryllium nitrate	13597994			1
	7787555			
alpha-BHC	319846			10
beta-BHC	319857			1
delta-BHC	319868			1
gamma-BHC	58899		U129	1
Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-	15271417	500/10,000		1
2,2'-Bioxirane	1464535		U085	10
Biphenyl	92524			100
(1,1'-Biphenyl)-4,4'diamine	92875		U021	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941		U073	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904		U091	10
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937		U095	10
Bis(chloromethyl) ketone	534076	10/10,000		1
Bis(2-chloroethyl)ether	111444		U025	10
Bis(2-chloroethoxy)methane	111911		U024	1,000
Bis(2-ethylhexyl)phthalate	117817		U028	100
Bitoscanate	4044659	500/10,000		1
Boron trichloride	10294345	500		1
Boron trifluoride	7637072	500		1
Boron trifluoride compound with methyl ether (1:1)	353424	1,000		1
Bromoacetone	598312		P017	1,000
Bromadiolone	28772567	100/10,000		1
Bromine	7726956	500		1
Bromoform	75252		U225	100
4-Bromophenyl phenyl ether	101553		U030	100
Brucine	357573		P018	100
1,3-Butadiene	106990			10
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683		U128	1
1-Butanamine, N-butyl-N-nitroso-	924163		U172	10
1-Butanol	71363		U031	5,000
2-Butanone	78933		U159	5,000
2-Butanone peroxide (R,T)	1338234		U160	10
2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamno)carbonyl] oxime	39196184		P045	100
2-Butenal	123739		U053	100
	4170303			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

2-Butene, 1,4-dichloro- (I,T)	764410		U074	1
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1-oxobutoxy] methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]-	303344		U143	10
Butyl acetate	123864			5,000
iso-Butyl acetate	110190			
sec-Butyl acetate	105464			
tert-Butyl acetate	540885			
n-Butyl alcohol (I)	71363		U031	5,000
Butylamine	109739			1,000
iso-Butylamine	78819			
sec-Butylamine	513495			
tert-Butylamine	13952846			
	75649			
Butyl benzyl phthalate	85687			100
n-Butyl phthalate	84742		U069	10
Butyric acid	107926			5,000
iso-Butyric acid	79312			
Cacodylic acid	75605		U136	1
Cadmium++ (2+)	7440439			10
Cadmium acetate	543908			10
Cadmium bromide	7789426			10
Cadmium chloride	10108642			10
Cadmium oxide	1306190	100/10,000		1
Cadmium stearate	2223930	1,000/10,000		1
Calcium arsenate	7778441	500/10,000		1
Calcium arsenite	52740166			1
Calcium carbide	75207			10
Calcium chromate	13765190		U032	10
Calcium cyanamide	156627			1,000
Calcium cyanide Ca(CN)2	592018		P021	10
Calcium dodecylbenzenesulfonate	26264062			1,000
Calcium hypochlorite	7778543			10
Camphechlor	8001352	500/10,000		1
Camphene, octachloro-	8001352		P123	1
Cantharidin	56257	100/10,000		1
Carbachol chloride	51832	500/10,000		1
Caprolactum	105602			5,000
Captan	133062			10
Carbamic acid, ethyl ester	51796		U238	100
Carbamic acid, methylnitroso-, ethyl ester	615532		U178	1
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	100/10,000		1
Carbamic chloride, dimethyl-	79447		U097	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546		U114	5,000
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164		U062	100
Carbaryl	63252			100
Carbofuran	1563662	10/10,000		10
Carbon disulfide	75150	10,000	P022	100
Carbon oxyfluoride (R,T)	353504		U033	1,000
Carbon tetrachloride	56235		U211	10
Carbonic acid, dithallium(1+) salt	6533739		U215	100
Carbonic dichloride	75445		P095	10
Carbonic difluoride	353504		U033	1,000
Carbonochloridic acid, methyl ester	79221		U156	1,000
Carbonyl Sulfide	463581			100
Carbophenothion	786196	500		1
Catechol	120809			100
Chloral	75876		U034	5,000
Chlorambem	133904			100
Chlorambucil	305033		U035	10
Chlordane	57749	1,000	U036	1
Chlordane, alpha & gamma isomers	57749		U036	1
Chlordane, technical	57749		U036	1
Chlorfenvinfos	470906	500		1
Chlorinated champhene (Campheclor)	8001352			1
Chlorine	7782505	100		10
Chlormephos	24934916	500		1
Chlormequat chloride	999815	100/10,000		1
Chlornaphazine	494031		U026	100
Choroacetaldehyde	107200		P023	1,000
Chloroacetophenone	532274			100
Chloroacetic acid	79118	100/10,000		100
p-Chloroaniline	106478		P024	1,000
Chlorobenzene	108907		U037	100
Chlorobenzilate	510156		U038	10
p-Chloro-m-cresol (4)	59507		U039	5,000
1-Chloro-2,3-epoxypropane	106898		U041	100
Chlorodibromomethane	124481			100
Chloroethane	75003			100
Chloroethanol	107073	500		1
Chloroethyl chlorofomate	627112	1,000		1
2-Chloroethyl vinyl ether	110758		U042	1,000
Chloroform	67663	10,000	U044	10
Chloromethane	74873		U045	100
Chloromethyl ether	542881	100	P016	1
Chloromethyl methyl ether	107302	100	U046	1
beta-Chloronaphthalene	91587		U047	5,000
2-Chloronaphthalene	91587		U047	5,000
Chlorophacinone	3691358	100/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

o-Chlorophenol (2)	95578		U048	100
4-Chlorophenyl phenyl ether	7005723			5,000
1-(o-Chlorophenyl)thiourea	5344821		P026	100
Chloroprene	126998			100
3-Chloropropionitrile	542767		P027	1,000
Chlorosulfonic acid	7790945			1,000
4-Chloro-o-toluidine, hydrochloride	3165933		U049	100
Chlorpyrifos	2921882			1
Chloroxuron	1982474	500/10,000		1
Chlorthiophos	21923239	500		1
Chromic acetate	1066304			1,000
Chromic acid	11115745			10
	7738945			
Chromic acid H_2CrO_4, calcium salt	13765190		U032	10
Chromic chloride (Chromium chloride)	10025737	1/10,000		1
Chromic sulfate	10101538			1,000
Chromium++	7440473			5,000
Chromous chloride	10049055			1,000
Chrysene	218019		U050	100
Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-,	62207765	100/10,000		1
Cobaltous bromide	7789437			1,000
Cobalt carbonyl	10210681	10/10,000		1
Cobaltous formate	544183			1,000
Cobaltous sulfamate	14017415			1,000
Coke Oven Emissions	NA			1
Colchicine	64868	10/10,000		1
Copper++	7440508			5,000
Copper cyanide	544923		P029	10
Coumaphos	56724	100/10,000		10
Coumatetralyl	5836293	500/10,000		1
Creosote	8001589		U051	1
Cresol(s) (Phenol, Methyl)	1319773		U052	100
m-Cresol	108394	1,000/10,000		100
o-Cresol	95487			100
p-Cresol	106445			100
Cresylic acid	1319773		U052	100
m-Cresylic acid	108394			100
o-Cresylic acid	95487			100
p-Cresylic acid	106445			100
Crimidine	535897	100/10,000		1
Crotonaldehyde	123739	1,000	U053	100
	4170303	1,000		100
Cumene (1)	98828		U055	5,000
Cupric acetate	142712			100
Cupric acetoarsenite	12002038			1
Cupric chloride	7447394			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Cupric nitrate	3251238			100
Cupric oxalate	5893663			100
Cupric sulfate	7758987			10
Cupric sulfate, ammoniated	10380297			100
Cupric tartrate	815827			100
Cyanides (soluble salts and complexes) not otherwise specified	57125		P030	10
Cyanogen	460195		P031	100
Cyanogen bromide	506683	500/10,000	U246	1,000
Cyanogen chloride	506774		P033	10
Cyanogen iodide (Iodine cyanide)	506785	1,000/10,000		1
Cyanophos	2636262	1,000		1
Cyanuric fluoride	675149	100		1
2,5-Cyclohexadiene-1,4-dione	106514		U197	10
Cyclohexane (1)	110827		U056	1,000
Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)-	58899		U129	1
Cyclohexanone (1)	108941		U057	5,000
2-Cyclohexanone	131895		P034	100
Cycloheximide	66819	100/10,000		1
Cyclohexylamine	108918	10,000		1
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474		U130	10
Cyclophosphamide	50180		U058	10
2,4-D Acid	94757		U240	100
2,4-D Ester	94111			100
	94791			
	94804			
	1320189			
	1928387			
	1928616			
	1929733			
	2971382			
	25168267			
	53467111			
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757		U240	100
Daunomycin	20830813		U059	10
Decarborane(14)	17702419	500/10,000		1
Demeton	8065483	500		1
Demeton-S-Methyl	919868	500		1
DDD, 4,4'DDD	72548		U060	1
DDE, 4,4'DDE	72559			1
DDT, 4,4'DDT	50293		U061	1
DEHP (Diethylhexyl phthalate)	117817		U028	100
Diallate	2303164		U062	100
Dialifor	10311849	100/10,000		1
Diazinon	333415			1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Diazomethane	334883			100
Dibenz[a,h]anthracene	53703		U063	1
1,2:5,6-Dibenzanthracene	53703		U063	1
Dibenzo[a,h]anthracene	53703		U063	1
Dibenzofuran	132649			100
Dibenz[a,i]pyrene	189559		U064	10
1,2-Dibromo-3-chloropropane	96128		U066	1
Dibromoethane	106934		U067	1
Diborane	19287457	100		1
Dibutyl phthalate	84742		U069	10
Di-n-butyl phthalate	84742		U069	10
Dicamba	1918009			1,000
Dichlobenil	1194656			100
Dichlone	117806			1
Dichlorobenzene	25321226			100
m-Dichlorobenzene (1,3)	541731		U071	100
o-Dichlorobenzene (1,2)	95501		U070	100
p-Dichlorobenzene (1,4)	106467		U072	100
3,3'-Dichlorobenzidine	91941		U073	1
Dichlorobromomethane	75274			5,000
1,4-Dichloro-2-butene (I,T)	764410		U074	1
Dichlorodifluoromethane	75718		U075	5,000
1,1-Dichloroethane	75343		U076	1,000
1,2-Dichloroethane	107062		U077	100
1,1-Dichloroethylene	75354		U078	100
1,2-Dichloroethylene	156605		U079	1,000
Dichloroethyl ether	11444	10,000	U025	10
Dichloroisopropyl ether	108601		U027	1,000
Dichloromethoxy ethane	111911		U024	1,000
Dichloromethyl ether	542881		P016	1
Dichloromethylphenylsilane	149746	1,000		1
2,4-Dichlorophenol	120832		U081	100
2,6-Dichlorophenol	87650		U082	100
Dichlorophenylarsine	696286		P036	1
Dichloropropane	26638197			1,000
1,1-Dichloropropane	78999			
1,3-Dichloropropane	142289			
1,2-Dichloropropane	78875		U083	1,000
Dichloropropane--Dichloropropene (mixture)	8003198			100
Dichloropropene	26952238			100
2,3-Dichloropropene	78886			
1,3-Dichloropropene	542756		U084	100
2,2-Dichloropropionic acid	75990			5,000
Dichlorvos	62737	1,000		10
Dicofol	115322			10
Dicrotophos	141662	100		1
Dieldrin	60571		P037	1
1,2:3,4-Diepoxybutane (I,T)	1464535	500	U085	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Diethanolamine	111422			100
Diethyl chlorophosphate	814493	500		1
Diethylamine	109897			1,000
Diethylarsine	692422		P038	1
Diethylcarbmazine citrate	1642542	100/10,000		1
1,4-Diethylenedioxide	123911		U108	100
Diethylhexyl phthalate	117817		U028	100
N,N-Diethylaniline	91667			1,000
N,N'-Diethylhydrazine	1615801		U086	10
O,O-Diethyl S-methyl dithiophosphate	3288582		U087	5,000
Diethyl-p-nitrophenyl phosphate	311455		P041	100
Diethyl phthalate	84662		U088	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972		P040	100
Diethylstilbestrol	56531		U089	1
Diethyl sulfate	64675			10
Digitoxin	71636	100/10,000		1
Diglycidyl ether	2238075	1,000		1
Digoxin	20830755	10/10,000		1
Dihydrosafrole	94586		U090	10
Diisopropyfluorophosphate	55914		P043	100
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a-beta)-	309002		P004	1
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)-	465736		P060	1
2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)-	60571		P037	1
2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1a-alpha, 2-beta, 2a-beta, 3-alpha, 6-alpha, 6a-beta, 7-beta, 7a-alpha)-	72208		P051	1
Dimethoate	60515		P044	10
3,3'-Dimethoxybenzidine	119904		U091	10
Dimefox	115264	500		1
Dimethoate	60515	500/10,000		10
Dimethyl Phosphorochloridothioate	2524030	500		1
Dimethyl sulfate	77781	500		100
Dimethylamine (I)	124403		U092	1,000
p-Dimethylaminoazobenzene	60117		U093	10
7,12-Dimethylbenz[a]anthracene	57976		U094	1
3,3'-Dimethylbenzidine	119937		U095	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159		U096	10
Dimethylcarbamoyl chloride	79447		U097	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Dimethylformamide	68122			100
Dimethyldichlorosilane	75785	500		1
1,1-Dimethylhydrazine	57147	1,000	U098	10
1,2-Dimethylhydrazine	540738		U099	1
alpha, alpha-Dimethylphenethylamine	122098		P046	5,000
Dimethyl-p-phenylenediamine	99989	10/10,000		1
2,4-Dimethylphenol	105679		U101	100
Dimethyl phthalate	131113		U102	5,000
Dimethyl sulfate	77781		U103	100
Dimetilan	644644	500/10,000		1
Dinitrobenzene (mixed)	25154545			100
m-Dinitrobenzene	99650			
o-Dinitrobenzene	528290			
p-Dinitrobenzene	100254			
4,6-Dinitro-o-cresol and salts	534521	10/10,000	P047	10
Dinitrophenol	25550587			10
2,5-Dinitrophenol	329715			
2,6-Dinitrophenol	573568			
2,4-Dinitrophenol	51285		P048	10
Dinitrotoluene	25321146			10
3,4-Dinitrotoluene	610399			
2,4-Dinitrotoluene	121142		U105	10
2,6-Dinitrotoluene	606202		U106	100
Dinoseb	88857	100/10,000	P020	1,000
Dinoterb	1420071	500/10,000		1
Di-n-octyl phthalate	117840		U107	5,000
1,4-Dioxane	123911		U108	100
Dioxathion	78342	500		1
Diphacinone	82666	10/10,000		1
1,2-Diphenylhydrazine	122667		U109	10
Diphosphoramide, octamethyl-	152169	100	P085	100
Diphosphoric acid, tetraethyl ester	107493		P111	10
Dipropylamine	142847		U110	5,000
Di-n-propylnitrosamine	621647		U111	10
Diquat	85007			1,000
	2764729			
Disulfoton	298044	500	P039	1
Dithiazanine iodide	514738	500/10,000		1
Dithiobiuret	541537	100/10,000	P049	100
Diuron	330541			100
Dodecylbenzenesulfonic acid	27176870			1,000
Emetine, Dihydrochloride	316427	1/10,000		1
Endosulfan	115297	10/10,000	P050	1
alpha-Endosulfan	959988			1
beta-Endosulfan	33213659			1
Endosulfant sulfate	1031078			1
Endothall	145733		P088	1,000
Endothion	2778043	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Endrin	72208	500/10,000	P051	1
Endrin aldehyde	7421934			1
Endrin & metabolites	72208		P051	1
Epichlorohydrin	106898	1,000	U041	100
Epinephrine	51434		P042	1,000
EPN	2104645	100/10,000		1
1,2-Epoxybutane	106887			100
Ergocalciferol	50146	1,000/10,000		1
Ergotamine tartrate	379793	500/10,000		1
Ethanal	75070		U001	1,000
Ethanamine, N-ethyl-N-nitroso-	55185		U174	1
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805		U155	5,000
Ethane, 1,2-dibromo-	106934		U067	1
Ethane, 1,1-dichloro-	75343		U076	1,000
Ethane, 1,2-dichloro-	107062		U077	100
Ethanedinitrile	460195		P031	100
Ethane, hexachloro-	67721		U131	100
Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	111911		U024	1,000
Ethane, 1,1'-oxybis-	60297		U117	100
Ethane, 1,1'-oxybis(2-chloro-	111444		U025	10
Ethane, pentachloro-	76017		U184	10
Ethanesulfonyl chloride, 2-chloro	1622328	500		1
Ethane, 1,1,1,2-tetrachloro-	630206		U208	100
Ethane, 1,1,2,2-tetrachloro-	79345		U209	100
Ethanethioamide	62555		U218	10
Ethane, 1,1,1-trichloro-	71556		U226	1,000
Ethane, 1,1,2-trichloro-	79005		U227	100
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752775		P066	100
Ethanol, 1,2-Dichloro-, acetate	10140871	1,000		1
Ethanol, 2-ethoxy-	110805		U359	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547		U173	1
Ethanone, 1-phenyl-	98862		U004	5,000
Ethene, chloro-	75014		U043	1
Ethene, 2-chloroethoxy-	110758		U042	1,000
Ethene, 1,1-dichloro-	75354		U078	100
Ethene, 1,2-dichloro- (E)	156605		U079	1,000
Ethene, tetrachloro-	127184		U210	100
Ethene, trichloro-	79016		U228	100
Ethion	563122	1,000		10
Ethoprophos	13194484	1,000		1
Ethyl acetate (I)	141786		U112	5,000
Ethyl acrylate (I)	140885		U113	1,000
Ethylbenzene	100414			1,000
Ethylbis(2-Chloroethyl)amine	538078	500		1
Ethyl carbamate (urethane)	51796		U238	100
Ethyl chloride	75003			100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Ethyl cyanide	107120		P101	10
Ethylenebisdithiocarbamic acid, salts & esters	111546		U114	5,000
Ethylenediamine	107153			5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004			5,000
Ethylene dibromide	106934		U067	1
Ethylene dichloride	107062		U077	100
Ethylene fluorohydrin	371620	10		1
Ethylene glycol	107211			5,000
Ethylene glycol monoethyl ether	110805		U359	1,000
Ethylene oxide (I,T)	75218	1,000	U115	10
Ethylenediamine	107153	10,000		5,000
Ethylenethiourea	96457		U116	10
Ethyleneimine	151564	500	P054	1
Ethyl ether (I)	60297		U117	100
Ethylthiocyanate	542905	10,000		1
Ethylidene dichloride	75343		U076	1,000
Ethyl methacrylate	97632		U118	1,000
Ethyl methanesulfonate	62500		U119	1
Famphur	52857		P097	1,000
Fenamlphos	22224926	10/10,000		1
Fenltrothion	122145	500		1
Fensulfothion	115902	500		1
Ferric ammonium citrate	1185575			1,000
Ferric ammonium oxalate	2944674			1,000
	55488874			
Ferric chloride	7705080			1,000
Ferric fluoride	7783508			100
Ferric nitrate	10421484			1,000
Ferric sulfate	10028225			1,000
Ferrous ammonium sulfate	10045893			1,000
Ferrous chloride	7758943			100
Ferrous sulfate	7720787			1,000
	7782630			
Fluenetil	4301502	100/10,000		1
Fluoranthene	206440		U120	100
Fluorene	86737			5,000
Fluorine	7782414	500	P056	10
Fluoroacetamide	640197	100/10,000	P057	100
Fluoracetic acid	144490	10/10,000		1
Fluoroacetic acid, sodium salt	62786		P058	10
Fluoroacetyl chloride	359068	10		1
Fluorouracil	51218	500/10,000		1
Fonofos	944229	500		1
Formaldehyde	50000	500	U122	100
Formaldehyde cyanohydrin	107164	1,000		1
Formetanate hydrochloride	23422539	500/10,000		1
Formothion	2540821	100		1
Formparanate	17702577	100/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Formic acid (C,T)	64186		U123	5,000
Fosthletan	21548323	500		1
Fubendazole	3878191	100/10,000		1
Fulminic acid, mercury(2') salt (R,T)	628864		P065	10
Fumaric acid	110178			5,000
Furan (I)	110009	500	U124	100
Furan, tetrahydro- (I)	109999		U213	1,000
2-Furancarboxaldehyde (I)	98011		U125	5,000
2,5-Furandione	108316		U147	5,000
Furfural (I)	98011		U125	5,000
Furfuran (I)	110009		U124	100
Gallium trichloride	13450903	500/10,000		1
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664		U206	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664		U206	1
Glycidylaldehyde	765344		U126	10
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257		U163	10
Guthion	86500			1
Heptachlor	76448		P059	1
Heptachlor epoxide	1024573			1
Hexachlorobenzene	118741		U127	10
Hexachlorobutadiene	87683		U128	1
Hexachlorocyclohexane (gamma isomer)	58899		U129	1
Hexachlorocyclopentadiene	77474	100	U130	10
Hexachloroethane	67721		U131	100
Hexachlorophene	70304		U132	100
Hexachloropropene	1888717		U243	1,000
Hexaethyl tetraphosphate	757584		P062	100
Hexamethylene-1, 6-diisocyanate	822060			100
Hexamethylphosphoramide	680319			1
Hexamethylenediamine, N,N'-Dibutyl	4835114	500		1
Hexane	110543			5,000
Hexone (Methyl isobutyl ketone)	108101		U161	5,000
Hydrazine (R,T)	302012	1,000	U133	1
Hydrazine, 1,2-diethyl-	1615801		U086	10
Hydrazine, 1,1-dimethyl-	57147		U098	10
Hydrazine, 1,2-dimethyl-	540738		U099	1
Hydrazine, 1,2-diphenyl-	122667		U109	10
Hydrazine, methyl-	60344		P068	10
Hydrazinecarbothioamide	79196		P116	100
Hydrochloric acid	7647010			5,000
Hydrocyanic acid	74908	100	P063	10
Hydrofluoric acid	7664393		U134	100
Hydrogen chloride (gas only)	7647010	500		5,000
Hydrogen cyanide	74908		P063	10
Hydrogen fluoride	7664393	100	U134	100
Hydrogen peroxide (Conc. >52%)	7722841	1,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hydrogen phosphide	7803512		P096	100
Hydrogen selenide	7783075	10		1
Hydrogen sulfide	7783064	500	U135	100
Hydroperoxide, 1-methyl-1-phenylethyl-	80159		U096	10
Hydroquinone	123319	500/10,000		100
2-Imidazolidinethione	96457		U116	10
Indeno(1,2,3-cd)pyrene	193395		U137	100
Iodomethane	74884		U138	100
Iron, Pentacarbonyl-	13463406	100		1
Isobenzan	297789	100/10,000		1
1,3-Isobenzofurandione	85449		U190	5,000
Isobutyronitrile	78820	1,000		1
Isobutyl alcohol (I,T)	78831		U140	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	500/10,000		1
Isodrin	465736	100/10,000	P060	1
Isofluorphate	55914	100		100
Isophorone	78591			5,000
Isophorone Diisocyanate	4098719	100		1
Isoprene	78795			100
Isopropanolamine dodecylbenzene sulfonate	42504461			1,000
Isopropyl chloroformate	108236	1,000		1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	500		1
Isosafrole	120581		U141	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964		P007	1,000
Kepone	143500		U142	1
Lactonitrile	78977	1,000		1
Lasiocarpine	303344		U143	10
Lead acetate	301042		U144	#
Lead arsenate	7784409 7645252 10102484			1
Lead, bis(acetato-O)tetrahydroxytri	1335326		U146	10
Lead chloride	7758954			10
Lead fluoborate	13814965			10
Lead fluoride	7783462			10
Lead iodide	10101630			10
Lead nitrate	10099748			10
Lead phosphate	7446277		U145	10
Lead stearate	7428480 1072351 52652592 56189094			10
Lead subacetate	1335326		U146	10
Lead sulfate	15739807			10
	7446142			
Lead sulfide	1314870			10
Lead thiocyanate	592870			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Leptophos	21609905	500/10,000		1
Lewisite	541253	10		1
Lindane	58899	1,000/10,000	U129	1
Lithium chromate	14307358			10
Lithium hydride	7580678	100		1
Malathion	121755			100
Maleic acid	110167			5,000
Maleic anhydride	108316		U147	5,000
Maleic hydrazide	123331		U148	5,000
Malononitrile	109773	500/10,000	U149	1,000
Manganese, tricarbonyl methylcyclopentadienyl	12108133	100		1
MDI (Methylene diphenyl diisocyanate)	101688			5,000
Mechlorethamine	51752	10		1
MEK (Methyl ethyl ketone)	78933		U159	5,000
Melphalan	148823		U150	1
Mephosfolan	950107	500		1
Mercaptodimethur	2032657			10
Mercuric acetate	1600277	500/10,000		1
Mercuric chloride	7487947	500/10,000		1
Mercuric cyanide	592041			1
Mercuric nitrate	10045940			10
Mercuric oxide	21908532	500/10,000		1
Mercuric sulfate	7783359			10
Mercuric thiocyanate	592858			10
Mercurous nitrate	10415755 7782867			10
Mercury	7439976		U151	1
Mercury (acetate-O)phenyl-	62384		P092	100
Mercury fulminate	628864		P065	10
Methacrolein diacetate	10476956	1,000		1
Methacrylic anhydride	760930	500		1
Methacrylonitrile (I,T)	126987	500	U152	1,000
Methacryloyl chloride	920467	100		1
Methacryloyloxyethyl isocyanate	30674807	100		1
Methamidophos	10265926	100/10,000		1
Methanamine, N-methyl-	124403		U092	1,000
Methanamine, N-methyl-N-nitroso-	62759		P082	10
Methane, bromo-	74839		U029	1,000
Methane, chloro- (I,T)	74873		U045	100
Methane, chloromethoxy-	107302		U046	1
Methane, dibromo-	74953		U068	1,000
Methane, dichloro-	75092		U080	1,000
Methane, dichlorodifluoro-	75718		U075	5,000
Methane, iodo-	74884		U138	100
Methane, isocyanato-	624839		P064	10
Methane, oxybis(chloro-	542881		P016	1
Methanesulfenyl chloride, trichloro-	594423		P118	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Methanesulfonyl fluoride	558258	1,000		1
Methanesulfonic acid, ethyl ester	62500		U119	1
Methane, tetrachloro-	56235		U211	10
Methane, tetranitro- (R)	509148		P112	10
Methane, tribromo-	75252		U225	100
Methane, trichloro-	67663		U044	10
Methane, trichlorofluoro-	75694		U121	5,000
Methanethiol (I,T)	74931		U153	100
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115297		P050	1
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one,1,1a,3,3a,4,5,5a,5b,6-decachloroctahydro-	143500		U142	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro-	76448		P059	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro-	57749		U036	1
Methanol (I)	67561		U154	5,000
Methapyrilene	91805		U155	5,000
Methidathion	950378	500/10,000		1
Methiocarb	2032657	500/10,000	P199	10
Methomyl	16752775	500/10,000	P066	100
Methoxychlor	72435		U247	1
Methoxyethylmercuric acetate	151382	500/10,000		1
Methyl alcohol (I)	67561		U154	5,000
Methyl aziridine	75558		P067	1
Methyl bromide	74839	1,000	U029	1,000
1-Methylbutadiene (I)	504609		U186	100
Methyl chloride (I,T)	74873		U045	100
Methyl 2-chloroacrylate	80637	500		1
Methyl chlorocarbonate (I,T)	79221		U156	1,000
Methyl chloroform	71556		U226	1,000
Methyl chloroformate	79221	500	U156	1,000
3-Methylcholanthrene	56495		U157	10
4,4'-Methylenebis(2-chloroaniline)	101144		U158	10
Methylene bromide	74953		U068	1,000
Methylene chloride	75092		U080	1,000
4,4'-Methylenedianiline	101779			10
Methylene diphenyl diisocyanate (MDI)	101688			5,000
Methyl ethyl ketone (MEK) (I,T)	78933		U159	5,000
Methyl ethyl ketone peroxide (R,T)	1338234		U160	10
Methyl hydrazine	60344	500	P068	10
Methyl iodide	74884		U138	100
Methyl isobutyl ketone	108101		U161	5,000
Methyl isocyanate	624839	500	P064	10
Methyl isothiocyanate	556616	500		1
2-Methyllactonitrile	75865		P069	10
Methyl mercaptan	74931	500	U153	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Methyl methacrylate (I,T)	80626		U162	1,000
Methyl parathion	298000		P071	100
Methyl phenkapton	3735237	500		1
Methyl phosphonic dichloride	676971	100		1
4-Methyl-2-pentanone (I)	108101		U161	5,000
Methyl tert-butyl ether	1634044			1,000
Methyl thiocyanate	556649	10,000		1
Methylthiouracil	56042		U164	10
Methyl vinyl ketone	78944	10		1
Methylmercuric dicyanamide	502396	500/10,000		1
Methyltrichlorosilane	75796	500		1
Metolcarb	1129415	100/10,000		1
Mevinphos	7786347	500		10
Mexacarbate	315184	500/10,000		1,000
Mitomycin C	50077	500/10,000	U010	10
MNNG	70257		U163	10
Monocrotophos	6923224	10/10,000		1
Monoethylamine	75047			100
Monomethylamine	74895			100
Muscimol	2763964	500/10,000	P007	1,000
Mustard gas	505602	500		1
Naled	300765			10
5,12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	20830813		U059	10
1-Naphthalenamine	134327		U167	100
2-Naphthalenamine (beta-Naphthylamine)	91598		U168	1
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031		U026	100
Naphthalene	91203		U165	100
Naphthalene, 2-chloro-	91587		U047	5,000
1,4-Naphthalenedione	130154		U166	5,000
2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-tetrasodium salt	72571		U236	10
Naphthenic acid	1338245			100
1,4-Naphthoquinone	130154		U166	5,000
alpha-Naphthylamine	134327		U167	100
beta-Naphthylamine (2-Naphthalenamine)	91598		U168	1
alpha-Naphthylthiourea	86884		P072	100
Nickel++	7440020			100
Nickel ammonium sulfate	15699180			100
Nickel carbonyl	13463393	1	P073	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393		P073	10
Nickel chloride	7718549 37211055			100
Nickel cyanide	557197		P074	10
Nickel hydroxide	12054487			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Nickel nitrate	14216752			100
Nickel sulfate	7786814			100
Nicotine & salts	54115	100	P075	100
Nicotine sulfate	65305	100/10,000		1
Nitric acid	7697372	1,000		1,000
Nitric acid, thallium(1+) salt	10102451		U217	100
Nitric oxide	10102439	100	P076	10
p-Nitroaniline	100016		P077	5,000
Nitrobenzene (I,T)	98953	10,000	U169	1,000
4-Nitrobiphenyl	92933			10
Nitrocyclohexane	1122607	500		1
Nitrogen dioxide	10102440 10544726	100	P078	10
Nitrogen oxide	10102439		P076	10
Nitroglycerine	55630		P081	10
Nitrophenol (mixed)	25154556			100
m-Nitrophenol	554847			100
o-Nitrophenol (2)	88755			100
p-Nitrophenol (4)	100027		U170	100
2-Nitropropane (I,T)	79469		U171	10
N-Nitrosodi-n-butylamine	924163		U172	10
N-Nitrosodiethanolamine	1116547		U173	1
N-Nitrosodiethylamine	55185		U174	1
N-Nitrosodimethylamine	62759	1,000	P082	10
N-Nitrosodiphenylamine	86306			100
N-Nitroso-N-ethylurea	759739		U176	1
N-Nitroso-N-methylurea	684935		U177	1
N-Nitroso-N-methylurethane	615532		U178	1
N-Nitrosomethylvinylamine	4549400		P084	10
N-Nitrosomorpholine	59892			1
N-Nitrosopiperidine	100754		U179	10
N-Nitrosopyrrolidine	930552		U180	1
Nitrotoluene	1321126			1,000
m-Nitrotoluene	99081			
o-Nitrotoluene	88722			
p-Nitrotoluene	99990			
5-Nitro-o-toluidine	99558		U181	100
Norbromide	991424	100/10,000		1
Octamethylpyrophosphoramide	152169		P085	100
Organorhodium complex (PMN-82-147)	0	10/10,000		1
Osmium tetroxide	20816120		P087	1,000
Ouabain	630604	100/10,000		1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733		P088	1,000
Oxamyl	23135220	100/10,000	P194	1
1,2-Oxathiolane, 2,2-dioxide	1120714		U193	10
2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180		U058	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Oxetane, 3,3-bis(chloromethyl)-	78717	500		1
Oxirane (I,T)	75218		U115	10
Oxiranecarboxyaldehyde	765344		U126	10
Oxirane, (chloromethyl)-	106898		U041	100
Oxydisulfoton	2497076	500		1
Ozone	10028156	100		1
Paraformaldehyde	30525894			1,000
Paraldehyde	123637		U182	1,000
Paraquat	1910425	10/10,000		1
Paraquat methosulfate	2074502	10/10,000		1
Parathion	56382	100	P089	10
Parathion-methyl	298000	100/10,000		100
Paris green	12002038	500/10,000		100
PCBs	1336363			
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
PCNB (Pentachloronitrobenzene)	82688		U185	100
Pentaborane	19624227	500		1
Pentachlorobenzene	608935		U183	10
Pentachloroethane	76017		U184	10
Pentachlorophenol	87865		U242	10
Pentachloronitrobenzene (PCNB)	82688		U185	100
Pentadecylamine	2570265	100/10,000		1
Paracetic acid	79210	500		1
1,3-Pentadiene (I)	504609		U186	100
Perachloroethylene	127184		U210	100
Perchloromethylmercaptan	594423	500		100
Phenacetin	62442		U187	100
Phenanthrene	85018			5,000
Phenol	108952	500/10,000	U188	1,000
Phenol, 2-chloro-	95578		U048	100
Phenol, 4-chloro-3-methyl-	59507		U039	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895		P034	100
Phenol, 2,4-dichloro-	120832		U081	100
Phenol, 2,6-dichloro-	87650		U082	100
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531		U089	1
Phenol, 2,4-dimethyl-	105679		U101	100
Phenol, 2,4-dinitro-	51285		P048	10
Phenol, methyl-	1319773		U052	1,000
m-Cresol	108394			
o-Cresol	95487			
p-Cresol	106445			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Phenol, 2-methyl-4,6-dinitro-and salts	534521		P047	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304		U132	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	100/10,000		1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857		P020	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	500/10,000		1
Phenol, 4-nitro-	100027		U170	100
Phenol, pentachloro-	87865		U242	10
Phenol, 2,3,4,6-tetrachloro-	58902		U212	10
Phenol, 2,4,5-trichloro-	95954		U230	10
Phenol, 2,4,6-trichloro-	88062		U231	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748		P009	10
Phenoxarsine, 10,10'-oxydi-	58366	500/10,000		1
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823		U150	1
Phenyl dichloroarsine	696286	500		1
1,10-(1,2-Phenylene)pyrene	193395		U137	100
p-Phenylenediamine	106503			5,000
Phenylhydrazine hydrochloride	59881	1,000/10,000		1
Phenylmercury acetate	62384	500/10,000	P092	100
Phenylsilatrane	2097190	100/10,000		1
Phenylthiourea	103855	100/10,000	P093	100
Phorate	298022	10	P094	10
Phosacetim	4104147	100/10,000		1
Phosfolan	947024	100/10,000		1
Phosgene	75445	10	P095	10
Phosmet	732116	10/10,000		1
Phosphamidon	13171216	100		1
Phosphine	7803512	500		100
Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester	2587908	500		1
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	500		1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	100		1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	500		1
Phosphoric acid	7664382			5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455		P041	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	500		1
Phosphoric acid, lead(2+) salt (2:3)	7446277	500	U145	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044		P039	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022		P094	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582		U087	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515		P044	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Phosphorofluondic acid, bis(1-methylethyl) ester	55914		P043	100
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382		P089	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857		P097	1,000
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000		P071	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972		P040	100
Phosphorus	7723140	100		1
Phosphorus oxychloride	10025873	500		1,000
Phosphorous pentachloride	10026138	500		1
Phosphorus pentasulfide (R)	1314803		U189	100
Phosphorus pentoxide	1314563	10		1
Phosphorus trichloride	7719122	1,000		1,000
Phthalic anhydride	85449		U190	5,000
Physostigmine	57476	100/10,000	P204	1
Phosostigmine, salicylate (1:1)	57647	100/10,000		1
2-Picoline	109068		U191	5,000
Picotoxin	124878	500/10,000		1
Piperidine	110894	1,000		1
Piperidine, 1-nitroso-	100754		U179	10
Pirimifos-ethyl	23505411	1,000		1
Plumbane, tetraethyl-	78002		P110	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363			1
Potassium arsenate	7784410			1
Potassium arsenite	10124502	500/10,000		1
Potassium bichromate	7778509			10
Potassium chromate	7789006			10
Potassium cyanide	151508	100	P098	10
Potassium hydroxide	1310583			1,000
Potassium permanganate	7722647			100
Potassium silver cyanide	506616	500	P099	1
Promecarb	2631370	500/10,000		1
Pronamide	23950585		U192	5,000
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063		P070	1
1-Propanamine (I,T)	107108		U194	5,000
1-Propanamine, N-propyl-	142847		U110	5,000
1-Propanamine, N-nitroso-N-propyl-	621647		U111	10
Propane, 1,2-dibromo-3-chloro	96128		U066	1
Propane, 2-nitro- (I,T)	79469		U171	10
1,3-Propane sultone	1120714		U193	10
Propane 1,2-dichloro-	78875		U083	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Propanedinitrile	109773		U149	1,000
Propanenitrile	107120		P101	10
Propanenitrile, 3-chloro-	542767		P027	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865		P069	10
Propane, 2,2'-oxybis[2-chloro-	108601		U027	1,000
1,2,3-Propanetnol, trinitrate- (R)	55630		P081	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		U235	10
1-Propanol, 2-methyl- (I,T)	78831		U140	5,000
2-Propanone (I)	67641		U002	5,000
2-Propanone, 1-bromo-	598312		P017	1,000
Propargite	2312358			10
Propargyl alcohol	107197		P102	1,000
Propargyl bromide	106967	10		1
2-Propenal	107028		P003	1
2-Propenamide	79061		U007	5,000
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717		U243	1,000
1-Propene, 1,3-dichloro-	542756		U084	100
2-Propenenitrile	107131		U009	100
2-Propenenitrile, 2-methyl- (I,T)	126987		U152	1,000
2-Propenoic acid (I)	79107		U008	5,000
2-Prepenoic acid, ethyl ester (I)	140885		U113	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632		U118	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626		U162	1,000
2-Propen-1-o1	107186		P005	100
Propiolactone, beta-	57578	500		1
Propionaldehyde	123386			1,000
Propionic acid	79094			5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721		U233	100
Propionic anhydride	123626			5,000
Propoxor (Baygon)	114261		U411	100
Propionitrile	107120	500		10
Propionitrile, 3-chloro-	542767	1,000		1,000
Propiophenone, 1, 4-amino phenyl	70699	100/10,000		1
n-Propylamine	107108		U194	5,000
Propyl chloroformate	109615	500		1
Propylene dichloride	78875		U083	1,000
Propylene oxide	75569	10,000		100
1,2-Propylenimine	75558	10,000	P067	1
2-Propyn-1-o1	107197		P102	1,000
Prothoate	2275185	100/10,000		1
Pyrene	129000	1,000/10,000		5,000
Pyrethrins	121299			1
	121211			
	8003347			
3,6-Pyridazinedione, 1,2-dihydro-	123331		U148	5,000
4-Pyridinamine	504245		P008	1,000
Pyridine	110861		U196	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Pyridine, 2-methyl-	109068		U191	5,000
Pyridine, 2-methyl-5-vinyl-	140761	500		1
Pyridine, 4-amino-	504245	500/10,000		1,000
Pyridine, 4-nitro-, 1-oxide	1124330	500/10,000		1
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)	54115		P075	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751		U237	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042		U164	10
Pyriminil	53558251	100/10,000		1
Pyrrolidine, 1-nitroso-	930552		U180	1
Quinoline	91225			5,000
Quinone (p-Benzoquinone)	106514		U197	10
Quintobenzene	82688		U185	100
Reserpine	50555		U200	5,000
Resorcinol	108463		U201	5,000
Saccharin and salts	81072		U202	100
Salcomine	14167181	500/10,000		1
Sarin	107448	10		1
Safrole	94597		U203	100
Selenious acid	7783008	1,000/10,000	U204	10
Selenious acid, dithallium (1+) salt	12039520		P114	1,000
Selenium ++	7782492			100
Selenium dioxide	7446084		U204	10
Selenium oxychloride	7791233	500		1
Selenium sulfide (R,T)	7488564		U205	10
Selenourea	630104		P103	1,000
Semicarbazide hydrochloride	563417	1,000/10,000		1
L-Serine, diazoacetate (ester)	115026		U015	1
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1,000		1
Silver ++	7440224			1,000
Silver cyanide	506649		P104	1
Silver nitrate	7761888			1
Silvex (2,4,5-TP)	93721		U233	100
Sodium	7440235			10
Sodium arsenate	7631892	1,000/10,000		1
Sodium arsenite	7784465	500/10,000		1
Sodium azide	26628228	500	P105	1,000
Sodium bichromate	10588019			10
Sodium bifluoride	1333831			100
Sodium bisulfite	7631905			5,000
Sodium cacodylate	124652	100/10,000		1
Sodium chromate	7775113			10
Sodium cyanide	143339	100	P106	10
Sodium dodecylbenzenesulfonate	25155300			1,000
Sodium fluoride	7681494			1,000
Sodium fluoroacetate	62748	10/10,000		10
Sodium hydrosulfide	16721805			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Sodium hydroxide	1310732			1,000
Sodium hypochlorite	7681529 10022705			100
Sodium methylate	124414			1,000
Sodium nitrite	7632000			100
Sodium prentachlorophenate	131522	100/10,000		1
Sodium phosphate, dibasic	7558794 10039324 10140655			5,000
Sodium phosphate, tribasic	7601549 7758294 7785844 10101890 10124568 10361894			5,000
Sodium selenate	13410010	100/10,000		1
Sodium selenite	10102188	100/10,000		100
	7782823			
Sodium tellurite	10102202	500/10,000		1
Stannane, acetoxytriphenyl	900958	500/10,000		1
Streptozotocin	18883664		U206	1
Strontium chromate	7789062			10
Strychnidin-10-one	57249		P108	10
Strychnidin-10-one, 2,3-dimethoxy-	357573		P018	100
Strychnine, & salts	572494	100/10,000	P108	10
Strychnine sulfate	60413	100/10,000		1
Styrene	100425			1,000
Styrene oxide	96093			100
Sulfotep	3689245	500		100
Sulfoxide, 3-chloropropyl octyl	3569571	500		1
Sulfur monochloride	12771083			1,000
Sulfur dioxide	7446095	500		1
Sulfur phosphide (R)	1314803		U189	100
Sulfur tetrafluoride	7783600	100		1
Sulfur trioxide	7446119	100		1
Sulfuric acid	7664939 8014957	1,000		1,000
Sulfuric acid, dithallium (1+) salt	7446186 10031591		P115	100
Sulfuric acid, dimethyl ester	77781		U103	100
Tabun	77816	10		1
2,4,5-T acid	93765		U232	1,000
2,4,5-T amines	2008460 1319728 3813147 6369966 6369977			5,000
Tellurium	13494809	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Tellurium hexafluoride	7783804	100		1
2,4,5-T esters	93798 1928478 2545597 25168154 61792072			1,000
2,4,5-T salts	13560991			1,000
2,4,5-T	93765		U232	1,000
TDE (Dichloro diphenyl dichloroethane)	72548		U060	1
TEPP (Tetraethyl ester diphosphoric acid)	107493	100		10
Terbufos	13071799	100		1
1,2,4,5-Tetrachlorobenzene	95943		U207	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016			1
1,1,1,2-Tetrachloroethane	630206		U208	100
1,1,2,2-Tetrachloroethane	79345		U209	100
Tetrachloroethene	127184		U210	100
Tetrachloroethylene	127184		U210	100
2,3,4,6-Tetrachlorophenol	58902		U212	10
Tetraethyl lead	78002	100	P110	10
Tetraethyl pyrophosphate	107493		P111	10
Tetraethyldithiopyrophosphate	3689245		P109	100
Tetraethyltin	597648	100		1
Tetramethyllead	75741	100		1
Tetrahydrofuran (I)	109999		U213	1,000
Tetranitromethane (R)	509148	500	P112	10
Tetraphosphoric acid, hexaethyl ester	757584		P062	100
Thallic oxide	1314325		P113	100
Thallium ++	7440280			1,000
Thallium acetate	563688		U214	100
Thallium carbonate	6533739		U215	100
Thallium chloride	7791120		U216	100
Thallium nitrate	10102451		U217	100
Thallium oxide	1314325		P113	100
Thallium selenite	12039520		P114	1,000
Thallium sulfate	7446186 10031591	100/10,000	P115	100
Thallous carbonate (Thallium (I) carbonate)	6533739	100/10,000	U215	100
Thallous chloride (Thallium (I) chloride)	7791120	100/10,000	U216	100
Thallous malonate (Thallium (I) malonate)	2757188	100/10,000		1
Thallous sulfate (Thallium (I) sulfate)	7446186	100/10,000	P115	100
Thioacetamide	62555		U218	10
Thiocarbazide	2231574	1,000/10,000		1
Thiodiphosphoric acid, tetraethyl ester	3689245		P109	100
Thiofanox	39196184	100/10,000	P045	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537		P049	100
Thiomethanol (I,T)	74931		U153	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Thionazin	297972	500		100
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl-	137268		U244	10
Thiophenol	108985	500	P104	100
Thiosemicarbazide	79196	100/10,000	P116	100
Thiourea	62566		U219	10
Thiourea, (2-chlorophenyl)-	5344821	100/10,000	P026	100
Thiourea, (2-methylphenyl)-	614788	500/10,000		1
Thiourea, 1-naphthalenyl-	86884		P072	100
Thiourea, phenyl-	103855		P093	100
Thiram	137268		U244	10
Titanium tetrachloride	7550450	100		1,000
Toluene	108883		U220	1,000
Toluenediamine	95807 496720 823405 25376458		U221	10
Toluene diisocyanate (R,T)	584849 91087 26471625	500 100	U223	100 100
o-Toluidine	95534		U328	100
p-Toluidine	106490		U353	100
o-Toluidine hydrochloride	636215		U222	100
Toxaphene	8001352		P123	1
2,4,5-TP acid	93721		U233	100
2,4,5-TP acid esters	32534955			100
1H-1,2,4-Triazol-3-amine	61825		U011	10
Trans-1,4-dichlorobutene	110576	500		1
Triamiphos	1031476	500/10,000		1
Triazofos	24017478	500		1
Trichloroacetyl chloride	76028	500		1
Trichlorfon	52686			100
1,2,4-Trichlorobenzene	120821			100
1,1,1-Trichloroethane	71556		U226	1,000
1,1,2-Trichloroethane	79005		U227	100
Trichloroethene	79016		U228	100
Trichloroethylene	79016		U228	100
Trichloroethylsilane	115219	500		1
Trichloronate	327980	500		1
Trichloromethanesulfenyl chloride	594423		P118	100
Trichloromonofluoromethane	75694		U121	5,000
Trichlorophenol	21567822			10
2,3,4-Trichlorophenol	15950660			
2,3,5-Trichlorophenol	933788			
2,3,6-Trichlorophenol	933755			
2,4,5-Trichlorophenol	95954		U230	10
2,4,6-Trichlorophenol	88062		U231	10
3,4,5-Trichlorophenol	609198			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Trichlorophenylsilane	98135	500		1
Trichloro(chloromethyl)silane	1558254	100		1
Trichloro(dichlorophenyl)silane	27137855	500		1
Triethanolamine dodecylbenzene-sulfonate	27323417			1,000
Triethoxysilane	998301	500		1
Trifluralin	1582098			10
Triethylamine	121448			5,000
Trimethylamine	75503			100
Trimethylchlorsilane	75774	1,000		1
2,2,4-Trimethylpentane	540841			1,000
Trimethylolpropane phosphite	824113	100/10,000		1
Trimethyiltin chloride	1066451	500/10,000		1
1,3,5-Trinitrobenzene (R,T)	99354		U234	10
1,3,5-Trioxane, 2,4,6-trimethyl-	123637		U182	1,000
Triphenyltin chloride	639587	500/10,000		1
Tris(2-chloroethyl)amine	555771	100		1
Tris(2,3-dibromopropyl) phosphate	126727		U235	10
Trypan blue	72571		U236	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA		D001	100
Unlisted Hazardous Wastes Characteristic of **Corrosivity**	NA		D002	100
Unlisted Hazardous Wastes Characteristic of **Reactivity**	NA		D003	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Unlisted Hazardous Wastes Characteristic of **Toxicity**				
Arsenic			D004	1
Barium			D005	1,000
Benzene			D018	10
Cadmium			D006	10
Carbon Tetrachloride			D019	10
Chlordane			D020	1
Chlorobenzene			D021	100
Chloroform			D022	10
Chromium			D007	10
o-Cresol			D023	100
m-Cresol			D024	100
p-Cresol			D025	100
Cresol			D026	100
2,4-D (Dichlorophenoxyacetic acid)			D016	100
1,4-Dichlorobenzene			D027	100
1,2-Dichloroethane			D028	100
1,1-Dichloroethylene			D029	100
2,4-Dinitrotoluene			D030	10
Endrin			D012	1
Heptachlor (and epoxide)			D031	1
Hexachlorobenzene			D032	10
Hexachlorobutadiene			D033	1
Hexachloroethane			D034	100
Lead			D008	10
Lindane			D013	1
Mercury			D009	1
Methoxychlor			D014	1
Methyl ethyl ketone			D035	5,000
Nitrobenzene			D036	1,000
Pentachlorophenol			D037	10
Pyridine			D038	1,000
Selenium			D010	10
Silver			D011	1
Tetrachloroethylene			D039	100
Toxaphene			D015	1
Trichloroethylene			D040	100
2,4,5 Trichlorophenol			D041	10
2,4,5-TP			D017	100
Vinyl chloride			D043	1
Uracil mustard	66751		U237	10
Uranyl acetate	541093			100
Uranyl nitrate	10102064 36478769			100
Urea, N-ethyl-N-nitroso	759739		U176	1
Urea, N-methyl-N-nitroso	684935		U177	1
Urethane (Carbamic acid ethyl ester)	51796		U238	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Valinomycin	2001958	1,000/10,000		1
Vanadic acid, ammonium salt	7803556		P119	1,000
Vanadic oxide V_20_5	1314621		P120	1,000
Vanadic pentoxide	1314621		P120	1,000
Vanadium pentoxide	1314621	100/10,000		1,000
Vanadyl sulfate	27774136			1,000
Vinyl chloride	75014		U043	1
Vinyl acetate	108054			5,000
Vinyl acetate monomer	108054	1,000		5,000
Vinylamine, N-methyl-N-nitroso-	4549400		P084	10
Vinyl bromide	593602			100
Vinylidene chloride	75354		U078	100
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	500/10,000	P001	100
Warfarin sodium	129066	100/10,000		100
Xylene (mixed)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
Xylenol	1300716			1,000
Xylylene dichloride	28347139	100/10,000		1
Yohimban-16-carboxylic acid, 11,17 dimethoxy-18-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,17-alpha,18-beta,20-alpha)-	50555		U200	5,000
Zinc ++	7440666			1,000
Zinc acetate	557346			1,000
Zinc ammonium chloride	52628258			1,000
	14639975			
	14639986			
Zinc borate	1332076			1,000
Zinc bromide	7699458			1,000
Zinc carbonate	3486359			1,000
Zinc chloride	7646857			1,000
Zinc cyanide	557211		P121	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	100/10,000		1
Zinc fluoride	7783495			1,000
Zinc formate	557415			1,000
Zinc hydrosulfite	7779864			1,000
Zinc nitrate	7779886			1,000
Zinc phenosulfonate	127822			5,000
Zinc phosphide	1314847	500	P122	100
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847		P122	100
Zinc silicofluoride	16871719			5,000
Zinc sulfate	7733020			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Zirconium nitrate	13746899			5,000
Zirconium potassium fluoride	16923958			1,000
Zirconium sulfate	14644612			5,000
Zirconium tetrachloride	10026116			5,000
F001			**F001**	**10**
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10 percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Trichloroethylene	79016		U228	100
(c) Methylene chloride	75092		U080	1,000
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Carbon tetrachloride	56235		U211	10
(f) Chlorinated fluorocarbons	NA			5,000
F002			**F002**	**10**
The following spent halogenated solvents: all spent solvent mixtures/blends containing, before use, a total of 10 percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Methylene chloride	75092		U080	1,000
(c) Trichloroethylene	79016		U228	100
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Chlorobenzene	108907		U037	100
(f) 1,1,2-Trichloro-1,2,2 trifluoroethane	76131			5,000
(g) o-Dischlorobenzene	95501		U070	100
(h) Trichlorofluoromethane	75694		U121	5,000
(i) 1,1,2-Trichloroethane	79005		U227	100
F003			**F003**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Xylene	1330207			1,000
(b) Acetone	67641			5,000
(c) Ethyl acetate	141786			5,000
(d) Ethylbenzene	100414			1,000
(e) Ethyl ether	60297			100
(f) Methyl isobutyl ketone	108101			5,000
(g) n-Butyl alcohol	71363			5,000
(h) Cyclohexanone	108941			5,000
(i) Methanol	67561			5,000
F004			**F004**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319773		U052	100
(b) Nitrobenzene	98953		U169	1,000
F005			**F005**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Toluene	108883		U220	1,000
(b) Methyl ethyl ketone	78933		U159	5,000
(c) Carbon disulfide	75150		P022	100
(d) Isobutanol	78831		U140	5,000
(e) Pyndine	110861		U196	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

F006 Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.	**F006**	**10**
F007 Spent cyanide plating bath solutions from electroplating operations.	**F007**	**10**
F008 Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	**F008**	**10**
F009 Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	**F009**	**10**
F010 Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	**F010**	**10**
F011 Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.	**F011**	**10**
F012 Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	**F012**	**10**
F019 Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process.	**F019**	**10**
F020 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)	**F020**	**1**
F021 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	**F021**	**1**
F022 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	**F022**	**1**
F023 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.)	**F023**	**1**
F024 Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in Section 261.32.)	**F024**	**1**
F025 Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	**F025**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

F026	**F026**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions.		
F027	**F027**	**1**
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.)		
F028	**K028**	**1**
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, and F027.		
F032	**F032**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used clorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		
F034	**F034**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		
F035	**F035**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		
F037	**F037**	**1**
Petroleum refinery primary oil/water/solids separation sludge--any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment unites) and K051 wastes are not included in this listing.		
F038	**F038**	**1**
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge--any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from once-through non-contact cooling waters segregated from treatment from other process or oil cooling wastes, sludges and floats generated in aggressive biological treatment units as defined in 261.31(b) (2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.		
K001	**K001**	**1**
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.		
K002	**K002**	**10**
Wastewater treatment sludge from the production of chrome yellow and orange pigments.		

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K003 Wastewater treatment sludge from the production of molyodate orange pigments.	**K003**	**10**
K004 Wastewater treatment sludge from the production of zinc yellow pigments.	**K004**	**10**
K005 Wastewater treatment sludge from the production of chrome green pigments.	**K005**	**10**
K006 Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).	**K006**	**10**
K007 Wastewater treatment sludge from the production of iron blue pigments.	**K007**	**10**
K008 Oven residue from the production of chrome oxide green pigments.	**K008**	**10**
K009 Distillation bottoms from the production of acetaldehyde from ethylene.	**K009**	**10**
K010 Distillation side cuts from the production of acetaldehyde from ethylene.	**K010**	**10**
K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.	**K011**	**10**
K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.	**K013**	**10**
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile.	**K014**	**5,000**
K015 Still bottoms from the distillation of benzyl chloride.	**K015**	**10**
K016 Heavy ends or distillation residues from the production of carbon tetrachloride.	**K016**	**1**
K017 Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.	**K017**	**10**
K018 Heavy ends from the fractionation column in ethyl chloride production.	**K018**	**1**
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.	**K019**	**1**
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.	**K020**	**1**
K021 Aqueous spent antimony catalyst waste from fluoromethanes production.	**K021**	**10**
K022 Distillation bottom tars from the production of phenol/acetone from cumene.	**K022**	**1**
K023 Distillation light ends from the production of ophthalic anhydride from naphthalene.	**K023**	**5,000**
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene.	**K024**	**5,000**
K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene.	**K025**	**10**
K026 Stripping still tails from the production of methyl ethyl pyridines.	**K026**	**1,000**
K027 Centrifuge and distillation residues from toluene diisocyanate production.	**K027**	**10**
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.	**K028**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K029 Waste from the product steam stripper in the production of 1,1,1-trichloroethane.	**K029**	**1**
K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.	**K030**	**1**
K031 By-product salts generated in the production of MSMA and cacodylic acid.	**K031**	**1**
K032 Wastewater treatment sludge from the production of chlordane.	**K032**	**10**
K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.	**K033**	**10**
K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.	**K034**	**10**
K035 Wastewater treatment sludges generated in the production of creosote.	**K035**	**1**
K036 Still bottoms from toluene reclamation distillation in the production of disulfoton.	**K036**	**1**
K037 Wastewater treatment sludges from the production of disulfoton.	**K037**	**1**
K038 Wastewater from the washing and stripping of phorate production.	**K038**	**10**
K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.	**K039**	**10**
K040 Wastewater treatment sludge from the production of phorate.	**K040**	**10**
K041 Wastewater treatment sludge from the production of toxaphene.	**K041**	**1**
K042 Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	**K042**	**10**
K043 2,6-Dichlorophenol waste from the production of 2,4-D.	**K043**	**10**
K044 Wastewater treatment sludges from the manufacturing and processing of explosives.	**K044**	**10**
K045 Spent carbon from the treatment of wastewater containing explosives.	**K045**	**10**
K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.	**K046**	**10**
K047 Pink/red water from TNT operations.	**K047**	**10**
K048 Dissolved air flotation (DAF) float from the petroleum refining industry.	**K048**	**10**
K049 Slop oil emulsion solids from the petroleum refining industry.	**K049**	**10**
K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry.	**K050**	**10**
K051 API separator sludge from the petroleum refining industry.	**K051**	**10**
K052 Tank bottoms (leaded) from the petroleum refining industry.	**K052**	**10**
K060 Ammonia still lime sludge from coking operations.	**K060**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K061 Emission control dust/sludge from the primary production of steel in electric furnaces.	**K061**	**10**
K062 Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).	**K062**	**10**
K064 Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.	**K064**	**10**
K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.	**K065**	**10**
K066 Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.	**K066**	**10**
K069 Emission control dust/sludge from secondary lead smelting.	**K069**	**10**
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.	**K071**	**1**
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	**K073**	**10**
K083 Distillation bottoms from aniline extraction.	**K083**	**100**
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K084**	**1**
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.	**K085**	**10**
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.	**K086**	**10**
K087 Decanter tank tar sludge from coking operations.	**K087**	**100**
K088 Spent potliners from primary aluminum reduction.	**K088**	**10**
K090 Emission control dust or sludge from ferrochromiumsilicon production.	**K090**	**10**
K091 Emission control dust or sludge from ferrochromium production.	**K091**	**10**
K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.	**K093**	**5,000**
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.	**K094**	**5,000**
K095 Distillation bottoms from the production of 1,1,1-trichloroethane.	**K095**	**100**
K096 Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	**K096**	**100**
K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.	**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.	**K099**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K100 Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.	**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.	**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	**K105**	**10**
K106 Wastewater treatment sludge from the mercury cell process in chlorine production.	**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines.	**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K109**	**10**
K110 Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.	**K111**	**10**
K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K114**	**10**
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.	**K116**	**10**
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.	**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.	**K118**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.	**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.	**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.	**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.	**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.	**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.	**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	**K136**	1
K141 Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).	**K141**	1
K142 Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal.	**K142**	1
K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.	**K143**	1
K144 Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.	**K144**	1
K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.	**K145**	1
K147 Tar storage tank residues from coal tar refining.	**K147**	1
K148 Residues from coal tar distillation, including, but not limited to, still bottoms.	**K148**	1
K149 Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.]	**K149**	10
K150 Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	**K150**	10
K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	**K151**	10
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.)	**K157**	++

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.	**K158**	++
K159 Organics from the treatment of thiocarbamate wastes.	**K159**	++
K160 Solids (including filter wastes, separation solids, and spent catalysts) from the production of thio-carbamates and solids from the treatment of thiocarbamate wastes.	**K160**	++
K161 Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)	**K161**	++

Notes:

[1] Chemical Abstract Service (CAS) Registry Number.
[2] U.S. Environmental Protection Agency Hazardous Waste Number.
[3] Reportable quantity release which requires notification (See Chapter 18).
[4] Incl udes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR' Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, or sulfonate

++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).
+++ The RQ for asbestos is limited to friable forms only.
# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.
The statutory RQ for this hazardous substance may be adjusted in a future rulemaking; until then the statutory RQ applies.
1* Indicates that the 1-pound RQ is a statutory RQ.
** Indicates that no RQ is being assigned to the generic or broad class.
(1+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 311(b)(4).
(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 30711(a)(4).
(3+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA section 112.
(4+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is RCRA section 3001.

APPENDIX 2

DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

AP2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

AP2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

AP2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

AP2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

AP2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

AP2.4. For installations with POL Storage Containers:

AP2.4.1. Single POL Storage Container Facilities. For facilities containing only one above-ground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

AP2.4.2. Multiple POL Storage Container Facilities

AP2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

AP2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single above ground oil or hazardous substance storage container.

AP2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

AP2.4.2.3.1. The total capacity of the above-ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

AP2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

AP2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.

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SULTANATE OF OMAN
FINAL GOVERNING STANDARDS

1 December 2012

Prepared by
U.S. Air Forces Central
United States Central Command

On behalf of
United States Central Command (USCENTCOM)

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FORWARD

This DoD Publication is issued under the authority and requirements of DoD Instruction (DoDI) 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996. This Final Governing Standard (FGS) provides criteria, standards, and management practices for environmental compliance at DoD installations in the Sultanate of Oman (Oman). The FGS is derived from DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document," dated May 2007.

This publication's predecessor, Final Governing Standards – Oman July 2010, is hereby cancelled. This Final Governing Standard applies to all United States Forces operating in the Sultanate of Oman.

This FGS is effective immediately and its use is mandatory by the DoD Components, pursuant to DoDI 4715.5. The Heads of the DoD Components may only issue supplementary instructions when deemed necessary to provide for unique requirements within their organizations.

FOR THE COMMANDER:

Karl R. Horst

KARL R. HORST
Major General, U.S. Army
Chief of Staff

METHODOLOGY

Chapters 2-19 of the FGS include the scope, definitions and criteria. Appendices and tables are also presented. The applicable Sultanate of Oman environmental regulations were compared to the May 2007 Overseas Environmental Baseline Guidance Document (OEBGD), and determinations were made as to whether the Sultanate of Oman environmental regulation was more or less stringent, equivalent to, or in addition to, the OEBGD standard. The standards of the government of Oman and the OEBGD standards were combined into one document to create this FGS.

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APPENDICES

TABLES

REFERENCES

Department of Defense

(a) DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996
(b) Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982
(c) Section 7158 of title 42, United States Code
(d) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(e) DoD Instruction 4715.4, "Pollution Prevention," June 18, 1996
(f) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
(g) DoD Instruction 6050.05, "Occupational and Environmental Health (OEH) November 11, 2008
(h) Defense Logistics Agency Instruction 4145.11, Army Technical Manual 38-410, Naval Supply Publication 573, Air Force Joint Manual 23-209, and Marine Corps Order 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999
(i) Air Force Interservice Manual 24-204, Army Technical Manual 38-250, Naval Supply Publication 505, Marine Corps Order P4030.191, and Defense Logistics Agency Instruction 4145.3, Defense Contract Management Agency D1, Ch3.4 (HM24), "Preparing Hazardous Materials for Military Air Shipments," 15 April 2007, Incorporating Change 1, 4 May 2007.
(j) DoD 4160.21 -M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993
(k) DoD Instruction 4001.1, "Installation Support," January 10, 2008
(l) Naval Facility Manual of Operation-213, Air Force Regulation 9 1-8, and Army Technical Manual 5-634, "Solid Waste Management," May 1990
(m) DoD 4150.7-M, "DoD Pest Management Training and Certification," April 24, 1997
(n) Military Handbook 1 028/8A, "Design of Pest Management Facilities," November 1, 1991
(o) Section 2643 of title 15, United States Code
(p) Title 40, Code of Federal Regulations, Part 763, Subpart E, "Asbestos-Containing Materials in Schools," current edition
(q) DoD Instruction 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998

C1. CHAPTER 1

OVERVIEW

C1.1. PURPOSE

The primary purpose of this Final Governing Standard (FGS) is to provide criteria and management practices for United States (US) forces in the Sultanate of Oman (Oman). It has been prepared in accordance with Department of Defense (DoD) instruction 4715.5 (reference (a)). Reference (a) is the basis for both the format and the default criteria of this FGS.

C1.2. APPLICABILITY

This FGS applies to actions of the DoD Components at installations in the Sultanate of Oman.

C1.3. EXEMPTIONS

This FGS does not apply to:

C1.3.1. DoD installations that do not have more than *de minimis* potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices, and other similar organizations).

C1.3.2. Leased, joint use, and similar facilities to the extent that the Department of Defense does not control the instrumentality or operation that a criterion seeks to regulate.

C1.3.3. Operations of U.S. military vessels in international waters or the operations of U.S. military aircraft or off-installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when United States forces are operating as part of a multi-national force not under full control of the United States. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DoD Directives and Instructions, and environmental annexes incorporated into operation plans or operation orders. However, this Final Governing Standard does apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DoD Components, including management or disposal of material or waste off-loaded in Oman

C1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order (E.O.) 12344 (Reference (b)) and conducted pursuant to 42 United States Code (U.S.C.) 7158 (Reference (c)).

C1.3.5. The determination or conduct of remediation to correct environmental problems caused by the Department of Defense's past activities.

C1.3.6. Environmental analyses conducted under E.O. 12114 (Reference (d)).

C1.4. DEFINITIONS

For purposes of this FGS, unless otherwise indicated, the following definitions apply:

C1.4.1. Criteria and Management Practices. Particular substantive provisions of the OEBGD that are used by the EEA to develop this FGS.

C1.4.2. Environmental Executive Agent (EEA). Responsible for establishing environmental standards and procedures, coordinating environmental protection activities, and assuring compliance of environmental policies.

C1.4.3. Existing Facility. Any facility and/or building, source, or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified.

C1.4.4. Final Governing Standards. A comprehensive set of country-specific substantive provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice.

C1.4.5. New Facility. Any facility and/or building, source, or projects with a construction start date on or after 1 October 1994, or a pre-existing facility that has been substantially modified since 1 October 1994.

C1.4.6. Requirements

C1.4.6.1. Particular provisions of U.S. law respecting environmental protection on DoD installations within the United States.

C1.4.6.2. Sultanate of Oman law of general applicability, including those specifically delegated to regional or local governments for implementation, respecting environmental protection and which are generally applied to the Sultanate of Oman military.

C1.4.6.3. Applicable international treaty provisions that are used in determining FGS. DoD installations overseas shall use FGS as standards for environmental compliance rather than the individual source documents that have been reconciled by the EEA in the creation of FGS.

C1.4.7. Substantial Modification. Any modification to a facility and/or building the cost of which exceeds $1 million, regardless of funding source.

C1.5. ADDITIONAL INFORMATION

C1.5.1. FGS shall not expressly indicate the source of the standard, whether domestic, Sultanate of Oman, or international agreement. EEAs may retain draft working documents and references used in developing FGS, but may not officially issue any compilation of such materials. DoD EEAs shall maintain, for purposes INTERNAL TO THE EEA AND DEPARTMENT OF DEFENSE, a record of their decision-making process which clearly identifies the comparative analysis strategy regarding how a particular FGS requirement was derived.

C1.5.2. USAFCENT as the Lead Environmental Component for Oman shall establish and implement an environmental audit program to ensure compliance with this FGS at least once every 3 years at all major installations.

C1.5.3. DoDI 4715.4 (Reference (e)) implements policy, assigns responsibility, and prescribes procedures for implementation of pollution prevention programs throughout the Department of Defense. As a matter of DoD policy, Reference (e) should be consulted for particular requirements that apply to activities outside the United States. Pollution prevention should be considered in developing the criteria and management practices for the FGS. Where economically advantageous and consistent with mission requirements, pollution prevention shall be the preferred means for attaining compliance with the FGS.

C1.5.4. Where Sultanate of Oman or Gulf Cooperation Council analytical methods and QA/QC procedures are documented; they should be reviewed to determine if they are equivalent to US EPA analytical methods and QA/QC procedures – see http://www.epa.gov/ and search for "analytical methods" for comparison. For all parameters, the more precise method and procedure should be used.

C1.5.5. Unless otherwise specified, all record keeping requirements, including assessments, inspection records, logs, manifests, notices, forms, and formats, are described in accordance with DoD 8910.1-M (Reference (f)).

C1.5.6. This FGS does not create any rights or obligations enforceable against the United States, the Department of Defense, or any of its components, nor does it create any standard of care or practice for individuals. Although this FGS refers to other DoDDs and DoDIs, it is intended only to coordinate the requirements of those directives as required to implement the policies found in Reference (a). This FGS does not change other DoDDs or DoDIs or alter DoD policies.

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C2. CHAPTER 2

AIR EMISSIONS

C2.1. SCOPE

This Chapter contains standards for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 15, "Asbestos."

C2.2. DEFINITIONS

C2.2.1. Coal Refuse. Waste products from coal mining, cleaning, and coal preparation operations (e.g., culm and gob) containing coal, matrix material, clay, and other organic and inorganic material.

C2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soil and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, nonboiling solvent to clean the parts are classified as cold cleaning machines.

C2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

C2.2.4. De minimis. In risk assessment it refers to a level of risk that is too small to be concerned with.

C2.2.5. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

C2.2.6. Freeboard Ratio. The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

C2.2.7. Healthcare Waste. It is the waste generated by facilities offering various types of healthcare, laboratories, facilities for the manufacture of drugs, pharmaceuticals and vaccines, veterinary institutions, research institutions, and from home treatment and patient care. It consists of two types:

C2.2.7.1. Non-Hazardous Healthcare Waste. It consists of all the wastes that are found in municipal wastes, and it is generated by administrative institutions and by the general cleaning activities in healthcare institutions. This constitutes the major part of healthcare wastes, and it is treated in the same way as municipal waste.

C2.2.7.2. Hazardous Healthcare Waste. It consists of wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C2.2.7.3. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

C2.2.8. Healthcare Waste Treatment Unit. It means the facility where the biological, chemical or physical properties of the hazardous healthcare waste are altered with the aim of eliminating its hazard so that it becomes safe, both for human health and the environment.

C2.2.9. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depleting Substances (ODS).

C2.2.10. Incinerator. Any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

C2.2.11. Motor Vehicle. Any commercially available vehicle that is not adapted to military use which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to, passenger cars, light duty vehicles, and heavy duty vehicles.

C2.2.12. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (MSW) including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

C2.2.13. Municipal Solid Waste (MSW). Any household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (nonmedical), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

C2.2.14. Ozone-Depleting Substances (ODS). Substances characterized as being chemically stable in the atmosphere near the surface of the earth and contain one or more atoms of chlorine or bromine, or both, which result in depletion of the ozone layer. Those substances listed in Table C2.T2 and Table C2.T7.

C2.2.15. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

C2.2.16. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

C2.2.17. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

C2.2.18. Stack. Any point in a source covered by criteria contained in C2.3.1., C2.3.2., C2.3.3., C2.3.4., or C2.3.5. designed to emit pollutants.

C2.2.19. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

C2.2.20. Substantially-Modified. Any modification to a facility/building, the cost of which exceeds $1 million, regardless of funding source.

C2.2.21. Vapor Cleaning Machine. A batch or in-line solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

C2.2.22. Wood Residue. Bark, sawdust, slabs, chips, shavings, mill trim, and other wood products derived from wood processing and forest management operations.

C2.3. CRITERIA

C2.3.1. Steam/Hot Water Generating Units. The following standards apply to units that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994.

C2.3.1.1. Air Emission Standards. The following criteria apply to units with a maximum design heat input capacity greater or equal to 10 million Btu/hr.

C2.3.1.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards for specific sized units shown in Table C2.T1. at all times, except during periods of startup, shut down, soot blowing, malfunction, or when emergency conditions exist.

C2.3.1.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight percent) and higher heating value will be measured and recorded for each new shipment of fuel. Use these data to calculate sulfur dioxide (SO_2) emissions and document compliance with the SO_2 limits using the equation in Table C2.T1. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for SO_2 and either oxygen (O_2) or carbon dioxide (CO_2).

C2.3.1.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or nitrogen oxides (NOx) standards in C2.T1. must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

C2.3.1.2.1. For units with a maximum design heat input capacity greater than 30 million Btu/hr: Opacity, except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

C2.3.1.2.2. For fossil fuel fired units with a maximum design heat input capacity greater than 100 million Btu/hr: NOx and either O_2 or CO_2.

C2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration.

C2.3.2.1. Table C2.T5 includes standards that apply to air emissions from incinerators.

C2.3.2.2. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Table C2.T3. and operating limits in Table C2.T4.

C2.3.2.3. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table C2.T3. and operating limits in Table C2.T4.

C2.3.2.4. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994 and that burn more than 1 ton per day (tpd) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of startup, shut down, malfunction, or when emergency conditions exist.

C2.3.2.5. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

C2.3.2.5.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

C2.3.2.5.1.1. Unit design: dual chamber.

C2.3.2.5.1.2. Minimum temperature in primary chamber: 1400-1600°F.

C2.3.2.5.1.3. Minimum temperature in secondary chamber: 1800-2200°F.

C2.3.2.5.1.4. Minimum residence time in the secondary chamber: 2 seconds.

C2.3.2.5.1.5. Incinerator operators must be trained in accordance with applicable Service requirements.

C2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. These requirements do not apply to coin-operated machines.

C2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than 2000 gallons per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed. The temperature of the refrigerated condenser must be maintained at 45F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at 45 F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that is most appropriate to suit local conditions:

C2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm). Control devices/methods must be operated according to manufacturer recommendations.

C2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

C2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet (ft^2); K = a conversion factor, 425 dscm/(ft^2-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

C2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains more than 5 percent by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 7 1-55-6), carbon tetrachloride (CAS No. 56-23-5), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents.

C2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 1-inch water layer or a freeboard ratio of at least 0.75.

C2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

C2.3.6. Units Containing ODS Listed in Table C2.T2. The following criteria apply to direct atmospheric emissions of ODS, HFCs, and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment.

C2.3.6.1. Refrigerant Recovery/Recycling. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or Sultanate of Oman equivalent.

C2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant shall not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners. *De minim is* releases associated with good faith attempts to recycle or recover ODS, HFC, and PFC refrigerants are not subject to this prohibition.

C2.3.6.3. Refrigerant Leak Monitoring and Repair. Monitor and repair refrigeration equipment for ODS leakage in accordance with the following criteria and repair, if found to be leaking.

C2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing more than 50 pounds of refrigerant and not covered by subparagraphs C2.3.6.3.1. or C2.3.6.3.2. of this chapter must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period.

C2.3.6.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following halon releases:

C2.3.6.4.1. *De minimis* releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

C2.3.6.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

C2.3.6.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulant agent cannot be used.

C2.3.7. Motor Vehicles. This criteria applies to DoD-owned motor vehicles as defined in paragraph C2.2.8.

C2.3.7.1. All vehicles shall be inspected every 2 years to ensure that no tampering with factory-installed emission control equipment has occurred.

C2.3.7.2. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

C2.3.8. Stack Heights. Hg is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures.

C2.3.8.1. Stacks shall be designed and constructed to heights at least equal to the largest H_g calculated from either of the following two criteria:

C2.3.8.1.1. $H_g = H +\_1.5L$, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but not greater than 0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest H_g.

C2.3.8.1.2. H_g is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum ground-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40 percent in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means not greater than 0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height (H_t) of the feature, not to exceed 2 miles if such feature achieves a height (H_t) 0.8 km from the stack that is at least 40 percent of the good engineering practice stack height determined by the formulae provided in C2.3.8.1.1. of this part or 26 meters, whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

C2.4. ADDITIONAL REQUIREMENTS

C2.4.1. For all air emission sources, grit and dust less than 76μm in diameter shall not exceed 0.050 g/m3. For all combustion air emission sources, smoke shall not be emitted that is darker than shade 1 on the Ringlemann Scale (20% opacity). Note: The Ringlemann scale is a scale for measuring the apparent density of smoke. It has a 5 levels of density inferred from a grid of black lines on a white surface which, if viewed from a distance, merge into known shades of grey. A Ringlemann No. 1 is equivalent to 20 percent black; a Ringlemann No. 5 is 100 percent black.

C2.4.2. Ambient Air Quality Standards. Ambient air pollution level limits have been established in the Arab states of the Gulf to protect human health from hazards from pollutants emitted from fixed and mobile sources. Ambient air quality standards are included in Table C2.T5.

C2.4.3. Operating Records for Hazardous Healthcare Waste Treatment Facility

C2.4.3.1. If a hazardous healthcare waste treatment facility is in operation, records must be maintained of measurements of the concentration of the emissions released into the atmosphere as a result of the treatment process.

C2.4.4. Table C2.T6. provides the guidelines regulating the standards of emissions resulting from the incineration of hazardous healthcare wastes.

C2.4.5. With the exception of the substances listed in Table C2.T7, it shall be prohibited to manufacture or use controlled substances, appliances, equipment and products that are harmful to the ozone layer in new industries or facilities or in case of expansion of the existing activities and installations.

C2.4.6. It shall be prohibited to import new or used appliances and equipment that are harmful to the ozone layer listed in Table C2.T8.

Table C2.T1. Emission Standards for Steam Generating Units[a]

Fuel Type	Maximum Design Heat Input Capacity: 10 – 100 million BTU/hr PM	Opacity[b]	SO_2[c]	Size >100 million BTU/hr PM	Opacity[b]	SO_2[c]	NO_x[d]
Gaseous	N/A	N/A	N/A	N/A	N/A	N/A	0.20
Gaseous - Coal Derived	N/A	N/A	N/A	N/A	N/A	N/A	***0.50***
Liquid Fossil Fuel	N/A	20%	0.50[e]	0.10	20%	0.80	0.30
Solid Fossil Fuel	0.10	20%	1.20	0.10	20%	1.20	0.70
Other Solid Fuel[f]	0.30	20%	N/A	0.20	20%	N/A	N/A

N/A = Not applicable.

a. Standards apply to units constructed or substantially modified after 1 October 1994. Standards do not apply during periods of startup, shutdown, malfunction, soot blowing, or when emergency conditions exist. Unless specified otherwise, emission standards are in lb/million BTU.

b. The opacity standards do not apply to units < 30 million BTU/hr. The 20% standard applies to the average opacity over a six-minute period. A 30% opacity value is allowed for one six-minute period per hour.

c. SO_2 is best controlled and compliance documented by limiting fuel sulfur content.
SO_2 emissions (lb/ million BTU) = 0.02 X sulfur content of fuel (%) / heat content of fuel (HHV, million BTU/lb fuel).
[E.g., for fuel oil with 0.5% sulfur, SO_2 = 0.02 X 0.5 / 0.019 = 0.53 lb/million BTU.]

d. Emission limitation for NOx is based on a 30-day rolling average. NOx standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.

e. Instead of 0.5 lb/million BTU of SO_2, fuel oil combustion units may comply with a 0.5% average fuel sulfur content limit (weight percent) which is statistically equivalent to 0.5 lb/million BTU.

f. Other solid fuels include wood or waste derived fuels.

Table C2.T2. Class I and II Ozone-Depleting Substances

Class I			
CFC - 11	CFC - 114	CFC - 215	Halon - 1211
CFC - 12	CFC - 115	CFC - 216	Halon - 1301
CFC - 13	CFC - 211	CFC - 217	Halon - 2402
CFC - 111	CFC - 212		Carbon Tetrachloride
CFC - 112	CFC - 213		Methyl Chloroform
CFC - 113	CFC - 214		Methyl Bromide
$CHFBr_2$	$C_2H_2F_3Br$	C_3HF_6Br	$C_3H_3F_4Br$
HBFC-2201 (CHF_2Br)	$C_2H_3FBr_2$	$C_3H_2FBr_5$	$C_3H_4FBr_3$
CH_2FBr	$C_2H_3F_2Br$	$C_3H_2F_2Br_4$	$C_3H_4F_2Br_2$
C_2HFBr_4	C_2H_4FBr	$C_3H_2F_3Br_3$	$C_3H_4F_3Br$
$C_2HF_2Br_3$	C_3HFBr_6	$C_3H_2F_4Br_2$	$C_3H_5FBr_2$
$C_2HF_3Br_2$	$C_3HF_2Br_5$	$C_3H_2F_5Br$	$C_3H_5F_2Br$
C_2HF_4Br	$C_3HF_3Br_4$	$C_3H_3FBr_4$	C_3H_6FBr
$C_2H_2FBr_3$	$C_3HF_4Br_3$	$C_3H_3F_2Br_3$	Chlorobromomethane
$C_2H_2F_2Br_2$	$C_3HF_5Br_2$	$C_3H_3F_3Br_2$	
Class II			
HCFC - 21	HCFC - 133a	HCFC - 225cb	HCFC - 243
HCFC - 22	HCFC – 141b	HCFC - 226	HCFC - 244
HCFC - 31	HCFC – 142b	HCFC - 231	HCFC - 251
HCFC - 121	HCFC - 151	HCFC - 232	HCFC - 252
HCFC - 122	HCFC - 221	HCFC - 233	HCFC - 253
HCFC - 123	HCFC - 222	HCFC - 234	HCFC - 261
HCFC - 124	HCFC - 223	HCFC - 235	HCFC - 262
HCFC - 131	HCFC - 224	HCFC - 241	HCFC - 271
HCFC - 132b	HCFC - 225ca	HCFC - 242	

Note: All isomers of the above chemicals are ODS, except isomers of (1,1,1 -trichloroethane (also known as methyl chloroform)) such as 1,1,2-trichloroethane.

Table C2.T3. Emission Standards for Incinerators

Pollutant	Emission Standards [1]				
Incinerator Type	**Existing MWC units[2]**		**MWC units that begin new construction or undergo substantial modification[2]**		**CISWI units**
Rated Capacity	**35-250 tpd**	**> 250 tpd**	**35-250 tpd**	**> 250 tpd**	**All units**
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm
Opacity	10 percent		10 percent		10 percent
NOx	N/A	See Note 3	500 ppmv	1 50ppmv	388 ppmv
SO2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv
Dioxins/furans	125 ng/dscm	See Note 4	13 ng/dscm		0.41 ng/dscm
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.47 mg/dscm
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	62 ppmv
Fugitive Ash	5% of hourly observation period		5% of hourly observation period		N/A

Notes:

[1] Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

[3] NOx limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.

[4] Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

Table C2.T4. Carbon Monoxide Operating Limits for Incinerators[1]

Incinerator Type	**Existing MWC units[2]**		**MWC units that begin new construction or undergo substantial modification[2]**		**CISWI units All units**
Rated Capacity	**35-250 tpd**	**35-250 tpd**	**35-250 tpd**	**> 250 tpd**	**All**
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Fluidized bed, mixed fuel, (wood/refuse-derived fuel)	200 ppmv (24-hour average)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)	100 ppmv (4-hr avg)	100 ppmv (24-hr avg)		
Mass burn rotary waterwall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		157 ppmv
Mass burn waterwall and refractory	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Mixed fuel-fired, (pulverized coal/refuse-derived fuel)	150 ppmv (4-hr avg)		150 ppmv (4-hr avg)		
Modular starved-air and excess air	50 ppmv (4-hr avg)		50 ppmv (4-hr avg)		
Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel)	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		
Stoker, refuse-derived fuel	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		

Notes:

[1] Compliance is determined by continuous emission monitoring systems.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

Table C2.T5. Ambient Air Quality Standards

Pollutant	Standard		Average Period	Measuring Method
	ppm	µg/m^3		
Sulfur Dioxide (SO_2)	0.169	441	One hour	UV-Fluorescence
	0.083	217	24 hours	
	0.076	65	One year	
Hydrogen Sulfide (H_2S)	0.140	200	One hour	UV-Fluorescence
	0.030	40	24 hours	
Nitrogen Dioxide (NO_2)	0.350	660	One hour	Chemiluminscence
	0.050	100	One year	
Ozone (O_3)	0.120	235	One hour	UV-Fluorescence
	0.080	157	8 hours	
(PM_{10}) inhalable Particulates		340	24 hours	
		80	One hour	
Carbon Monoxide (CO)	35	40,000	One hour	Non Dispersive IR
	9	10,000	8 hours	
Nonmetha Hydrocarbons	0.24	160	3 hours	GC-FID\PID
Lead (Pb)	NA	NA	24 hours	Gravimetry + AAS
Sulfates (SO_4)		23	24 hours	Gravimetry + Ion Chromatograph
Fluorides (F)		1.0	One month	Colorimetric
Ammonia (NH_3)	0.8		One hour	Chemiluminscence

Table C2.T6. Guidelines Regulating the Standards of Emissions Resulting From the Incineration of Hazardous Healthcare Wastes

Pollutants	Measurements
Total suspended particles	34 mg/m^3 (1) (modified to 7% Oxygen)
Opacity	10 % except for 6 minutes during any hour
Carbon monoxide	50 mg/m^3
Sulfur dioxide	150 mg/m^3
Hydrogen chloride	100 mg/m^3 or removal of at least 97 %
Nitrogen oxides	400 mg/m^3
Organic compounds	8 parts out of million or removal of at least 99.99 %
Hydrogen fluoride	5mg/m^3
Dioxin and furan	125 ng/m^3
Cadmium	0.16 mg/m^3
Lead	1.2 mg/m^3
Arsenic	1.2 mg/m^3
Mercury	0.55 mg/m^3

Table C2.T7. Controlled Substances

Group	Substance	Number of Isomers	Ozone Depleting Potential*
Group I			
$CHFCl_2$	(HCFC-21)**	1	0.04
CHF_2Cl	(HCFC-22)**	1	0.055
CH_2FCl	(HCFC-31)	1	0.02
C_2HFCl_4	(HCFC-121)	2	0.01–0.04
$C_2HF_2Cl_3$	(HCFC-122)	3	0.02–0.08
$C_2HF_3Cl_2$	(HCFC-123)	3	0.02–0.06
$CHCl_2CF_3$	(HCFC-123)**	-	0.02
C_2HF_4Cl	(HCFC-124)	2	0.02–0.04
$CHFClCF_3$	(HCFC-124)**	-	0.022
$C_2H_2FCl_3$	(HCFC-131)	3	0.007–0.05
$C_2H2F_2Cl_2$	(HCFC-132)	4	0.008–0.05
$C_2H_2F_3Cl$	(HCFC-133)	3	0.02–0.06
$C_2H_3FCl_2$	(HCFC-141)	3	0.005–0.07
CH_3CFCl_2	(HCFC-141b)**	-	0.11
$C_2H_3F_2Cl$	(HCFC-142)	3	0.008–0.07
CH_3CF_2Cl	(HCFC-142b)**	-	0.065
C_2H_4FCl	(HCFC-151)	2	0.003–0.005
C_3HFCl_6	(HCFC-221)	5	0.015–0.07
$C_3HF_2Cl_5$	(HCFC-222)	9	0.01–0.09
$C_3HF_3Cl_4$	(HCFC-223)	12	0.01–0.08
$C_3HF_4Cl_3$	(HCFC-224)	12	0.01–0.09
$C_3HF_5Cl_2$	(HCFC-225)	9	0.02–0.07
$CF_3CF_2CHCl_2$	(HCFC-225ca)**	-	0.025
CF_2ClCF_2CHClF	(HCFC-225cb)**	-	0.033
C_3HF_6Cl	(HCFC-226)	5	0.02–0.10
$C_3H_2FCl_5$	(HCFC-231)	9	0.05–0.09
$C_3H_2F_2Cl_4$	(HCFC-232)	16	0.008–0.10
$C_3H_2F_3Cl_3$	(HCFC-233)	18	0.007–0.23
$C_3H_2F_4Cl_2$	(HCFC-234)	16	0.01–0.28
$C_3H_2F_5Cl$	(HCFC-235)	9	0.03–0.52

Table C2.T7. Controlled Substances

Group	Substance	Number of Isomers	Ozone Depleting Potential*
$C_3H_3FCl_4$	(HCFC-241)	12	0.004–0.09
$C_3H_3F_2Cl_3$	(HCFC-242)	18	0.005–0.13
$C_3H_3F_3Cl_2$	(HCFC-243)	18	0.007–0.12
$C_3H_3F_4Cl$	(HCFC-244)	12	0.009–0.14
$C_3H_4FCl_3$	(HCFC-251)	12	0.001–0.01
$C_3H_4F_2Cl_2$	(HCFC-252)	16	0.005–0.04
$C_3H_4F_3Cl$	(HCFC-253)	12	0.003–0.03
$C_3H_5FCl_2$	(HCFC-261)	9	0.002–0.02
$C_3H_5F_2Cl$	(HCFC-262)	9	0.002–0.02
C_3H_6FCl	(HCFC-271)	5	0.001–0.03
Group II			
$CHFBr_2$		1	1.00
CHF_2Br	(HBFC-22B1)	1	0.74
CH_2FBr		1	0.73
C_2HFBr_4		2	0.3-0.8
$C_2HF_2Br_3$		3	0.5-1.8
$C_2HF_3Br_2$		3	0.4-1.6
C_2HF_4Br		2	0.7-1.2
$C_2H_2FBr_3$		3	0.1-1.1
$C_2H_2F_2Br_2$		4	0.2-1.5
$C_2H_2F_3Br$		3	0.7-1.6
$C_2H_3FBr_2$		3	0.1-1.7
$C_2H_3F_2Br$		3	0.2-1.1
C_2H_4FBr		2	0.07-0.1
C_3HFBr_6		5	0.3-1.5
$C_3HF_2Br_5$		9	0.2-1.9
$C_3HF_3Br_4$		12	0.3-1.8
C3HF4Br3		12	0.5-2.2
$C_3HF_5Br_2$		9	0.9-2.0
C_3HF_6Br		5	0.7-3.3
$C_3H_2FBr_5$		9	0.1-1.9
$C_3H_2F_2Br_4$		16	0.2-2.1

Table C2.T7. Controlled Substances

Group	Substance	Number of Isomers	Ozone Depleting Potential*
$C_3H_2F_3Br_3$		18	0.2-5.6
$C_3H_2F_4Br_2$		16	0.3-7.5
$C_3H_2F_5Br$		8	0.9-1.4
$C_3H_3FBr_4$		12	0.08-1.9
$C_3H_3F_2Br_3$		18	0.1-3.1
$C_3H_3F_3Br_2$		18	0.1-2.5
$C_3H_3F_4Br$		12	0.3-4.4
$C_3H_4FBr_3$		12	0.03-0.3
$C_3H_4F_2Br_2$		16	0.1-1.0
$C_3H_4F_3Br$		12	0.07-0.8
$C_3H_5FBr_2$		9	0.04-0.4
$C_3H_5F_2Br$		9	0.07-0.8
C_3H_6FBr		5	0.02-0.7
Group III			
CH_2BrCl	Bromochloromethane	1	0.12

* Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.

** Identifies the most commercially viable substances with ODP values listed against them to be used for the purposes of the Protocol.

Table C2.T8. List of Products Prohibited From Import When Containing Controlled Substances

Products*

1. Automobile and truck air conditioning units (whether incorporated in vehicles or not)
2. Domestic and commercial refrigeration and air conditioning/heat pump equipment**
   - -Refrigerators
   - -Freezers
   - -Dehumidifiers
   - -Water coolers
   - -Ice machines
   - -Air conditioning and heat pump units
3. Aerosol products, except medical aerosols
4. Portable fire extinguisher
5. Insulation boards, panels and pipe covers
6. Pre-polymers

Group	Substance	Ozone Depleting Potential***
Group I		
CFCl3	(CFC-11)	1.0
CF2Cl2	(CFC-12)	1.0
C2F3Cl3	(CFC-113)	0.8
C2F4Cl2	(CFC-114)	1.0
C2F5Cl	(CFC-115)	0.6
Group II		
CF2BrCl	(halon-1211)	3.0
CF3Br	(halon-1301)	10.0
C2F4Br2	(halon-2402)	6.0

* Though not when transported in consignments of personal or household effects or in similar non-commercial situations normally exempted from customs attention.

** When containing the controlled substances listed in the table as a refrigerant and/or in insulating material of the product.

***A number that refers to the amount of ozone depletion caused by a substance. The ODP is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11.

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C3. CHAPTER 3

DRINKING WATER

C3.1. SCOPE

This Chapter contains criteria for providing potable water.

C3.2. DEFINITIONS

C3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

C3.2.2. Aflaj. A channel dug into the earth or running along the earth's surface that is used to collect groundwater or natural spring water or to hold and collect flood water in order to be distributed and used for various purposes.

C3.2.3. Appropriate DoD Medical Authority. The medical professional designated by the in-theater DoD Component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the DoD Component's installations.

C3.2.4. Concentration/Time (CT). The product of residual disinfectant concentration, C, in milligrams per liter (mg/L) determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables C3.T11. through C3.T24.

C3.2.5. Conventional Treatment. Water treatment, including chemical coagulation, flocculation, sedimentation, and filtration.

C3.2.6. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited onto a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.

C3.2.7. Direct Filtration. Water treatment, including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

C3.2.8. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

C3.2.9. DoD Water System. A public or non-public water system.

C3.2.10. Emergency Assessment. Evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service caused by natural disasters, accidents, and sabotage.

C3.2.11. First Draw Sample. A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.

C3.2.12. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

C3.2.13. Haloacetic Acids. The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

C3.2.14. Holding Tank. Any structure to hold wastewater without leakage, seepage or overflow into the surrounding environment.

C3.2.15. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

C3.2.16. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

C3.2.17. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

C3.2.18. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

C3.2.19. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

C3.2.20. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

C3.2.21. Potable Water. Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

C3.2.22. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

C3.2.22.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

C3.2.22.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

C3.2.22.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least 6 months per year, but not year- round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

C3.2.22.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least 6 months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

C3.2.23. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

C3.2.24. Septic Tank. Any structure designed to treat domestic wastewater by compartmentalized sedimentation and anaerobic biological degradation.

C3.2.25. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (1.2 ft/hr), resulting in particulate removal by physical and biological mechanisms.

C3.2.26. Soakaway Pit. Any pit or any other underground construction designed for seepage of the treated wastewater into the ground by infiltration or percolation.

C3.2.27. Spring Water. Water flowing naturally from an underground crack to the ground surface, which is collected only at the spring or through the crack which reaches the underground layer feeding the spring. This requires the existence of a natural force making the water flow to the surface through the natural opening.

C3.2.28. Thermopile Bacteria. Bacteria that prefer temperatures above 55 °C and can tolerate temperatures up to 75-80 °C.

C3.2.29. Total Trihalomethanes. The sum of the concentration in milligrams per liter of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

C3.2.30. Unbottled Drinking Water. Water fit for human consumption supplied to consumers by means of a public or limited distribution network, from wells, springs or any source of surface water used for drinking.

C3.2.31. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever the principal function of the well is emplacement of any fluid.

C3.2.32. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities, which provide a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

C3.2.33. Wadi. A bed or valley of a stream that is usually dry except during the rainy season and that often forms an oasis.

C3.2.34. Well Water. Water obtained from an opening which has been drilled or dug or constructed in any other way in the ground and which reaches the underground layer containing the water.

C3.3. CRITERIA

C3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:

C3.3.1.1. Maintain a map/drawing of the complete potable water system.

C3.3.1.2. Update the potable water system master plan at least every 5 years.

C3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintaining septic systems and on-site treatment units, and by appropriate land use management on DoD installations. Mark all springs or drinking water supply sources with a sign indicating it as a drinking water supply source.

C3.3.1.3.1. No hazardous substances or waste or other water pollutants shall be discharged to aflaj and their channels, surface watercourses, wadis or places of underground water recharge.

C3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years for systems using surface water, and every 5 years for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with SULTANATE OF OMAN authorities.

C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, at a minimum, must be disinfected.

C3.3.1.6. Maintain a continuous positive pressure of at least 20 pounds per square inch (psi) in the water distribution system.

C3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

C3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority);

C3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing);

C3.3.1.7.3. An effective annual water main flushing program;

C3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs; and

C3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

C3.3.1.8. Establish an effective cross connection control and backflow prevention program.

C3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

C3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

C3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption:

C3.3.1.10.2. Identification of key personnel;

C3.3.1.10.3. Procedures to restore service;

C3.3.1.10.4. Procedures to isolate damaged lines;

C3.3.1.10.5. Identification of alternative water supplies; and

C3.3.1.10.6. Installation public notification procedures.

C3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years.

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least 3 years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

C3.3.1.14. Conduct vulnerability assessments, which include, but are not limited to, a review of:

C3.3.1.14.1. Pipes and constructed conveyances, physical barriers, water collection, pretreatment, treatment, storage, and distribution facilities, electronic, computer, or other automated systems utilized by the PWS;

C3.3.1.14.2. Use, storage, or handling of various chemicals; and

C3.3.1.14.3. Operation and maintenance of the water storage, treatment, and distribution systems.

C3.3.2. Regardless of whether a DoD water system produces or purchases water, it will, by independent testing or validated supplier testing, ensure conformance with the following:

C3.3.2.1. Total Coliform Bacteria Requirements

C3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption. Treated water entering the distribution system shall be free from coli-form bacteria in any 100 ml examined sample. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms, E. coli, or any repeat sample is positive for total coliforms. Unbottled drinking water must be totally free of microbes causing diseases and viruses detrimental to human health.

C3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table C3.T2., "Total Coliform Monitoring Frequency."

C3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

C3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

C3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection C3.3.3. to:

C3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

C3.3.2.2. Inorganic Chemical Requirements

C3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed for human consumption does not exceed applicable limitations set out in Table C3.T3. Except for nitrate, nitrite, and total nitrate/nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For nitrate, nitrite, and total nitrate/nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

C3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table C3.T4., "Inorganics Monitoring Requirements."

C3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph C3.3.3. as soon as possible. If the nitrate, nitrite, or total nitrate and nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

C3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table C3.T4., "Inorganics Monitoring Requirements," until remedial actions are completed and authorities determine the system is reliable and consistent.

C3.3.2.2.4. The MCL for arsenic applies to CWS and NTNCWS.

C3.3.2.3. Fluoride Requirements

C3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L, as stated in Table C3.T3., "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample annually at the entry point to the distribution system for surface water systems, and once every 3 years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table C3.T5., "Recommended Fluoride Concentrations at Different Temperatures."

C3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.4. Lead and Copper Requirements

C3.3.2.4.1. DoD CWS and NTNCWS will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead or copper levels are exceeded in more than 10% of all sampled taps.

C3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table C3.T6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table C3.T6.

C3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table C3.T6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and Sultanate of Oman) within 60 days and will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.5. <u>Synthetic Organics Requirements</u>

C3.3.2.5.1. An installation responsible for CWS and NTNCWS will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table C3.T7., "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

C3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements."

C3.3.2.5.3. If a system is out of compliance, the notification set out in paragraph C3.3.3. shall be completed as soon as possible, but in no case later than 14 days after the violation. The installation will immediately begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL, as noted in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements," and will continue until the installation commander determines the system is back in compliance, and all necessary remedial measures have been implemented.

C3.3.2.6. <u>Disinfectant/Disinfection Byproducts (DDBP) Requirements</u>

C3.3.2.6.1. An installation responsible for a CWS and NTNCWS that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

C3.3.2.6.1.1. Ensure that the MCL of 0.080 mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of ***0.7*** mg/L for chlorite, and the MCL of 0.01 mg/L for bromate are met in drinking water.

C3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of ***4.0*** mg/L for chlorine, the MRDL of 4.0 mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are met in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections. The chlorine content shall be increased in case of epidemics and outbreaks of water-borne illnesses – consult the installation Bioenvironmental Engineer or Preventative Medicine for recommendations.

C3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table C3.T9., "Disinfectant/Disinfection Byproducts Monitoring Requirements." Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone are also included in Table C3.T9.

C3.3.2.6.3. For TTHM and HAA5 a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table C3.T9. for chlorine, chloramine, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table C3.T9., the installation will accomplish the notification requirements outlined in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

C3.3.2.7. <u>Radionuclide Requirements</u>

C3.3.2.7.1. An installation responsible for a CWS will test the system for conformance with the applicable radionuclide limits contained in Table C3.T10., "Radionuclide MCLs and Monitoring Requirements."

C3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table C3.T10.

C3.3.2.7.3. If the average annual MCL for gross alpha activity for radium is exceeded, the installation will complete the notification according to the procedures in paragraph C3.3.3. within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

C3.3.2.7.4. The concentration of the radiation activity of radon in drinking water shall not exceed 100 be/l.

C3.3.2.7.5. The concentration of the radiation activity of radionuclides in drinking water must be in conformity with Table C3.T25.

C3.3.2.8. <u>Surface Water Treatment Requirements.</u> DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table C3.T1. If the turbidity readings in Table C3.T1. are exceeded, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than

14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DBP requirements (C3.3.2.6.), will ensure that protection from microbial pathogens is not compromised.

C3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored for total coliforms, at a minimum, and disinfectant residuals periodically.

C3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources, including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

C3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct or conventional filtration processes. This requirement only applies to DoD PWSs that:

C3.3.2.11.1. Use surface water or GWUDISW;

C3.3.2.11.2. Use direct or conventional filtration processes; and

C3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

C3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and Sultanate of Oman) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps being taken to correct the violation, the necessity for seeking an alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.

C3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

C3.3.5. Quality-Related Properties

C3.3.5.1. Drinking water shall be free of any substances that can adversely affect its color, taste, odor or appearance. It shall also be free of any extraneous substances such as soil, dust, threads, hair or similar substances visible to the naked eye.

C3.3.5.2. The pH value of unbottled drinking water shall range between 6.5 and 8.

C3.3.5.3. The total dissolved solids concentration in unbottled drinking water shall range between 100 and 1000 ppm.

C3.3.5.4. Permitted levels of chemical components in drinking water are shown in Tables C3.T26, C3.T27, C3.T28, C3.T29.

C3.3.6. Organic Biological Properties. Unbottled drinking water must be totally free of any algae, fungi and insects and their eggs, spores or parts as well of any protozoa, including amoeba.

C3.4. ADDITIONAL REQUIREMENTS

C3.4.1. When water is treated with ozone, ultraviolet rays or any other means, this treatment shall be sufficient to kill all microbes and the treated water shall conform to the microbiological characteristics of treated water in paragraph C3.3.2.1.1.

C3.4.2. Water distributed by tanker vehicles (unpiped water supplies) shall be free of fecal coliform bacteria in any 100 ml examined and fecal coliform shall not exceed 1 colonies / l00mL of examined sample but not in two consecutive samples.

C3.4.3. Sampling and Testing (See paragraph C1.5.4.)

Table C3.T1. Surface Water Treatment Requirements

1. Unfiltered Systems

a. Systems which use unfiltered surface water or GUDISW will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily, and must continue as long as the unfiltered system is in operation. If the total coliforms and/or fecal coliforms exceed 100/100 milliliters (mL) and 20/1 00 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU).

b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T11. through C3.T24.

c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.

d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made at the same times as total coliforms are sampled.

e. Disinfectant residual of water entering the distribution system cannot be less than 0.2 mg/L for greater than four hours.

f. Water in a distribution system with a heterotrophic bacteria concentration less than or equal to 500/mL measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.

g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

2. Filtered Systems

a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.

b. The turbidity of filtered water will be monitored at least once every four hours. The turbidity of filtered water for direct and conventional filtration systems will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.

c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

*Proper conventional treatment typically removes 2.5-log *Giardia*/ 2.0-log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0-log *Giardia*/ 1.0-log viruses. Slow sand filtration removes typically removes 2.0-log *Giardia*/ 2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.

3. SW or GWUDISW systems will provide at least 99% (2-log) removal of *Cryptosporidium*. A system is considered to be compliant with the *Cryptosporidium* removal requirements if:

a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU.

Table C3.T1. Surface Water Treatment Requirements (continued)

b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs.

c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of *Giardia lamblia* cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of *Cryptosporidium* oocysts.

d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1 a above to remain unfiltered.

4. Individual Filter Effluent Monitoring. Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for 3 months in a row (for the same filter), the installation must conduct a self-assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for 2 months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.

5. Covers for Finished Water Storage Facilities. Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table C3.T2. Total Coliform Monitoring Frequency

Population Served	Number of Samples [1]	Population Served	Number of Samples [1]
25 to 1,000 [2]	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes:

1. Minimum Number of Routine Samples Per Month
2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve less than 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table C3.T3. Inorganic Chemical MCLs

Contaminant	**MCL**	
Arsenic [1]	0.010	mg/L
Antimony [1]	0.006	mg/L
Asbestos [1]	7 million	fibers/L (longer than 10 µm)
Barium	0.7	mg/L
Beryllium [1]	0.004	mg/L
Cadmium [1]	0.003	mg/L
Chromium [1]	0.05	mg/L
Cyanide [1]	0.07	mg/L (as free cyanide)
Fluoride [2]	1.5	mg/L
Mercury [1]	0.001	mg/L
Nickel [1]	0.02	mg/L
Nitrate [3]	10	mg/L (as N)
Nitrite [3]	1	mg/L (as N)
Total Nitrite and Nitrate [3]	10	mg/L (as N)
Nitrite (Long-term exposure)	0.2	mg/L (as NO_2)
Selenium [1]	0.01	mg/L
Sodium [4]	400	mg/L
Thallium	0.002	mg/L
Boron	0.5	mg/L
Manganese	0.4	mg/L
Molybdenum	0.07	mg/L
Iodine	0.015	mg/L
Aluminum	0.1	mg/L
Bromate	0.01	mg/L
Iron	1	mg/L
Zinc	3	mg/L

Notes:

1. MCLs apply to CWS and NTNCWS.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNCWS, and TNCWS.
4. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis. ***Quality level for Sodium ≤ 200 mg/L***

Table C3.T4. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---
Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos [3]	1 sample every 9 years	1 sample every 9 years	>MCL	Yes
Total Nitrate/Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [6]
Nitrite	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [7]
Corrosivity [8]	Once	Once	---	---

Notes:

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a sanitary survey conducted by the PWS.
4. Any sampling point with an analytical value greater than or equal to 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are <50% of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country-specific FGS to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Saturation Index.

Table C3.T5. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (°F)	Control Limits (mg/L)		
	Lower	Optimum	Upper
50.0 - 53.7	0.9	1.2	1.7
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table C3.T6. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	No. of Sites for Standard Monitoring [1, 2]	No. of Sites for Reduced Monitoring [3]	No. of Sites for Water Quality Parameters [4]
>100,000	100	50	25
10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes:

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multi-family residences with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNCWS, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6-month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every 3 years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table C3.T7. Organic Chemical MCLs

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
Pesticides/PCBs		
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008
Aldicarb sulfoxide	0.004	0.0005
Aldrine	0.00003	
Atrazine	0.002	0.0001
Benzo[a]pyrene	0.0002	
Carbofuran	0.007	0.0009
Chlordane	0.0002	0.0002
Chlorotoluron	0.03	
Dalapon	0.2	
2,4-D	0.07	0.0001
1,2 Dibromo-3-chloropropane	0.001	
1,2 Dibromoethane	0.0004	
2,3 Dichlorophenox-acetic acid	0.03	
1,3 Dichloropropane	0.02	
Di (2-ethylhexyl) adipate	0.4	
Dimethoate	0.006	
Di (2-ethylhexyl) phthalate	0.006	
Dinoseb	0.007	
4,1-Dioxin	0.05	
Diquat	0.02	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.0000 1
Glyphosphate	0.7	
Heptachlor	0.0004	0.00004
Heptachlorepoxide	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Isoproturon	0.009	
Lindane	0.0002	0.00002
MCBA	0.002	
Methoxychlor	0.02	0.0001
Metolachlor	0.01	
Molinate	0.006	
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.000 1
Pendimethaline	0.02	
Pentachlorophenol	0.00 I	0.00004

Table C3.T7. Organic Chemical MCLs

Picloram	0.5	
Simazine	0.002	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Terbuthylazine	0.007	
Toxaphene	0.003	0.001
2,4,5-TP (Silvex)	0.05	0.0002
Trifluralin	0.02	
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Carbon tetrachloride	0.004	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1,2-Dichloroethylene	0.05	0.0005
trans-1,2-Dichloroethylene	0.05	0.0005
1,1-Dichloroethylene	0.007	0.0005
1,1,1-Trichloroethane	0.20	0.0005
1,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.005	
1,1,2-Trichloroethane	0.005	
1,2,4-Trichloro-benzene	0.07	
1,2-Dichloropropane	0.005	0.0005
EDTA	0.6	
Ethylbenzene	0.3	0.0005
Hexachlorobutadiene	0.0006	
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Pentachlorovinyl	0.009	
Styrene	0.02	0.0005
Tetrachloroethane	0.04	
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	0.7	0.0005
Vinyl chloride	0.002	0.0005
Xylene (total)	10	0.0005
Other Organics		
Acrylamide	0.05% dosed at 1 ppm [1]	
Epihydrochlorin	treatment technique 0.0 1% dosed at 20 ppm [1]	

Note:

1. Only applies when adding these polymer flocculants to the treatment process. No sampling is required; the system certifies that dosing is within specified limits.

Table C3.T8. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement [1]		Trigger for more monitoring [2]	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes [3, 4]
Pesticides/PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit [5]	Yes [4, 6]

Notes:

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNCW, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 quarterly samples for groundwater systems, and at least 4 quarterly samples for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a sanitary survey of the PWS.
5. Detection limits noted in Table C3.T7., or as determined by the best available testing methods.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection: systems >3,300 reduce to a minimum of 2 quarterly samples in one year during each repeat compliance period, or systems <3,300 reduce to a minimum of 1 sample every 3 years.
7. Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements

Source Water Type	Population Served by System	Analyte & Frequency of Samples	Number of Samples
Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW)	10,000 or more	TTHM & HAA5 - Quarterly[1,2]	4[1,2,3]
SW or GWUDISW	Serving 500 to 9,999	TTHM & HAA5 - Quarterly[4]	1[5,6]
SW or GWUDISW	499 or less	TTHM & HAA5 - Yearly	1[7,8]
Ground Water (GW)	10,000 or more	TTHM & HAA5 - Quarterly[9]	1[10,11]
GW	9,999 or less	TTHM & HAA5 - Yearly[12]	1[13,14]
		Chlorite - Daily & Monthly[15,16,17,18]	
		Bromate - Monthly[19,20]	
		Chlorine[21,22]	
		Chloramines[23,24]	
		Chlorine Dioxide[25,26,27]	
		TOC[28]	

Notes:

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.
2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least 1 year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to one sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.
5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to one sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.
6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to one sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HHA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.
10. System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least 1 year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to one sample per 3-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least 1 year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A three-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of 1 year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least one sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is less than 0.05 mg/L based upon monthly measurements for 1 year. Systems using hypochlorite or on-site hyopochlorite systems where the source of hypopchlorite or salt does not meet National Sanitation Foundation (NSF) or equivalent quality criteria most also monitor for bromate.
20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, three additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take three samples in the distribution system as close as possible to the first customer at intervals of not less than 6 hours
26. If any daily sample from the distribution system exceeds the MRDL and if one or more of the three samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any two consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following an exceedance of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for 1 year, may reduce TOC and alkalinity to one paired sample per plant per quarter.

Table C3.T10. Radionuclide MCLs and Monitoring Requirements

Contaminant	**MCL**
Gross Alpha [1]	***13.5*** pCi/L
Combined Radium-226 and -228	5 pCi/L
Beta Particle and Photon Radioactivty [2]	4 mrem/yr
Uranium	30 .g/L

Notes:

1. Gross alpha activity includes radium-226, but excludes radon and uranium.
2. Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides.

Monitoring Requirements:

All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed if activity is <5 picoCuries per liter (pCi/L). Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the MCL, analysis of a single sample may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Table C3.T11. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 0.5C or Lower*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH=6.5 Log Inactivations						pH=7.0 Log Inactivations						pH=7.5 Log Inactivations					
	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0
<=0.4	23	46	69	91	114	137	27	54	82	109	136	163	33	65	98	130	163	195	40	79	119	158	198	237
0.6	24	47	71	94	118	141	28	56	84	112	140	168	33	67	100	133	167	200	40	80	120	159	199	239
0.8	24	48	73	97	121	145	29	57	86	115	143	172	34	68	103	137	171	205	41	82	123	164	205	246
1	25	49	74	99	123	148	29	59	88	117	147	176	35	70	105	140	175	210	42	84	127	169	211	253
1.2	25	51	76	101	127	152	30	60	90	120	150	180	36	72	108	143	179	215	43	86	130	173	216	259
1.4	26	52	78	103	129	155	31	61	92	123	153	184	37	74	111	147	184	221	44	89	133	177	222	266
1.6	26	52	79	105	131	157	32	63	95	126	158	189	38	75	113	151	188	226	46	91	137	182	228	273
1.8	27	54	81	108	135	162	32	64	97	129	161	193	39	77	116	154	193	231	47	93	140	186	233	279
2	28	55	83	110	138	165	33	66	99	131	164	197	39	79	118	157	197	236	48	95	143	191	238	286
2.2	28	56	85	113	141	169	34	67	101	134	168	201	40	81	121	161	202	242	50	99	149	198	248	297
2.4	29	57	86	115	143	172	34	68	103	137	171	205	41	82	124	165	206	247	50	99	149	199	248	298
2.6	29	58	88	117	146	175	35	70	105	139	174	209	42	84	126	168	210	252	51	101	152	203	253	304
2.8	30	59	89	119	148	178	36	71	107	142	178	213	43	86	129	171	214	257	52	103	155	207	258	310
3	30	60	91	121	151	181	36	72	109	145	181	217	44	87	131	174	218	261	53	105	158	211	263	316

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH=8.5 Log Inactivations						pH=9.0 Log Inactivations					
	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0
<=0.4	46	92	139	185	231	277	55	110	165	219	274	329	65	130	195	260	325	390
0.6	48	95	143	191	238	286	57	114	171	228	285	342	68	136	204	271	339	407
0.8	49	98	148	197	246	295	59	118	177	236	295	354	70	141	211	281	352	422
1	51	101	152	203	253	304	61	122	183	243	304	365	73	146	219	291	364	437
1.2	52	104	157	209	261	313	63	125	188	251	313	376	75	150	226	301	376	451
1.4	54	107	161	214	268	321	65	129	194	258	323	387	77	155	232	309	387	464
1.6	55	110	165	219	274	329	66	132	199	265	331	397	80	159	239	318	398	477
1.8	56	113	169	225	282	338	68	136	204	271	339	407	82	163	245	326	408	489
2	58	115	173	231	288	346	70	139	209	278	348	417	83	167	250	333	417	500
2.2	59	118	177	235	294	353	71	142	213	284	355	426	85	170	256	341	426	511
2.4	60	120	181	241	301	361	73	145	218	290	363	435	87	174	261	348	435	522
2.6	61	123	184	245	307	368	74	148	222	296	370	444	89	178	267	355	444	533
2.8	63	125	188	250	313	375	75	151	226	301	377	452	91	181	272	362	453	543
3	64	127	191	255	318	382	77	153	230	307	383	460	92	184	276	368	460	552

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T12. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 5.0C*

Chlorine Concentration (mg/L)	p11< = 6 Log Inactivations						p11 = 6.5 Log Inactivations						p11 = 7.0 Log Inactivations						p11 = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139	28	55	83	111	138	166
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	114	143	171
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149	30	60	90	119	149	179
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152	31	61	92	122	153	183
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155	31	62	94	125	156	187
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158	32	64	96	128	160	192
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162	33	65	98	131	163	196
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165	33	67	100	133	167	200
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169	34	68	102	136	170	204
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172	35	70	105	139	174	209
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175	36	71	107	142	178	213
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178	36	72	109	145	181	217
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182	37	74	111	147	184	221

Chlorine Concentration (mg/L)	p11< = 8 Log Inactivations						p11 = 8.5 Log Inactivations						p11 = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0
<=0.4	33	66	99	132	165	198	39	79	118	157	197	236	47	93	140	186	233	279
0.6	34	68	102	136	170	204	41	81	122	163	203	244	49	97	146	194	243	291
0.8	35	70	105	140	175	210	42	84	126	168	210	252	50	100	151	201	251	301
1	36	72	108	144	180	216	43	87	130	173	217	260	52	104	156	208	260	312
1.2	37	74	111	147	184	221	45	89	134	178	223	267	53	107	160	213	267	320
1.4	38	76	114	151	189	227	46	91	137	183	228	274	55	110	165	219	274	329
1.6	39	77	116	155	193	232	47	94	141	187	234	281	56	112	169	225	281	337
1.8	40	79	119	159	198	238	48	96	144	191	239	287	58	115	173	230	288	345
2	41	81	122	162	203	243	49	98	147	196	245	294	59	118	177	235	294	353
2.2	41	83	124	165	207	248	50	100	150	200	250	300	60	120	181	241	301	361
2.4	42	84	127	169	211	253	51	102	153	204	255	306	61	123	184	245	307	368
2.6	43	86	129	172	215	258	52	104	156	208	260	312	63	125	188	250	313	375
2.8	44	88	132	175	219	263	53	106	159	212	265	318	64	127	191	255	318	382
3	45	89	134	179	223	268	54	108	162	216	270	324	65	130	195	259	324	389

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T13. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 10C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104	21	42	63	83	104	125
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107	21	43	64	85	107	128
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112	22	45	67	89	112	134
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114	23	46	69	91	114	137
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116	23	47	70	93	117	140
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	96	120	144
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122	25	49	74	98	123	147
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124	25	50	75	100	125	150
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129	26	52	79	105	131	157
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131	27	53	80	107	133	160
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134	27	54	82	109	136	163
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137	28	55	83	111	138	166

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	35	70	105	139	174	209
0.6	26	51	77	102	128	153	31	61	92	122	153	183	36	73	109	145	182	218
0.8	26	53	79	105	132	158	32	63	95	126	158	189	38	75	113	151	188	226
1	27	54	81	108	135	162	33	65	98	130	163	195	39	78	117	156	195	234
1.2	28	55	83	111	138	166	33	67	100	133	167	200	40	80	120	160	200	240
1.4	28	57	85	113	142	170	34	69	103	137	172	206	41	82	124	165	206	247
1.6	29	58	87	116	145	174	35	70	106	141	176	211	42	84	127	169	211	253
1.8	30	60	90	119	149	179	36	72	108	143	179	215	43	86	130	173	216	259
2	30	61	91	121	152	182	37	74	111	147	184	221	44	88	133	177	221	265
2.2	31	62	93	124	155	186	38	75	113	150	188	225	45	90	136	181	226	271
2.4	32	63	95	127	158	190	38	77	115	153	192	230	46	92	138	184	230	276
2.6	32	65	97	129	162	194	39	78	117	156	195	234	47	94	141	187	234	281
2.8	33	66	99	131	164	197	40	80	120	159	199	239	48	96	144	191	239	287
3	34	67	101	134	168	201	41	81	122	162	203	243	49	97	146	195	243	292

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T14. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 15C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	16	25	33	41	49	10	20	30	39	49	59	12	23	35	47	58	70	14	28	42	55	69	83
0.6	8	17	25	33	42	50	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
0.8	9	17	26	35	43	52	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88
1	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75	15	30	45	60	75	90
1.2	9	18	27	36	45	54	11	21	32	43	53	64	13	25	38	51	63	76	15	31	46	61	77	92
1.4	9	18	28	37	46	55	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
1.6	9	19	28	37	47	56	11	22	33	44	55	66	13	26	40	53	66	79	16	32	48	64	80	96
1.8	10	19	29	38	48	57	11	23	34	45	57	68	14	27	41	54	68	81	16	33	49	65	82	98
2	10	19	29	39	48	58	12	23	35	46	58	69	14	28	42	55	69	83	17	33	50	67	83	100
2.2	10	20	30	39	49	59	12	23	35	47	58	70	14	28	43	57	71	85	17	34	51	68	85	102
2.4	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86	18	35	53	70	88	105
2.6	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88	18	36	54	71	89	107
2.8	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89	18	36	55	73	91	109
3	11	21	32	42	53	63	13	25	38	51	63	76	15	30	46	61	76	91	19	37	56	74	93	111

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	17	33	50	66	83	99	20	39	59	79	98	118	23	47	70	93	117	140
0.6	17	34	51	68	85	102	20	41	61	81	102	122	24	49	73	97	122	146
0.8	18	35	53	70	88	105	21	42	63	84	105	126	25	50	76	101	126	151
1	18	36	54	72	90	108	22	43	65	87	108	130	26	52	78	104	130	156
1.2	19	37	56	74	93	111	22	45	67	89	112	134	27	53	80	107	133	160
1.4	19	38	57	76	95	114	23	46	69	91	114	137	28	55	83	110	138	165
1.6	19	39	58	77	97	116	24	47	71	94	118	141	28	56	85	113	141	169
1.8	20	40	60	79	99	119	24	48	72	96	120	144	29	58	87	115	144	173
2	20	41	61	81	102	122	25	49	74	98	123	147	30	59	89	118	148	177
2.2	21	41	62	83	103	124	25	50	75	100	125	150	30	60	91	121	151	181
2.4	21	42	64	85	106	127	26	51	77	102	128	153	31	61	92	123	153	184
2.6	22	43	65	86	108	129	26	52	78	104	130	156	31	63	94	125	157	188
2.8	22	44	66	88	110	132	27	53	80	106	133	159	32	64	96	127	159	191
3	22	45	67	89	112	134	27	54	81	108	135	162	33	65	98	130	163	195

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T15. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 20C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54	11	21	32	43	53	64
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57	12	23	35	46	58	69
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58	12	23	35	47	58	70
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59	12	24	36	48	60	72
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61	12	25	37	49	62	74
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62	13	25	38	50	63	75
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63	13	26	39	51	64	77
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66	13	27	40	53	67	80
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67	14	27	41	54	68	81
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68	14	28	42	55	69	83

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	18	35	53	70	88	105
0.6	13	26	39	51	64	77	15	31	46	61	77	92	18	36	55	73	91	109
0.8	13	26	40	53	66	79	16	32	48	63	79	95	19	38	57	75	94	113
1	14	27	41	54	68	81	16	33	49	65	82	98	20	39	59	78	98	117
1.2	14	28	42	55	69	83	17	33	50	67	83	100	20	40	60	80	100	120
1.4	14	28	43	57	71	85	17	34	52	69	86	103	21	41	62	82	103	123
1.6	15	29	44	58	73	87	18	35	53	70	88	105	21	42	63	84	105	126
1.8	15	30	45	59	74	89	18	36	54	72	90	108	22	43	65	86	108	129
2	15	30	46	61	76	91	18	37	55	73	92	110	22	44	66	88	110	132
2.2	16	31	47	62	78	93	19	38	57	75	94	113	23	45	68	90	113	135
2.4	16	32	48	63	79	95	19	38	58	77	96	115	23	46	69	92	115	138
2.6	16	32	49	65	81	97	20	39	59	78	98	117	24	47	71	94	118	141
2.8	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	95	119	143
3	17	34	51	67	84	101	20	41	61	81	102	122	24	49	73	97	122	146

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T16. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 25C*

Chlorine Concentration (mg/L)	p11< = 6 Log Inactivations						p11 = 6.5 Log Inactivations						p11 = 7.0 Log Inactivations						p11 = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	28	35	42
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39	8	16	24	31	39	47
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40	8	16	24	32	40	48
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41	8	16	25	33	41	49
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41	8	17	25	33	42	50
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42	9	17	26	34	43	51
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43	9	17	26	35	43	52
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44	9	18	27	35	44	53
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45	9	18	27	36	45	54
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46	9	18	28	37	46	55

Chlorine Concentration (mg/L)	p11< = 8 Log Inactivations						p11 = 8.5 Log Inactivations						p11 = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	12	23	35	47	58	70
0.6	9	17	26	34	43	51	10	20	31	41	51	61	12	24	37	49	61	73
0.8	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75
1	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
1.2	9	18	28	37	46	55	11	22	34	45	56	67	13	27	40	53	67	80
1.4	10	19	29	38	48	57	12	23	35	46	58	69	14	27	41	55	68	82
1.6	10	19	29	39	48	58	12	23	35	47	58	70	14	28	42	56	70	84
1.8	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
2	10	20	31	41	51	61	12	25	37	49	62	74	15	29	44	59	73	88
2.2	10	21	31	41	52	62	13	25	38	50	63	75	15	30	45	60	75	90
2.4	11	21	32	42	53	63	13	26	39	51	64	77	15	31	46	61	77	92
2.6	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
2.8	11	22	33	44	55	66	13	27	40	53	67	80	16	32	48	64	80	96
3	11	22	34	45	56	67	14	27	41	54	68	81	16	32	49	65	81	97

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T17. CT Values for Inactivation of Viruses by Free Chlorine

	Log Inactivation		Log Inactivation		Log Inactivation	
	2.0 pH		3.0 pH		3.0 pH	
Temperature (C)	**6-9**	**10**	**6-9**	**10**	**6-9**	**10**
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table C3.T18. CT Values for Inactivation of *Giardia* Cysts by Chlorine Dioxide

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	10	4.3	4	3.2	2.5	2
1-log	21	8.7	7.7	6.3	5	3.7
1.5-log	32	13	12	10	7.5	5.5
2-log	42	17	15	13	10	7.3
2.5-log	52	22	19	16	13	9
3-log	63	26	23	19	15	11

Table C3.T19. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

	Temperature (C)					
Removal	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	8.4	5.6	4.2	2.8	2.1	1.4
3-log	25.6	17.1	12.8	8.6	6.4	4.3
4-log	50.1	33.4	25.1	16.7	12.5	8.4

Table C3.T20. CT Values for Inactivation of *Giardia* Cysts by Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	0.48	0.32	0.23	0.16	0.12	0.08
1-log	0.97	0.63	0.48	0.32	0.24	0.16
1.5-log	1.5	0.95	0.72	0.48	0.36	0.24
2-log	1.9	1.3	0.95	0.63	0.48	0.32
2.5-log	2.4	1.6	1.2	0.79	0.60	0.40
3-log	2.9	1.9	1.43	0.95	0.72	0.48

Table C3.T21. CT Values for Inactivation of Viruses by Free Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	0.9	0.6	0.5	0.3	0.25	0.15
3-log	1.4	0.9	0.8	0.5	0.4	0.25
4-log	1.8	1.2	1.0	0.6	0.5	0.3

Table C3.T22. CT Values for Inactivation of *Giardia* Cysts by Chloramine pH 6-9

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	635	365	310	250	185	125
1-log	1,270	735	615	500	370	250
1.5-log	1,900	1,100	930	750	550	375
2-log	2,535	1,470	1,230	1,000	735	500
2.5-log	3,170	1,830	1,540	1,250	915	625
3-log	3,800	2,200	1,850	1,500	1,100	750

Table C3.T23. CT Values for Inactivation of Viruses by Chloramine

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	1,243	857	643	428	321	214
3-log	2,063	1,423	1,067	712	534	356
4-log	2,883	1,988	1,491	994	746	497

Table C3.T24. CT Values for Inactivation of Viruses by UV

Log Inactivation	
2.0	**3.0**
21	36

Table C3.T25 Concentration of Radiation Activity of Radionuclides in Drinking Water

Radionuclide	Bq/l	Radionuclide	Bq/l	Radionuclide	Bq/l
Hydrogen 3	10000	Cobalt 58	100	Radium 224	1
Beryllium 7	10000	Cobalt 60	100	Radium 225	1
Carbon 14	100	Nickel 59	1000	Radium 226/228	0.19
Sodium 22	100	Nickel 63	1000	Radium 228	0.1
Phosphorus 32	100	Zinc 65	100	Molybdenum 93	100
Phosphorus 33	1000	Arsenic 73	1000	Molybdenum 99	100
Sulphur 35	100	Arsenic 74	100	Technetium 96	100
Chloride 36	100	Arsenic 76	100	Technetium 97	1000
Calcium 45	100	Arsenic 77	1000	Technetium 99	100
Calcium 47	100	Selenium 75	100	Ruthenium 97	1000
Scandium 46	100	Bromine 82	100	Ruthenium 103	100
Scandium 47	100	Rubidium 86	100	Ruthenium 106	10
Scandium 48	100	Strontium 85	100	Radium 105	1000
Vanadium 48	100	Strontium 89	100	Palladium 103	1000
Chromium 51	10000	Strontium 90	10	Silver 105	100
Manganese 52	100	Yttrium 90	100	Silver 110	100
Manganese 53	10000	Yttrium 91	100	Silver 111	100
Manganese 54	100	Zirconium 93	100	Cadmium 109	100
Iron 55	1000	Zirconium 95	100	Cadmium 110	100
Iron 59	100	Niobium 93	1000	Indium 111	1000
Cobalt 56	100	Niobium 94	100	Indium 114	100
Cobalt 57	100	Niobium 95	100	Osmium 191	100
Tin 113	100	Uranium 237	100	Osmium 193	100
Tin 125	100	21 Uranium 238	10	Iridium 190	100
Antimony 122	100	Lanthanum 140	100	Iridium 192	100
Antimony 124	100	Cerium139	1000	Platinum 191	1000
Antimony 125	100	Cerium 141	100	Platinum 193	1000
Tellurium 123	100	Cerium 143	100	Gold 198	100
Tellurium 127	1000	Cerium 144	10	Gold 199	1000
Tellurium 129	1000	Neodynium 147	100	Mercury 197	1000
Tellurium 131	1000	Promethium 147	1000	Mercury 203	100
Tellurium 132	100	Promethium 149	100	Thallium 200	1000
Iodine 125	10	Samarium 151	1000	Thallium 201	1000
Iodine 126	10	Samarium 153	100	Thallium 202	1000
Iodine 129	1000	Erbium 152	100	Thallium 204	100

Table C3.T25 Concentration of Radiation Activity of Radionuclides in Drinking Water

Radionuclide	Bq/l	Radionuclide	Bq/l	Radionuclide	Bq/l
Iodine 131	10	Erbium 154	100	Lead 203	1000
Cesium 129	1000	Erbium 155	1000	Bismuth 206	100
Cesium 131	1000	Gadolinium 153	1000	Bismuth 207	100
Cesium 32	100	Terbium 160	100	Bismuth 210	100
Cesium 134	10	Erbium 169	1000	Lead 210	0.1
Cesium 135	100	Thulium 171	1000	Polonium 210	0.1
Cesium 136	100	Ytterbium 175	1000	Radium 223	1
Cesium 137	10	Tantalum 182	100	Curium 242	10
Barium 131	1000	Tungsten 181	1000	Curium 243	1
Barium 140	100	Tungsten 185	1000	Curium 244	1
Uranium 235	1	Rhenium 186	100	Curium 245	1
Uranium 236	1	Osmium 185	100	Curium 246	1
Thorium 227	10	Uranium 234	10	Curium 247	1
Thorium 228	1	Neptunium 237	1	Curium 248	0.1
Thorium 229	0.1	Neptunium 239	100	Berkelium 249	100
Thorium 230	1	Plutonium 236	1	Californium 246	100
Thorium 231	1000	Plutonium 237	1000	Californium 247	10
Thorium 232	1	Plutonium 238	1	Californium 249	1
Thorium 234	100	Plutonium 239	1	Californium 250	1
Protactinium 230	100	Plutonium 240	1	Californium 251	1
Protactinium 231	0.1	Plutonium 241	10	Californium 252	1
Protactinium 233	100	Plutonium 242	1	Californium 253	100
Uranium 230	1	Plutonium 244	1	Californium 254	1
Uranium 231	1000	Americium 241	1	Einsteinium 253	10
Uranium 232	1	Americium 242	1000	Einsteinium 254	10
Uranium 233	1	Americium 243	1		

Table C3.T26. Chemical Components used in Treatment of Drinking Water and Related Components

Component	Maximum Level
Derivatives of purification substances	μg/l
Dichloromethane bromate	60
Bromoform	100
Chlorate	700
Chloroform	300
Cyanogen chloride	70
Dibromoacetonitrile	70
Dibromochloromethane	100
Dichloroacetate	50
Dichloroacetonitrile	20
Monochloroacetate	20
Trichloroacetate	200
4,2 – 6 Trichlorophenol	200
Contaminants from treatment chemicals	μg/l
Acrylamide	0.5
Epichlorohydrin	0.4
Contaminants from pipes and equipment	μg/l
Benzo [alpha] benzene	0.7
Copper	1000
Lead	10
Vinyl chloride	0.3

Table C3.T27. Residues of Insecticides Used for Public Health Purposes

Residues of insecticides used for public health purposes	Maximum level (ug/L)
Chlorpirifos	30
DDT and substitutes	1
Permethrin	300
Pyriproxyfen	300

Table C3.T28. Toxic Substances

Toxic Substance	Maximum level (ug/L)
Micrositin LR	1

Table C3.T29. Aesthetic Quality Characteristics and Substances

Substances or characteristics	Quality Level	Maximum Level	Units
a) Organoleptic parameter			
Color	None	<15	True color unit
Turbidity	1	<5	NTU
Taste and Odor	Not Offensive	Acceptable	-
Temperature	Not Offensive	Acceptable	-
a) Inorganic Constituents			
Ammonia	-	1.5	mg/L
Chloride	≤250	400	mg/L
Sulfate	≤250	400	mg/L
Total Hardness	≤250	500	mg/L
Total Dissolved Solids	120-600	1000	mg/L
Hydrogen Sulfide	≤0.05	0.1	
Magnesium		30 if sulphites ≥250 150 if sulphites <250	mg/L

C4. CHAPTER 4

WASTEWATER

C4.1. SCOPE

This Chapter contains criteria to control and regulate discharges of wastewater into surface waters. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges, and pollutants from indirect dischargers.

C4.2. DEFINITIONS

C4.2.1. 7-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 7 consecutive days.

C4.2.2. 30-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

C4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

C4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

C4.2.5. Best Management Practices (BMP). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into waters of the Sultanate of Oman.

C4.2.6. Biochemical Oxygen Demand (BOD_5). The five-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

C4.2.7. Carbonaceous BOD_5 ($CBOD_5$). The five-day measure of the pollutant parameter, $CBOD_5$. This test can substitute for the BOD_5 testing which suppresses the nitrification reaction/component in the BOD_5 test.

C4.2.8. Conventional Pollutants. BOD_5, total suspended solids (TSS), oil and grease, fecal coliforms, and pH.

C4.2.9. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

C4.2.10. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

C4.2. 11. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to waters of the Sultanate of Oman from any "point source."

C4.2.12. Domestic Wastewater. Effluent, including settleable materials (sludge) and scum discharged from water closets, baths, kitchens etc, of houses and institutions.

C4.2.13. Domestic Wastewater Treatment System (DWTS). Any DoD or Sultanate of Oman facility designed to treat wastewater before its discharge to waters of the Sultanate of Oman and in which the majority of such wastewater is made up of domestic sewage.

C4.2.14. Drain. Any pipe or channel including chambers and manholes thereon used for the foul and/or storm water drainage of a building and any buildings or yards related and laid externally to those buildings.

C4.2.14.1 Foul Drain. Any drain used to convey sewage from a building to a sewer or other point of disposal.

C4.2. 15. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into waters of the Sultanate of Oman.

C4.2.16. Existing Source. A source in operation, or under construction, prior to 1 October 1994, unless it is subsequently substantially modified, that discharges pollutants.

C4.2.17. Holding Tank. Any structure to hold the wastewater without any leak, seepage or overflow into the surrounding environment.

C4.2.18. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

C4.2.19. Industrial Activities Associated with Storm Water. Activities that may contribute pollutants to storm water runoff or drainage during wet weather events. (See Table C4.T3., "Best Management Practices.")

C4.2.20. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to waters of the Sultanate of Oman.

C4.2.21. Institutions. Public or private premises such as schools, colleges and offices excluding industrial buildings or hospitals.

C4.2.22. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

C4.2.23. Liquid effluent. Any aqueous or non-aqueous liquid which will enter the environment via release.

C4.2.24. Marine environment. The area of the coast extending from the line of the highest high tide seaward to the territorial limits of Oman

C4.2.25. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

C4.2.26. New Source. A source built or substantially modified on or after 1 October 1994 that directly or indirectly discharges pollutants to the wastewater system.

C4.2.27. Non-Household Liquid Wastes. Liquid wastes flowing out of any site used partially or wholly for industrial, agricultural, commercial, constructional or research purposes or any other purposes, except household wastewater.

C4.2.28. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft, or any conveyance that merely collects natural surface flows of precipitation.

C4.2.29. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical waste; biological material; radioactive material; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

C4.2.30. Population Equivalent. The estimated number of a population that would discharge domestic wastewater of total organic load equivalent to that of a particular non-domestic wastewater effluent discharge. For design purposes, the population equivalent shall be calculated by dividing the daily BOD load (in grams) by 60; or the daily volume thereof (in liters) by 180 and the larger of the two figures thus calculated shall be used as the population equivalent.

C4.2.31. Private Sewer. A sewer for storm water drainage constructed and maintained at the expense of the owner.

C4.2.32. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

C4.2.33. Public Channel. A channel for storm water drainage which is vested in and maintained by the Municipality for the Area.

C4.2.34. Public Sewer. Any sewer vested in and maintained by the Municipality for the Area.

C4.2.35. Regulated Facilities. Those facilities for which criteria are established under this

Chapter, such as DWTS, IWTS, or industrial discharges.

C4.2.36. <u>Reuse.</u> The utilization of wastewater or sludge.

C4.2.37. <u>Sacrificial Discharge</u>. The discharge of wastewater or sludge in a way that does not result in a direct benefit.

C4.2.38. <u>Septic Tank.</u> Any structure designed to treat biodegradable wastewater by settlement and anaerobic biological degradation.

C4.2.39. <u>Sewer.</u> Any pipe or channel together with associated manholes designed to convey sewage from two or more buildings and any buildings or yards associated with those buildings.

C4.2.40. <u>Sludge</u>. Any semi-liquid, semi-solid or solid arising from any wastewater treatment.

C4.2.41. <u>Soakaway Pit.</u> Any pit or any other underground construction designed for seepage of the treated wastewater into the ground by infiltration or percolation.

C4.2.42. <u>Storm Water.</u> Run-off and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

C4.2.43. <u>Storm Water Drain.</u> Any channel or pipe used to convey storm water from any part of a building, from the surface of the ground and any paved area to a public channel or other point of disposal.

C4.2.44. <u>Substantial Modification.</u> Any modification to a facility, the cost of which exceeds $1,000,000, regardless of funding source.

C4.2.45. <u>Total Suspended Solids (TSS).</u> The pollutant parameter total filterable suspended solids.

C4.2.46. <u>Total Toxic Organics (TTO).</u> The summation of all quantifiable values greater than 0.01 mg/L for the toxic organics in Table C4.T1., "Components of Total Toxic Organics."

C4.2.47. <u>Trap.</u> A device incorporating a water seal built into a pipe or fitment to prevent gas passing upstream of the trap.

C4.2.48. <u>Waters of the Sultanate of Oman.</u> Surface water including the territorial seas recognized under customary international law, including:

C4.2.48.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce.

C4.2.48.2. Waters which are or could be used for recreation or other purposes.

C4.2.48.3. Waters from which fish or shellfish are or could be taken and sold.

C4.2.48.4. Waters which are used or could be used for industrial purposes by industries.

C4.2.48.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

C4.2.48.6. Tributaries of waters identified in subparagraphs C4.2.29.1. through C4.2.29.5. of this definition.

C4.2.48.7. Exclusions to waters of the Sultanate of Oman. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this Chapter, are not waters of the Sultanate of Oman. This exclusion applies only to manmade bodies of water that were neither originally waters of the Sultanate of Oman nor resulted from impoundment of waters of the Sultanate of Oman.

C4.2.49. Wastewater. Any liquid containing environmental pollutants in excess of discharge standards, discharged from any source.

C4.3. CRITERIA

C4.3.1. Effluent Limitations for Direct Dischargers of Conventional Pollutants

C4.3.1.1. All new sources of pollutants directly discharged to waters of the Sultanate of Oman will comply with the following effluent limitations:

C4.3.1.1.1. BOD_5

C4.3.1.1.1.1. The BOD_5 concentration will not exceed 30 mg/L.

C4.3.1.1.1.2. $CBOD_5$ may be substituted for BOD_5. $CBOD_5$ limit, if substituted for the parameter BOD_5, should be at least 5 mg/L less than each numerical limit for the 30-day and 7-day average for the BOD_5 limit. The $CBOD_5$ test procedure suppresses the nitrification component in the BOD_5 test procedure, thereby reducing the value or effects and lowering the oxygen demand. When $CBOD_5$ is substituted for BOD_5, the following limits will apply:

C4.3.1.1.1.2.1. 30-day average will not exceed 25 mg/L.

C4.3.1.1.1.2.2. The 7-day average will not exceed 40 mg/L.

C4.3.1.1.2. TSS

C4.3.1.1.2.1. The TSS concentration will not exceed 30 mg/L.

C4.3.1.1.2.2. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.1.2. Existing sources of pollutants to waters of the Sultanate of Oman will comply with the following effluent limitations:

C4.3.1.2.1. BOD_5

C4.3.1.2.1.1. The BOD_5 concentration will not exceed 30 mg/L.

C4.3.1.2.2. TSS

C4.3.1.2.2.1. The TSS concentration will not exceed 30 mg/L.

C4.3.1.2.2.2. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.1.3. Monitoring. Monitoring requirements apply to all regulated facilities. The monitoring frequency (including both sampling and analysis) given in Table C4.T2., "Monitoring Requirements," includes all three parameters which are regulated (BOD_5, TSS, and pH). Samples shall be collected at the point of discharge to the waters of the Sultanate of Oman.

C4.3.1.4. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. Retain records for 3 years.

C4.3.1.4.1. The effluent, concentration, or other measurement specified for each regulated parameter.

C4.3.1.4.2. The daily volume of effluent discharge from each point source.

C4.3.1.4.3. Test procedures for the analysis of pollutants.

C4.3.1.4.4. The date, exact place, and time of sampling and/or measurements.

C4.3.1.4.5. The name of the person who performed the sampling and/or measurements.

C4.3.1.4.6. The date of analysis.

C4.3.1.5. Complaint System. A system for investigating water pollution complaints from individuals or Sultanate of Oman water pollution control authorities will be established, involving the EEA, as appropriate.

C4.3.1.6. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 0.049 million gallons per day (MGD), monthly sample must comply with level for 30-day average.

C4.3.2. Effluent Limitations For Non-Categorical Industrial Indirect Dischargers

C4.3.2.1. Effluent Limits. The following effluent limits will apply to all discharges of pollutants to DWTSs and associated collection systems from process wastewater for which categorical standards have not been established (see subparagraphs C4.3.3.1.1.8., C4.3.3.1.1.9., and C4.3.3.1.1.10. for a list of categorical standards.

C4.3.2.1.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater treatment plant flow is prohibited.

C4.3.2.1.2. Ignitability and Explosivity

C4.3.2.1.2.1. The discharge of wastewater with a closed cup flashpoint of less than 60C (140F) is prohibited.

C4.3.2.1.2.2. The discharge of waste with any of the following characteristics is prohibited:

C4.3.2.1.2.2.1. A liquid solution that contains more than 24% alcohol by volume and has a flash point less than 60 C (140 F).

C4.3.2.1.2.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction.

C4.3.2.1.2.2.3. An ignitable compressed gas.

C4.3.2.1.2.2.4. An oxidizer, such as peroxide.

C4.3.2.1.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

C4.3.2.1.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

C4.3.2.1.3.2. Wastes that react violently with water;

C4.3.2.1.3.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water;

C4.3.2.1.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

C4.3.2.1.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

C4.3.2.1.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material"; and

C4.3.2.1.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

C4.3.2.1.4. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 is allowed, unless the DWTS is specifically designed to handle that type of wastewater.

C4.3.2.1.5. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin.

C4.3.2.1.6. Spills and Batch Discharges (slugs). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

C4.3.2.1.6.1. Description of discharge practices, including non-routine batch discharges;

C4.3.2.1.6.2. Description of stored chemicals;

C4.3.2.1.6.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this Chapter, including procedures for subsequent written notification within 5 days;

C4.3.2.1.6.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training;

C4.3.2.1.6.5. Proper procedures for building containment structures or equipment;

C4.3.2.1.6.6. Necessary measures to control toxic organic pollutants and solvents; and

C4.3.2.1.6.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

C4.3.2.1.7. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

C4.3.2.1.8. Heat. Heat in amounts that inhibit biological activity in the DWTS resulting in interference, but in no case in such quantities that the temperature of the process water at the DWTS exceeds 40°C (104°F).

C4.3.2.2. Complaint System. A system for investigating water pollution complaints from Sultanate of Oman water pollution control authorities will be established, involving the EEA as appropriate.

C4.3.3. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect). Any installations which have activities that fall into any of the industrial categories listed below must comply with the following effluent limitations (i.e., either direct or indirect discharge limitations at the source of the discharge). For most categories, the effluent limitations are the same for new and existing activities. Where differences in limitations exist, activities constructed or substantially modified on or after 1 October 1994 will meet the limitations for new activities.

C4.3.3.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

C4.3.3.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

C4.3.3.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

C4.3.3.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

C4.3.3.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

C4.3.3.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

C4.3.3. 1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

C4.3.3.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

C4.3.3.1.8. The following discharge standards apply to new and existing facilities in the above electroplating subparts which directly or indirectly discharge less than 38,000 liters per day (10,000 gallons per day):

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, amenable	5.0	2.7
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Toxic Organics	4.57	---

C4.3.3.1.9. The following discharge standards apply to new and existing facilities in the above electroplating subparts that directly, or indirectly, discharge 38,000 liters per day (10,000 gallons per day) or more:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, total	1.9	1.0
Copper	4.5	2.7
Nickel	4.1	2.6
Chrome	7.0	4.0
Zinc	4.2	2.6
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Metals	10.5	6.8
Total Toxic Organics	2.13	---

C4.3.3.1.10. In addition to the above standards, new and existing facilities that electroplate precious metals and that directly or indirectly discharge 38,000 liters per day (10,000 gallons per day) or more must comply with the following standard:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Silver	1.2	0.7

C4.3.3.2. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters that are specified in the paragraph of this Chapter dealing with industrial dischargers. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan. (See Table C4.T2., "Monitoring Requirements.")

C4.3.4. Storm Water Management

C4.3.4.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table C4.T3., "Best Management Practices." Update the SWPPP annually using in-house resources.

C4.3.4.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events, should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

C4.3.5. Septic System. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

C4.3.6. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate.

C4.4. ADDITIONAL REQUIREMENTS

C4.4.1. Every building shall be provided with a foul drain to effectively convey sewage from the building to a sewer or other approved point of disposal.

C4.4.2. Grease traps shall be installed where there is a potential for large quantities of oil and grease to be discharged into drains, such as canteens and kitchens.

C4.4.3. Petroleum and oil traps shall be installed at all garages and other places where there is a potential for petroleum and oil to reach the drain or sewer.

C4.4.4. Storm Water Requirements

C4.4.4.1. All storm water shall be discharged to a public storm water channel or drain.

C4.4.4.2. All storm water drains shall be supplied, installed and maintained by the owners.

C4.4.4.3. No wastewater shall be discharged to a storm water drain or channel.

C4.4.4.4. No solid waste of any kind shall be discharged to a storm water drain or channel.

C4.4.4.5. No industrial wastes of any kind shall be discharged to a storm water drain or channel.

C4.4.4.6. Pipes or channels designed to convey storm water shall not discharge across the surface of any foot-path in a street. Storm water shall be conveyed through underground cast iron pipes or by other means approved by the installation.

C4.4.4.7. Storm water channels shall be of adequate size, constructed of impervious material, finished off smooth, and laid to a gradient of not less than 1 in 100.

C4.4.4.8. Storm water channels shall be provided with grilles to prevent any debris from entering into a public channel, water course or wadi and, where directed by the local command authority. A suitable silt trap shall also be provided.

C4.4.5. It is prohibited to discharge any kind of wastewater or materials that can impede the operation of a Public Domestic Wastewater Treatment System (DWTS) or impact the effluent quality.

C4.4.6. A DWTS must be maintained periodically. The DWTS must be equipped with flow measuring devices and equipment necessary for wastewater sample collection and analyses.

C4.4.7. Wastewater or sludge shall not be discharged sacrificially except in circumstances where no form of wastewater re-use is feasible.

C4.4.8. It is prohibited to use untreated sewage or wastewater for irrigation or any agricultural purposes.

C4.4.9. It is prohibited to dispose any liquid effluent containing the following compounds or materials to the marine environment:

C4.4.9.1. Pesticides, herbicides, or insecticides;

C4.4.9.2. Radioactive elements;

C4.4.9.3. All materials produced for biological or chemical warfare.

C4.4.10. Any wastewater discharged to the DWTS shall not exceed applicable limitations set out in Table C4.T4.

C4.4.11. Any industrial wastewater discharged to the public sewer shall not exceed applicable limitations set out in Table C4.T5.

C4.4.12. Any non-household effluent discharged to a public sewer shall not exceed applicable limitations set out in Table C4.T6.

C4.4.13. Any wastewater discharged to the maritime environment shall not exceed applicable limitations set out in Table C4.T7.

C4.4.14. Ballast water discharged to the maritime or land environment shall not exceed applicable limitations set out in Table C4.T8.

C4.4.15. Any liquid effluent proposed for disposal to the marine environment shall not result in:

C4.4.15.1. Visible floating particulate, grease or oil,

C4.4.15.2. Esthetically undesirable discoloration of the sea surface,

C4.4.15.3. Visible evidence of disposal in water or on beaches, rocks, or structures,

C4.4.15.4. Reduction of natural light transmittance more than 10% of ambient values at point of disposal;

C4.4.15.5. Alteration of marine sediments which lead to degradation of benthic marine life.

C4.4.15.6. Alteration of organic matter in adjacent sediments harmful to marine life;

C4.4.15.7. Objectionable aquatic growth which degrades native aquatic species;

C4.4.15.8. Objectionable odors emanating from receiving waters at point of disposal;

C4.4.15.9. Alteration of the natural quality of fish, shellfish or other marine resources used for human consumption.

C4.4.16. The discharge end of any effluent discharge pipe must be sited a minimum of 1 meter below the Lowest Low Tide Level at the proposed discharge site. A 300 meter radius from the point of effluent discharge is set as the initial zone of dilution at which point the disposed effluent shall not result in:

C4.4.16.1. Increase in ambient water temperature more than 10^{o}C (weekly average);

C4.4.16.2. Reduction in dissolved oxygen values more than 10% of ambient values;

C4.4.16.3. Changes in ambient pH more than 0.2 units;

C4.4.16.4. Increased or decreased salinity of receiving water greater than 2 parts per thousand from ambient values.

C4.4.17. The operator of a hazardous healthcare waste treatment facility should maintain an operating record that contains test results of the wastewater discharged from the treatment process, and the methods and location of discharged wastewater disposal.

C4.4.18. Septic Tanks, Soakaway Pits and Holding Tanks Requirements

C4.4.18.1 In the absence of a public sewer, all building drains shall be routed to a septic tank with the ability to connect to a public sewer in the future.

C4.4.18.2. Septic tanks shall only be allowed in institutions and accommodations which discharge solely domestic wastewater from population equivalents not greater than 150. Any larger institutions must be served by a DWTS.

C4.4.18.3. Septic tanks must be constructed in such manner, and using appropriate materials, as to ensure that they remain watertight at all times.

C4.4.18.4. Septic tanks shall be of an adequate capacity/size to take all the human sewage in the buildings.

C4.4.18.5. Septic tanks shall be constructed at a distance of not less than 3 meters from any building on the same plot of land or the adjoining neighbor's buildings and it shall be insulated at the base and sides and properly plastered from the inside with cement and sand. The distance condition stated above may be reconsidered with regard to old areas and small plots of land provided this does not prejudice the public safety and the rights of third parties.

C4.4.18.5.1. Septic tanks and soakaway pits must be located at least 100 meters away from any public water supply sources, wells and aflaj and at least 30 meters away from private wells.

C4.4.18.5.2. The uppermost level of wastewater in the septic tank shall not exceed the water levels of any nearby well heads. The septic tanks must be located such that the pollutants cannot reach nearby wells.

C4.4.18.6. Soakaway pit systems must be designed and based on ground percolation tests carried out by the owner at his own expense as described in Table C4.T9. If the ground nature, hydrogeological conditions, percolation tests and population density so allow, the wastewater from the septic tanks may be discharged into appropriately designed and constructed soakaway pits or to a permeable underground construction. If such conditions are not suitable, then the wastewater from septic tanks must be discharged into holding tanks which must be constructed and installed according to Table C4.T10.

C4.4.18.7. Holding tanks must be constructed in such manner, using appropriate materials, as to ensure that they remain watertight and also comply with the following conditions:

C4.4.18.7.1. Always be constructed on land within the legal control of the owner of the premises.

C4.4.18.7.2. Be located at least 1.5 meters away from any wall of an occupied building.

C4.4.18.7.3 Be sited in an appropriate position so as to facilitate future connection when a public sewer becomes available.

C4.4.18.7.4 Be sited in a position where they can be accessed and served by wastewater tanker vehicles, and in any event not at a distance greater than 20 meters from the nearest service point.

C4.4.18.7.5 Holding tanks must be located at least 15 meters away from any water source and in such position that any wastewater overflow or spillage cannot reach such water source.

C4.4.18.7.6 The uppermost level of wastewater in holding tanks shall not exceed the levels of any nearby well heads. The holding tanks must be located such that the pollutants cannot reach the nearby wells.

Table C4.T1. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1,2-Dichloropropane
Methyl bromide (bromomethane)	1,3-Dichloropropylene (1,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1,2-Trichloroethane
1,1 -Dichloroethene	Benzene
1,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1,2-Dichloroethane	Bromoform (tribromomethane)
1,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1 -Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1,2-Diphenylhydrazine
1,3-Dichlorobenzene	N-nitrosodiphenylamine
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate

Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)

Table C4.T1. Components of Total Toxic Organics

Base/Neutral Extractable Organics (continued)	
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractables Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	
Pesticides/PCBs	
Alpha-Endosulfan	Endrin
Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor
Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)
Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and metabolites)	PCB-1016 (Arochlor 1016)
Dieldrin	

Table C4.T2. Monitoring Requirements

Plant Capacity (MGD)	Monitoring Frequency
0.001 - 0.99	Monthly
1.0 - 4.99	Weekly
> 5.0	Daily

Table C4.T3. Best Management Practices

Activity	**Best Management Practice**
Aircraft Ground Support Equipment Maintenance	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids. Cap hoses to prevent drips and spills.
Aircraft/runway deicing	Perform anti-icing before the storm. Put critical aircraft in hangars/shelters.
Aircraft/vehicle fueling operations	Protect fueling areas from rain. Provide spill response equipment at fueling station.
Aircraft/vehicle maintenance & repair	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids.
Aircraft/vehicle washing	Capture wash water and send to wastewater treatment plant Treat wash water with oil water separator before discharge.
Bulk fuel storage areas	Use dry camlock connectors to reduce fuel loss. Capture spills with drip pans when breaking connections. Curb fuel transfer areas; treat with oil water separator.
Construction activities	Construct sediment dams/silt fences around construction sites.
Corrosion control activities	Capture solvent/soaps used to prepare aircraft for painting. Perform corrosion control activities inside.
Hazardous material storage	Store hazardous materials inside or under cover. Reduce use of hazardous materials.
Outdoor material storage areas	Cover and curb salt, coal, urea piles. Store product drums inside or under cover. Reduce quantity of material stored outside.
Outdoor painting/depainting operations	Capture sandblasting media for proper disposal. Capture paint clean up materials (thinners, rinsates).
Pesticide operations	Capture rinse water when mixing chemicals. Store spray equipment inside.
Power production	Capture leaks and spills from power production equipment using drip pans, etc.
Vehicle storage yards	Check vehicles in storage for leaks and spills. Use drip pans to capture leaking fluids.

Table C4.T4. Pretreatment Criteria for Acceptance of Liquid Waste to the Public DWTS

Parameter	Symbol	Standards	Unit
pH	pH	5-10	mg/l
Color		Non-resistance	mg/l
BOD_5	BOD	1000	mg/l
COD_5	COD	3000	mg/l
Temperature	C	60	mg/l
Insolubles		2000	mg/l
Total Dissolved Solids	TDS	4000	mg/l
Grease and Oil		120	mg/l
Sulfide (as ions)	S\`	10	mg/l
Sulfate (as ions)	S\`	1000	mg/l
Phenols		150	mg/l
Cyanide	CN	1	mg/l
Detergents (capable of vigorous decomposition)		100	mg/l
Total Chlorinated Hydrocarbons	TCH	0.5	mg/l
Total Organic Carbon	TOC	1000	mg/l
Caustic Alkali (calcium carbonates)		3000	mg/l
Total toxic metals		10	mg/l
Aluminum	Al	30	mg/l
Arsenic	As	5	mg/l
Barium	Ba	10	mg/l
Cadmium	Cd	2	mg/l
Total Chromium		5	mg/l
Copper	Co	5	mg/l
Iron	Fe	25	mg/l
Lead	Pb	5	mg/l
Mercury	Hg	0.1	mg/l
Nickel	Ni	5	mg/l
Silver	Ag	5	mg/l
Zinc	Zn	10	mg/l

Table C4.T5. Criteria for the Discharge of Industrial Effluents into Public Sewers

Parameter	Symbol	Standards	Unit
Synthetic Detergents		10-30	mg/l
Cyanide Compounds	CN	0.1-1	mg/l
Sulfides	S	8-10	mg/l
Sulfates		80-100	mg/l
Tar & Tar Oils		0-5	mg/l
Floating oils & Grease		5-30	mg/l
Emulsified Oil & Grease		50-75	mg/l
Suspended Solids	SS	300-500	mg/l
Chemical Oxygen Demand	COD	700-1500	mg/l
Cadmium	Cd	0.5-5	mg/l
Chromium, total	Cr	0.1-2	mg/l
Copper	Cu	1-4	mg/l
Lead	Pb	2-4	mg/l
Nickel	Ni	1-4	mg/l
Silver	Ag	2-4	mg/l
Zinc	Zn	2-5	mg/l
Arsenic	AS	0.1-4	mg/l
Mercury	Hg	0.00-0.1	mg/l

Table C4.T6. Standards for Discharge of Non-Household Liquid Waste into Sewage System

Components	Maximum Level
pH	6-10
Color	Raises no objection
Biochemical Oxygen Demand (5 days)	1000 mg/L
Chemical Oxygen Demand	1500 mg/L
Temperature	43°C
Suspended solid	1000 mg/L
Total dissolved solids	3000 mg/L
Grease and oil	30 mg/L
Sulphide	3 mg/L
Sulphate	500 mg/L
Phenols	5 mg/L
Cyanide	1 mg/L
Detergents	30 mg/L
Alkalinity	2000 mg/L
Toxic metals	10 mg/L
Aluminum	10 mg/L
Arsenic	1 mg/L
Barium	10 mg/L
Beryllium	5 mg/L
Cadmium	2 mg/L
Chromium	2 mg/L
Copper	1 mg/L
Iron	5 mg/L
Lead	2 mg/L
Mercury	0.1 mg/L
Nickel	2 mg/L
Silver	0.1 mg/L
Zinc	2 mg/L

Table C4.T7. Criteria for Direct Discharge or Discharge of Treated Wastewater to the Maritime Environment

Parameter	Symbol	Standards	Unit
1- Physical Tests			
Total Dissolved Solids	TDS	1500	mg/l
Floating Particles		Nil	mg/l
Temperature		10	°C
Turbidity		5-75	N.T.U
2- Inorganic Parameters			
Ammonia	NH_4	1-3	mg/l
Chlorine Residual		0.05-1	mg/l
Cyanide	CN	0.05-0.1	mg/l
Dissolved Oxygen	DO	>2-4	mg/l
Fluoride	F	2-25	mg/l
Phosphates	PO_4^{-3}	0.1	mg/l
Sulfide	S^{-2}	0.1-0.5	mg/l
Total Kjeldahl Nitrogen as N		100-250	mg/l
Chemical Oxygen Demand	COD	100-250	mg/l
3- Trace Metals			
Aluminum	Al	3-25	mg/l
Arsenic	As	0.05	mg/l
Barium	Ba	2	mg/l
Cadmium	Cd	0.01-0.05	mg/l
Chromium, total	Cr	0.1-0.5	mg/l
Cobalt	Co	0.05-2	mg/l
Copper	Cu	0.2-0.5	mg/l
Iron	Fe	1.5-2	mg/l
Lead	Pb	0.08-0.1	mg/l
Manganese	Mn	0.2-1	mg/l
Mercury	Hg	0.001	mg/l
Nickel	Ni	0.1	mg/l
Zinc	Zn	0.1-2	mg/l
Silver	Ag	0.005	mg/l
Selenium	Se	0.02	mg/l
4- Organic Parameters			
Oil & Grease		5	mg/l
Phenols (estimated as Phenols)		0.002-0.1	mg/l
Total Organic Carbon	TOC	75	mg/l
Halogenated Hydrocarbons & Pesticides		0.001-0.2	mg/l
5- Biological Tests			
Total Coliform		10-100	MPN/100ml
Egg Parasites		Nil	No/l
Worm Parasites		Nil	No/l
Fecal Coliform		100 (80% samples)	MPN/100 ml
Fecal Streptococci		100	MPN/100 ml
Salmonella		Not Detectable	MPN/L

Table C4.T8. Criteria for Ballast Water Discharge

Parameter	Symbol	Standards	Unit
Ammonia, as N	NH_3	2-3	mg/l
Biochemical Oxygen Demand	BOD_5	40-50	mg/l
pH	pH	6-9	pH
Chemical Oxygen Demand	COD	200-250	mg/l
Floatable Oil and Grease		Nil	mg/l
Suspended Solid	SS	40-50	mg/l
Total Oil (Hexane Extractable)	TO	10-15	mg/l
Total Organic Carbon	TOC	90-100	mg/l

Table C4.T9. Procedure for Percolation Test and Soakaway Pit Design

Time for Test Water To fall 25 mm (minutes)	Effective Absorption / Soakaway Area Required (square meters) per person	
	Houses	Institutions
2 (or less)	1.8	0.5
3	1.2	0.6
4	2.4	0.7
5	2.8	0.8
10	3.7	0.9
15	4.6	1.2
30	6.3	1.7
60	8.4	2.2

Table C4.T10 Holding Tanks Design and Measurements Criteria

1.	In any event, holding tanks capacity must provide a minimum of 3 days storage with the condition that the capacity shall not be less than 3000 liters. In calculations for capacity, 240 liters of tank volume must be allowed for each person contributing to the sewage discharging to the holding tank.
2.	The holding tank shall normally be rectangular. In special circumstances alternative shapes may be acceptable.
3.	The nominal water depth of the tank must not be less than 1.5 meters and not more than 2.0 meters.
4.	There must be two tanks operating in parallel when the contributing population exceeds 100 persons. Each tank must be capable of isolation from the other. Each such tank must also have at least half the capacity calculated according to item 1.
5.	The tank floor must have a slope of 1 in 4 down to the suction side and have a sump 600 x 600 x 300mm deep under the opening provided for installing the suction pipe so as to facilitate complete emptying of the tank contents.
6.	Holding tanks must be of reinforced concrete or other materials in accordance with the requirements Article 13 of these Regulations and should be strong enough to withstand heavy loads such as cars and trucks.
7.	The openings to the tank must not be less than 600 x 600 millimeters in dimension and must be provided with sealed covers of heavy duty type so as not to allow the escape of odors.
8.	Ventilation:- All Septic tanks must be provided with a ventilation pipe of 100mm nominal diameter to a height not less than one meter above the roof of adjoining buildings, or the eaves where such buildings have pitched roofs on condition that: a) No ventilation pipe may be fixed or located so as to prevent the escape of any foul air into the building. b) The open end of any ventilation pipe must be provided with suitable mesh cover so as to prevent entry of adventitious matter whilst also not impeding air flow. c) Ventilating pipes shall be straight except where this unavoidable. d) Ventilation pipes shall not be used for carrying rain water drainage.

C5. CHAPTER 5

HAZARDOUS MATERIAL

C5.1. SCOPE

This Chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements, which are covered under other Chapters. This FGS does not cover munitions.

C5.2. DEFINITIONS

C5.2.1. Chemical Safety Data: Written, printed or drawn information issued by the original source which indicate the composition and characteristics of chemicals, the instructions for use and the necessary precautions to avoid or eliminate their hazards under normal conditions or in emergencies.

C5.2.2. Handling: Any transfer of Chemical between natural or juridical persons, by sale, purchase, distribution or exchange.

C5.2.3. Hazardous Chemicals. Gas, liquid or solid chemicals referred to in the lists of classification, which are characterized by their own effectiveness, toxicity, explosiveness, causing corrosion, or any other characteristics that could endanger the human health and environment, whether alone or when coming into contact with other substances.

C5.2.4. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the following information:

C5.2.4.1. Identification/name of hazardous chemicals;

C5.2.4.2. Appropriate hazard warnings; and

C5.2.4.3. The name and address of the manufacturer, importer, or other responsible party; and that is prepared in accordance with DoDI 6050.05 (Reference (g)).

C5.2.5. Hazardous Material. Any material that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table C5.T1., "Typical Hazardous Materials Characteristics," or the material is listed in Table AP1.T4., "List of Hazardous Waste/Substances/Materials." Munitions are excluded.

C5.2.6. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with Reference (g).

C5.2.7. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle, either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

C5.2.8. Chemical Container Label: Any written, printed or drawn information attached to the chemical container which illustrates its composition, properties and instructions for use.

C5.2.9. Material Safety Data Sheet (MSDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

C5.2.10. Package. The complete product of wrapping process that consists of packaging and contents ready to be transported.

C5.2.11. Packaging. Containers and any other related materials necessary for the containers to contain these substances and make sure that the requirements of wrapping are met.

C5.2.12. Wrapping. Works which, by virtue of which substances are wrapped either by rolling up, packaging in packets or by any other secure way.

C5.3. CRITERIA

C5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and Marine Corps Order (MCO) 4450.1 2A (Reference (h)) provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Interservice Manual 24-204(I), Army Technical Order (TO) 3 8-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, DCMAD1, Ch3.4 (HM24), (Reference (i)).

C5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

C5.3.2.1. Any person whatsoever, who imports, exports, transports, stores, handles, uses or discharges any hazardous chemical, shall comply with the following:

C5.3.2.1.1. Containers shall be strong, vibration proof, and resistant to damage, whether this may be caused either by the external environment or the contained substance.

C5.3.2.1.2. Containers shall be leak-proof and non-reactive.

C5.3.2.1.3. Containers shall be sealed so as to prevent any leakage.

C5.3.3. Installations will ensure that for each hazardous material shipment:

C5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material and include an MSDS;

C5.3.3.2. All drivers are trained on the hazardous material included in the shipment, including health risks of exposure and the physical hazards of the material, including potential for fire, explosion, and reactivity;

C5.3.3.3. Drivers will be trained on spill control and emergency notification procedures;

C5.3.3.4. For any hazardous material categorized on the basis of section AP1.1. of this FGS, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes;

C5.3.3.5. The transport vehicles are subjected to a walk-around inspection by the driver before and after the hazardous material is loaded; and

C5.3.3.6. Packages are labeled in accordance with paragraph C5.3.7.

C5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material as well as an inventory of all hazardous materials contained therein. (See paragraph C18.3.2.)

C5.3.5. Each MSDS shall be in English or the predominant language in the work place, and shall contain at least the following information:

C5.3.5.1. The identity used on the label.

C5.3.5.1.1. If the hazardous chemical is a single substance, its chemical, scientific, commercial, common name and CAS number.

C5.3.5.1.2. If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or

C5.3.5.1.3. If the hazardous chemical is a mixture that has not been tested as a whole:

C5.3.5.1.3.1. The chemical, scientific, commercial, common name(s) and CAS numbers(s) of all ingredients that have been determined to be health hazards, and that comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

C5.3.5.1.3.2. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations that would exceed an established Occupational Safety and Health Administration (OSHA)-permissible exposure limit, or could present a health hazard to employees; and

C5.3.5.1.3.3. The chemical, scientific, commercial, common name(s) and CAS number(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

C5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

C5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

C5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical;

C5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

C5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available;

C5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen;

C5.3.5.8. Any generally applicable precautions for safe handling and use that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

C5.3.5.9. Any generally applicable control measures that are known to the chemical manufacturer, importer, or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment;

C5.3.5.10. Emergency and first aid procedures;

C5.3.5.11. The date of preparation of the MSDS or the last change to it; and

C5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

C5.3.6. Each work center will maintain a file of MSDSs for each hazardous material procured, stored, or used at the work center. MSDSs that are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site.

C5.3.7. All hazardous materials on DoD installations will have a Hazardous Chemical Warning Label in accordance with Reference (g) (or Sultanate of Oman equivalent) and have MSDS information either accompany the shipment or in the HMIRS in accordance with

Reference (g) and other DoD Component instructions. These requirements apply throughout the life-cycle of these materials.

C5.3.7.1. Labels shall be firmly fixed to the containers and shall clearly include not less than the following details:

C5.3.7.1.1. Both the scientific and commercial names of the contents and the quantity.

C5.3.7.1.2. The chemical and physical properties of the contained substance.

C5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

C5.3.9. All excess hazardous material will be processed through the Defense Reutilization and Marketing Service (DRMS) in accordance with the procedures in DoD 4160.21-M (Reference (j)). The DRMS will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local pharmacy or exchange program.

C5.3.10. All personnel who use, handle, or store hazardous materials will be trained in accordance with Reference (g) and other DoD Component instructions.

C5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

C5.4. ADDITIONAL REQUIREMENTS

C5.4.1. Packaging

C5.4.1.1 Hazardous chemicals are to be placed inside good quality, sealed packages that are able to withstand all conditions of transport, storage, trading, vibration effects, and temperature changes.

C5.4.1.2. The packages must be made of, or the inside of the packages must be coated with; anti-rust, anti-corrosion, and anti-interaction substances that are compatible with the substances. The chemicals may not be packed in breakable or cracked packages. The package shall be double-sealed with two layers. For dried hazardous chemicals, packages shall be compatible with the contents, be able to withstand transport conditions, and shall not be packed in paper packages.

C5.4.1.3. The United Nations packaging specifications and/or the Sultanate of Oman specifications shall be used.

C5.4.2. Transportation by Land

C5.4.2.1. Hazardous chemicals shall safely be transported within defined speed limits and on allowed roadways.

C5.4.2.2. Tanks assigned to transport chemicals shall be made of certain material suitable for external environment and for the transported chemical. The tanks' containers shall be designed with a wide opening for inspection. This opening shall contain an appropriate device for pressure relief.

C5.4.2.3. Metal plates shall be installed on the outer surface from all sides of the transport units to define the tank contents and the risk involved. The tanks shall be painted with a reflective painting in the required color that is able to withstand the weather conditions.

C5.4.2.4. All hazardous chemical carriers in liquid form shall use a yellow lamp with flashing light installed on the driver compartment.

C5.4.2.5. Obtaining the approval of the responsible authorities with regard to transportation means and drivers who shall transport the hazardous substances, along with providing contingency and accident-ready plans will be the responsibility of the transporter.

C5.4.3. Storage

C5.4.3.1. Storage shall be designed to limit fire risks, spilling, include secondary containment, prevent injuries, and ensure that incompatible substances are separated.

C5.4.3.2. Provide access to easily-opened emergency egress including emergency lighting and exit sign placement at floor level to be visible during smokey conditions.

C5.4.3.3. Provide proper ventilation.

C5.4.3.4. Design non-slippery smooth floors free from cracks and equipped with special channels able to collect contaminated fire water.

C5.4.3.5. Ground all electrical devices inside the storage and provide electrical circuits with grounding circuit breakers and overload protection devices.

C5.4.3.6. Establishment of dining room or clothing changing room as a basic part of the storage is prohibited. Such dining or locker room buildings shall be kept at least 10 meters away from storage area.

C5.4.3.7. Aisle must be kept clear such that forklifts and handling or emergency devices are not impeded.

C5.4.3.8. The height of stored substances may not exceed 3 m unless a rack shelving system is used.

C5.4.3.9. Battery charging, thermal packing, or welding may not be performed in storage area.

C5.4.3.10. A plan must be prepared illustrating the nature of risk in every part of the storage area including a list of places and stored quantities of chemicals with their dangerous characteristics. The plan must also address emergency equipment location, fire protection devices, and available emergency procedures. Staff shall be initially trained on the emergency procedures, weekly safety issues presented, and the documentation filed in a separate facility.

C5.4.4. Hazardous chemicals must be separated from any area frequented by the public according to the requirements in Table C5.T2.

C5.4.5. Separation of chemicals shall be done according to the UN specifications and requirements in Table C5.T3.

C5.4.6. Material Safety Data Sheet (MSDS) information will be reviewed prior to handling spilled or leaked chemicals.

C5.4.7. Necessary equipment must be provided and maintained to deal with spills and personal protection.

C5.4.8. Properly dispose of all damaged and non-usable packages. Keep storage areas clean. Remove cardboard, wood, package material, and any other unused material.

C5.4.9. Provide appropriate fire extinguishers in accessible areas after consulting the fire department. Install a fire alarm system and conduct periodic inspection to ensure validity of extinguishers and alarms.

C5.4.10. Operations of storage areas shall be carefully monitored by an experienced and trained inspector.

Table C5.T1. Typical Hazardous Materials Characteristics

1.	The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials that damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gases, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive materials.
2.	The item and/or its disposal is regulated by the Sultanate of Oman because of its hazardous nature.
3.	The item has a flashpoint below 93°C (200°F) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control.
4.	The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of greater than 1.0 volt or less than -1.0 volt.
5.	In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics.
6.	The item has special characteristics that, in the opinion of the manufacturer or the DoD Components, could cause harm to personnel if used or stored improperly.

Table C5.T2. Minimum Separation of Hazardous Chemicals from the Public

UN Class/Division[a]	Minimum separation in meters
1	50
2.1	5
2.2	5
2.3	15
3.1	10
4.1, 4.2	5
5.1, 5.2	5
6.1, 6.2	5
8	5

Table C5.T3. Minimum Separation of Hazardous Chemicals from Other Chemicals

UN Class/ Division	1.1	2.1	2.2	2.3	3.1	4.1	4.2	4.3	5.1	5.2	6.1	8
1.1		C	C	C	C	C	C	C	C	C	C	C
2.1	C			C	B	B	C	B	C	C	B	B
2.2	C			C	A	A	B	A	A	B	A	A
2.3	C	C	C		C	C	C	C	C	C	C	C
3.1	C	B	A	C		B	B	B	C	C	B	A
4.1	C	B	A	C	B		B	B	C	C	B	A
4.2	C	C	B	C	B	B		B	C	C	B	A
4.3	C	B	A	C	B	B	B		C	C	B	B
5.1	C	C	A	C	C	C	C	C		B	B	B
5.2	C	C	B	C	C	C	C	C	B		C	B
6.1	C	B	A	C	B	B	B	B	B	C		A
8	C	B	A	C	A	A	A	B	B	B	A	

Legend:

A- Separation shall be on a distance of at least 3 m.
B- Separation shall be on a distance of at least 5 m.
C- They shall not be stored in the same chamber and the minimum separation distance between storage areas is 10 m.

Substances (including mixtures and solutions) and articles subject to these Regulations are assigned to one of nine classes according to the hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. These classes and divisions are:

Class 1: Explosives
- Division 1.1: Substances and articles which have a mass explosion hazard
- Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard
- Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard

or both, but not a mass explosion hazard
- Division 1.4: Substances and articles which present no significant hazard
- Division 1.5: Very insensitive substances which have a mass explosion hazard
- Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard

Class 2: Gases
- Division 2.1: Flammable gases
- Division 2.2: Non-flammable, non-toxic gases
- Division 2.3: Toxic gases

Class 3: Flammable liquids

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases
- Division 4.1: Flammable solids, self-reactive substances and solid desensitized explosives
- Division 4.2: Substances liable to spontaneous combustion
- Division 4.3: Substances which in contact with water emit flammable gases

Class 5: Oxidizing substances and organic peroxides
- Division 5.1: Oxidizing substances
- Division 5.2: Organic peroxides

Class 6: Toxic and infectious substances
- Division 6.1: Toxic substances
- Division 6.2: Infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles, including environmentally hazardous substances

C6. CHAPTER 6

HAZARDOUS WASTE

C6.1. SCOPE

This Chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed, and recycled in an environmentally sound manner.

C6.2. DEFINITIONS

C6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4., "List of Hazardous Waste/Substances/Material." with a U.S. Environmental Protection Agency (USEPA) waste number with the "P" designator, or those hazardous wastes in Table AP1.T4. with Hazard Code "H".

C6.2.2. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into or on any land or water that would allow the waste or constituent to enter the environment. Proper disposal effectively mitigates hazards to human health and the environment.

C6.2.3. DoD Hazardous Waste Generator. The Department of Defense considers a generator to be the installation, or activity on an installation, that produces a hazardous waste.

C6.2.3.1. Hazardous Waste Generator. The owner (and/or his agent) of any land or premises of any type where hazardous waste is generated. Any person (and/or his agent) trading in hazardous materials having hazardous residues of any kind or from any source.

C6.2.4. Elementary Neutralization. A process of neutralizing a HW, that is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

C6.2.5. Hazardous Waste Management Facility. Any facility (including the soil and its changes) used to store, treat or dispose of hazardous wastes.

C6.2.6. Hazardous Constituent. A chemical compound listed by name in Table AP1.T4., "List of Hazardous Waste/Substances/Material," or that possesses the characteristics described in section AP1.1.

C6.2.7. Hazardous Waste. A discarded material that may be solid, semi-solid, liquid, or contained gas, and either exhibits a characteristic of a hazardous waste as defined in section AP1.1. or is listed as a hazardous waste in Tables AP1.T1. through AP1.T4. Excluded from this definition are domestic sewage sludge, household wastes, and medical wastes.

C6.2.8. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area (HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

C6.2.9. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending, or other treatment is also hazardous waste fuel.

C6.2.10. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this FGS.

C6.2.11. Hazardous Waste Log. A listing of HW deposited and removed from an HWSA. Information such as the waste type, volume, location, and storage removal dates should be recorded.

C6.2.12. Hazardous Waste Profile Sheet (HWPS). A document that identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

C6.2.13. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. An HWSA may store more than 55 gallons of a HW stream, and more than one quart of an acute HW stream.

C6.2.14. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

C6.2.15. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

C6.2.16. Transportation. The process of transporting wastes outside the site whether through land, air or sea.

C6.2.17. Transporter. The person who transports wastes through land, air or sea.

C6.2.18. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste that would render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

C6.2.19. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The number could be the Unit Identification Code (UIC) or the DoD Activity Address Code (DoDAAC). The EEA should specify the method for determining the unique identification number in the FGS.

C6.2.20. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment. "Used oil," means any oil or other waste petroleum, oil, or lubricant (POL) product that has been refined from crude oil, or is synthetic oil, has been used and as a result of such use, is contaminated by physical or chemical impurities, or is off-specification and cannot be used as intended. Although used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, it is still considered used oil, unless it has been mixed with hazardous waste. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

C6.3. CRITERIA

C6.3.1. DoD Hazardous Waste Generators

C6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using their knowledge of the materials and processes that generated the waste, or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name), and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics should be measurable by standardized, and available testing protocols.

C6.3.1.2. An HWPS will be used to identify each hazardous waste stream. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams or process modifications that change the character of the hazardous waste being handled at the storage area.

C6.3.1.3. Each generator will use a unique identification number for all recordkeeping, reports, and manifests for hazardous waste.

C6.3.1.4. Pre-Transport Requirements

C6.3.1.4.1. Transportation

C6.3.1.4.1.1. When transporting HW via commercial transportation on Sultanate of Oman public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable Sultanate of Oman transportation regulations. Requirements may include placarding, marking, containerization, and labeling. Hazardous waste designated for international transport will be prepared in accordance with applicable international regulations. In the absence of Sultanate of Oman regulations, international standards will be used.

C6.3.1.4.1.2. When transporting HW via military vehicle on Sultanate of Oman public roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, if required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), Sultanate of Oman transportation regulations.

C6.3.1.4.2. Manifesting. All HW leaving the installation will be accompanied by a manifest to ensure a complete audit trail from point of origin to ultimate disposal. The manifest will include the information listed below. Sultanate of Oman forms will be used when applicable; otherwise, DD Form 1348-1A, "Issue Release/Receipt Document," or DD Form 1348-2, "Issue Release/Receipt Document with Address Label," may be used. This manifest should include:

C6.3.1.4.2.1. Generator's name, address, and telephone number;

C6.3.1.4.2.2. Generator's unique identification number;

C6.3.1.4.2.3. Transporter's name, address, and telephone number;

C6.3.1.4.2.4. Destination name, address, and telephone number;

C6.3.1.4.2.5. Description of waste;

C6.3.1.4.2.6. Total quantity of waste;

C6.3.1.4.2.7. Date of shipment; and

C6.3.1.4.2.8. Date of receipt.

C6.3.1.4.3. Generators will maintain an audit trail of HW from the point of generation to disposal. Generators using DRMS disposal services will obtain a signed copy of the manifest from the initial DRMS recipient of the waste, at which time the DRMS will assume responsibility. A generator, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different unique identification number (see definition C6.2.14.) will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer, and disposal of the waste. Activities desiring to dispose of their HW outside the DRMS system will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal.

C6.3.2. Hazardous Waste Accumulation Point (HWAP)

C6.3.2.1. An HWAP is defined in paragraph C6.2.8. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those that are chemically incompatible. Each HWAP will have warning signs (National Fire Protection Association or appropriate international sign) appropriate for the waste being accumulated at that site.

C6.3.2.2. An HWAP will comply with the storage limits in paragraph C6.2.6. When these limits have been reached, the generator will make arrangements within 5 working days to move the HW to an HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348-1A) to appropriate authorities responsible for removing the HW (e.g., DRMO). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-Quart) volume accumulation limits, but must be transported off-site to a final destination facility within 1 year.

C6.3.2.3. All criteria of paragraph C6.3.4., "Use and Management of Containers," apply to HWAPs with the exception of subparagraph C6.3.4.1.5., "Weekly Inspections."

C6.3.2.4. The following provisions of paragraph C6.3.5., "Recordkeeping Requirements," apply to HWAPs: C6.3.5.1. ("Turn-in Documents"), C6.3.5.5. ("Manifests"), and C6. 3.5.6. ("Waste Analysis/Characterization Records").

C6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate HW training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph C6.3.9.

C6.3.3. Hazardous Waste Storage Area (HWSA)

C6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

C6.3.3.2. Design and Operation of HWSAs. HWSAs must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned release of HW or HW constituents to air, soil, groundwater or surface water that could threaten human health or the environment. Hazardous waste should not be stored longer than 1 year in an HWSA.

C6.3.3.3. Waste Analysis and Verification

C6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served, will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

C6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, an HWPS for each waste stream that is stored at each HWSA.

C6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

C6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided.

C6.3.3.3.3.2. Ensure that no waste is accepted for storage unless an HWPS is provided, or is available and properly referenced.

C6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

C6.3.3.3.4. Analyze waste shipments in accordance with the waste analysis plan to determine whether it matches the waste description on the accompanying manifest and documents; and

C6.3.3.3.4.1. Reject shipments that do not match the accompanying waste descriptions unless the generator provides an accurate description.

C6.3.3.4. Security

C6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the HWSA grounds.

C6.3.3.4.2. Security System Design. An acceptable security system for a HWSA consists of either:

C6.3.3.4.2.1. A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the HWSA; or

C6.3.3.4.2.2. An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff) that completely surrounds the HWSA, combined with a means to control entrance at all times (e.g., an attendant, television monitors, locked gate, or controlled roadway access).

C6.3.3.4.3. Required Signs. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the HWSA, and at other locations, in sufficient numbers to be seen from any approach to the HWSA. The legend must be written in English and in any other language predominant in the area surrounding the installation, and must be legible from a distance of at least 25 feet. Existing signs with a legend other than "Danger Unauthorized Personnel Keep Out," may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the HWSA, and that entry can be dangerous.

C6.3.3.5. Required Aisle Space. Aisle space must allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation during an emergency. Containers must not obstruct an exit.

C6.3.3.6. Access to Communications or Alarm System

C6.3.3.6.1. General. Whenever HW is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

C6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

C6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

C6.3.3.7.1. An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel.

C6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams.

C6.3.3.7.3. Portable fire extinguishers, fire control equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment.

C6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems.

C6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, and eyewash and shower facilities.

C6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA communications alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its proper operation in time of emergency.

C6.3.3.8. General Inspection Requirements

C6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of HW constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

C6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of HW, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

C6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems (e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, or eroding dike).

C6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in subparagraph C6. 3.4.1.5. Minimum frequencies for inspecting tank systems are found in subparagraph C6.3.7.5.2. For equipment not covered by those paragraphs, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

C6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

C6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep the records for at least 3 years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

C6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate HW training program in accordance with the training requirements in paragraph C6.3.9.

C6.3.3.10. Storage Practices

C6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion, and generation of toxic gases.

C6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No Smoking" signs, or the appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "No Smoking" legend must be written in English and in any other language predominant in the area. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

C6.3.3.11. Closure and Closure Plans

C6.3.3.11.1. Closure. At closure of an HWSA, HW and HW waste residues must be removed from the containment system, including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of HW and according to the Closure Plan.

C6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA will also develop a Closure Plan. The Closure Plan will be implemented concurrent with the decision to close the HWSA. The Closure Plan will include: estimates of the storage capacity of the HW, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

C6.3.4. Use and Management of Containers

C6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following guidelines will apply when handling and storing HW containers.

C6.3.4.1.1. Containers holding HW will be in good condition, free from severe rusting, bulging, or structural defects.

C6.3.4.1.2. Containers used to store HW, including overpack containers, must be compatible with the materials stored.

C6.3.4.1.3. Management of Containers

C6.3.4.1.3.1. A container holding HW must always be closed during storage, except when it is necessary to add or remove waste.

C6.3.4.1.3.2. A container holding HW must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

C6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

C6.3.4.1.4. Containers holding HW will be marked with a HW marking, and a label indicating the hazard class of the waste contained (flammable, corrosive, etc.).

C6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking and deteriorating containers as well as deterioration of the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

C6.3.4.2. Containment. Container storage areas must have a secondary containment system meeting the following:

C6.3.4.2.1. Must be sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

C6.3.4.2.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

C6.3.4.2.3. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in subparagraph C6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

C6.3.4.2.4. Rainwater captured in secondary containment areas should be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the HW in the containers. Contaminated water shall be treated as HW until determined otherwise.

C6.3.4.3. Special Requirements for Ignitable or Reactive Waste. Areas that store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

C6.3.4.4. Special Requirements for Incompatible Wastes

C6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

C6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

C6.3.4.4.3. A storage container holding HW that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments, must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

C6.3.4.4.4. A transporter shall not mix wastes of different shipment characteristics by putting them in a single container. Moreover, the transporter shall abide by the labels that show the nature of wastes and take the necessary precautions.

C6.3.5. <u>Recordkeeping Requirements</u>

C6.3.5.1. <u>Turn-in Documents.</u> Turn-in documents, e.g., DD 1348-1A or manifests, must be maintained for 3 years.

C6.3.5.2. <u>Hazardous Waste Log.</u> A written HW log will be maintained at the HWSA to record all HW handled and should consist of the following:

C6.3.5.2.1. Name/address of generator;

C6.3.5.2.2. Description and hazard class of the hazardous waste;

C6.3.5.2.3. Number and types of containers;

C6.3.5.2.4. Quantity of hazardous waste;

C6.3.5.2.5. Date stored;

C6.3.5.2.6. Storage location; and

C6.3.5.2.7. Disposition data, to include: dates received, sealed, and transported, and transporter used.

C6.3.5.3. The HW log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

C6.3.5.4. <u>Inspection Logs.</u> Records of inspections should be maintained for a period of 3 years.

C6.3.5.5. <u>Manifests.</u> Manifests of incoming and outgoing hazardous wastes will be retained for a period of 5 years.

C6.3.5.5.1. The generator shall keep a copy of every transportation document until a signed copy from the facility specified in the document, to which wastes are shipped, is received. Also, the signed copy shall be kept for at least 5 years starting from the date wastes are received by the transporter.

C6.3.5.5.2. Hazardous waste transporter shall keep a copy of the transportation document signed by him/her, by the provider [generator] of wastes, and by the recipient of wastes for 5 years upon reception of wastes.

C6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until 5 years after closure of the HWSA.

C6.3.5.7. The installation will maintain records, identified in subparagraphs C6.3.5.1., C6.3.5.5., and C6.3.5.6. for all HWAPs on the installation.

C6.3.6. Contingency Plan

C6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of HW in accordance with the provisions of Chapter 18, "Spill Prevention and Response Planning."

C6.3.6.2. A current copy of the installation contingency plan must be:

C6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan that are pertinent to their facilities and operation); and

C6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and upon which the plan relies to provide emergency services. Contingency Plans should be available in both English and Arabic.

C6.3.7. Tank Systems. The following criteria apply to all storage tanks containing HW. See Chapter 19, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POLs and hazardous substances.

C6.3.7.1. Application. The requirements of this subparagraph apply to HWSAs that use tank systems for storing or treating HW. Tank systems that are used to store or treat HW that contain no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in subparagraph C6.3.7.4., Containment and Detection of Releases. Tank systems, including sumps that serve as part of a secondary containment system to collect or contain releases of HW, are exempted from the requirements in subparagraph C6.3.7.4.

C6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of subparagraph C6.3.7.4., installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

C6.3.7.3. Design and Installation of New Tank Systems or System Components. Managers of HWSAs installing new tank systems or system components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating HW. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

C6.3.7.4. Containment and Detection of Releases. To prevent the release of HW or hazardous constituents to the environment, secondary containment that meets the requirements of this subparagraph must be:

C6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

C6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

C6.3.7.4.3. Provided for tank systems that store or treat HW by 1 January 1999;

C6.3.7.4.4. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

C6.3.7.4.5. Constructed to include one or more of the following: a liner external to the tank, a vault, or double-walled tank.

C6.3.7.5. General Operating Requirements

C6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

C6.3.7.5.2. The installation must inspect and log at least once each operating day:

C6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

C6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

C6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of HW (e.g., wet spots, dead vegetation).

C6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA.

C6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or that is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

C6.3.7.6.1. Cessation of use; prevention of flow or addition of wastes. The installation must immediately stop the flow of HW into the tank system or secondary containment system and inspect the system to determine the cause of the release.

C6.3.7.6.2. Containment of visible releases to the environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

C6.3.7.6.2.1. Prevent further migration of the leak or spill to soil or surface water;

C6.3.7.6.2.2. Remove and properly dispose of any contaminated soil or surface water;

C6.3.7.6.2.3. Remove free product to the maximum extent possible; and

C6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

C6.3.7.6.3. Make required notifications and reports.

C6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable, and structures and equipment.

C6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

C6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

C6.3.8.1.1. Industrial furnaces.

C6.3.8.1.2. Boilers that are identified as follows:

C6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

C6.3.8.1.2.2. Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids;

C6.3.8.1.2.3. Used oil-fired space heaters provided that:

C6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

C6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.5 million BTU per hour; and

C6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

C6.3.8.2. Prohibitions on Dust Suppression or Road Treatment. Used oil, HW, or used oil contaminated with any HW will not be used for dust suppression or road treatment.

C6.3.8.3. Lead-acid batteries that are to be recycled will be managed as hazardous material. Lead-acid batteries that are not recycled will be managed as HW.

C6.3.9. Hazardous Waste Training

C6.3.9.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty after the effective date of this FGS must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05 (Reference (g)).

C6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

C6.3.9.3. Training Contents and Requirements. The training program must:

C6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

C6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience.

C6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

C6.3.9.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

C6.3.9.3.4.1. Emergency procedures (response to fire/explosion/spills; use of communications/alarm systems; body and equipment clean up);

C6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures;

C6.3.9.3.4.3. Employee Protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

C6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

C6.3.9.4. Documentation of Training. Installations must document all HW training for each individual assigned duties involving actual or potential exposure to HW. Updated training records on personnel assigned duties involving actual or potential exposure to HW must be kept by the HWSA manager or the responsible installation office and retained for at least 3 years after termination of duty of these personnel.

C6.3.10. Hazardous Waste Disposal

C6.3.10.1. All DoD HW should normally be disposed of through the DRMS. A decision not to use the DRMS for HW disposal may be made in accordance with DoDD 4001.1 (Reference (k)) to best accomplish the installation mission, but should be concurred with by the component chain of command to ensure that installation contracts and disposal criteria are at least as protective as criteria used by the DRMS.

C6.3.10.2. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or Sultanate of Oman law are not disposed of in the Sultanate of Oman unless the disposal is conducted in accordance with FGS and the following:

C6.3.10.2.1. When HW cannot be disposed of in accordance with FGS within the Sultanate of Oman, it will either be retrograded to the United States or, if permissible under international agreements, transferred to another country outside the United States where it can be disposed of in an environmentally sound manner and in compliance with FGS applicable to the country of disposal, if any exist. Transshipment of HW to a country other than the United States for disposal must be approved by, at a minimum, the DUSD(I&E).

C6.3.10.2.2. The determination of whether particular DoD-generated HW may be disposed of in the Sultanate of Oman will be made by the EEA, in coordination with the unified combatant commander, the Director of Defense Logistics Agency, other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

C6.3.10.3. Disposal Procedures

C6.3.10.3.1. The determination of whether HW may be disposed of in the Sultanate of Oman must include consideration of whether the means of treatment and/or containment technologies employed in the Sultanate of Oman program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the Sultanate of Oman program includes:

C6.3.10.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

C6.3.10.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

C6.3.10.3.1.3. Appropriate standards and limitations on the methods that may be used to treat and dispose of HW.

C6.3.10.3.1.4. Standards designed to minimize the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface, or groundwater.

C6.3.10.3.2. The EEA must also be satisfied, either through reliance on the Sultanate of Oman regulatory system and/or provisions in the disposal contracts, that:

C6.3.10.3.2.1. Persons and facilities in the waste management process have demonstrated the appropriate level of training and reliability; and

C6.3.10.3.2.2. Effective inspections, monitoring, and recordkeeping will take place.

C6.3.10.4. Sultanate of Oman facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the Sultanate of Oman as being in compliance with their regulatory requirements. This evaluation and approval may consist of having a valid permit or Sultanate of Oman equivalent for the HW that will be handled.

C6.3.10.5. Hazardous waste will be recycled or reused to the maximum extent practical. Safe and environmentally acceptable methods will be used to identify, store, prevent leakage, and dispose of HW, to minimize risks to health and the environment.

C6.3.10.6. Land Disposal Requirements. Hazardous wastes will only be land-disposed when there is a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal site for as long as the wastes remain hazardous. Hazardous waste may be land-disposed only in facilities meeting the following criteria:

C6.3.10.6.1. The land disposal facility has a liner and a leachate collection system. The liner will be of natural or man-made materials and restrict the downward or lateral escape of HW, hazardous constituents, or leachate. The permeability of such liners will be no greater than 10^{-7} cm/sec;

C6.3.10.6.2. The land disposal facility has a groundwater monitoring program capable of determining the facility's impact on the quality of water in the aquifers underlying the facility; and

C6.3.10.6.3. The requirements of subparagraphs C6.3.10.6.1. or C6.3.10.6.2., above, may be waived for a particular land disposal facility by the EEA if a written determination is made by a qualified geologist or geotechnical engineer that there is a low potential for migration of HW, hazardous constituents, or leachate from the facility to water supply wells, irrigation wells, or surface water. This determination will be based on an analysis of local precipitation, geologic conditions, physical properties, depth to groundwater, and proximity of water supply wells or surface water, as well as use of alternative design and operating practices. Methods for preventing migration will be at least as effective as liners and leachate collection systems required in subparagraph C6. 3.10.6.1.

C6.3.10.6.4. Landfills have to be designed, established, operated and maintained in a way that ensures that no leakage of wastes occurs to soil layers, ground water, or surface water, and that no dispersal due to winds will take place.

C6.3.10.7. Incinerator Standards. This subparagraph applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

C6.3.10.7.1. Incinerators used to dispose of HW must be licensed or permitted by a component Sultanate of Oman authority or approved by the EEA. This license, permit, or approval must comply with the criteria listed in subparagraph C6.3.10.7.2.

C6.3.10.7.2. A license, permit, or EEA approval for incineration of HW must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme that would require an incinerator to achieve the standards set forth in either subparagraphs C6. 3.10.7.2.1. or C6.3.10.7.2.2. is acceptable.

C6.3.10.7.2.1. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission of particulate matter, and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

C6.3.10.7.2.2. The incinerator has demonstrated, as a condition for obtaining a license, permit, or EEA approval, the ability to effectively destroy the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the competent 11N authority or the EEA to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

C6.3.10.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes categorized as hazardous on the basis of section AP1.1. and which, after treatment as described herein, no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix 1 will continue to be managed as 11W under the criteria of this FGS, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of 11N disposal alternatives. These technologies should not be implemented without consultation with the EEA, or the Combatant Commander, if there is no EEA.

C6.3.10.8.1. Organics

C6.3.10.8.1.1. Incineration in accordance with the requirements of subparagraph C6.3.10.7.1.

C6.3.10.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

C6.3.10.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentrations of a representative compound or indicator parameter (e.g., total organic carbon) has been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the 11W being biodegraded.

C6.3.10.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction;

liquid extraction; precipitation/crystallization, or phase separation techniques, such as decantation, filtration, and centrifugation when used in conjunction with one of the above techniques.

C6.3.10.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions.

C6.3.10.8.2. Heavy Metals

C6.3.10.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

C6.3.10.8.2.2. Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals.

C6.3.10.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits the characteristic for reactivity defined in Appendix 1.

C6.3.10.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3., will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

C6.3.10.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with subparagraphs C6.3.10.8.2.1. or C6.3.10.8.2.2. to stabilize, fix or recover heavy metals, as appropriate, and in accordance with subparagraph C6.3.10.8.4. to neutralize any corrosives before disposal.

C6.3.10.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accord with subparagraphs C6.3.10.7. and C6.3.10.8.

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C7. CHAPTER 7

SOLID WASTE

C7.1. SCOPE

This Chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated, and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4 (Reference (e)) and service solid waste management manuals. The criteria in this Chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are located in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste Management," Chapter 11, "Pesticides," and Chapter 14, "Polychlorinated Biphenyls."

C7.2. DEFINITIONS

C7.2.1. Aflaj. A channel dug into the earth or running along the earth's surface that is used to collect groundwater or natural spring water or to hold and collect flood water in order to be distributed and used for various purposes.

C7.2.2. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

C7.2.3. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

C7.2.4. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

C7.2.5. Collection Frequency. The number of times collection is provided in a given period of time.

C7.2.6. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

C7.2.7. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

C7.2.8. Construction and Demolition Waste. The waste building materials, packaging, and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures.

C7.2.9. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

C7.2.10. Curb Collection. Collection of solid waste placed adjacent to a street.

C7.2.11. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

C7.2.12. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

C7.2.13. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

C7.2.14. Generation. The act or process of producing solid waste.

C7.2.15. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

C7.2.16. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

C7.2.17. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities.

C7.2.18. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

C7.2.19. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

C7.2.20. Municipal Solid Waste (MSW). Normally, residential and commercial solid waste generated within a community, not including yard waste. (See also definition in Chapter 2, "Air Emissions.")

C7.2.21. Municipal Solid Waste Landfill (MSWLF) Unit. A discrete area of land or an excavation, on or off an installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. An MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

C7.2.22. Open Burning. Burning of solid wastes in the open, such as in an open dump.

C7.2.23. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

C7.2.24. Residential Solid Waste. The wastes generated by normal household activities, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

C7.2.25. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

C7.2.26. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

C7.2.27. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

C7.2.28. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

C7.2.29. Septic Tank. Means any structure designed to treat domestic wastewater by compartmentalized sedimentation and anaerobic biological degradation.

C7.2.30. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 9 1-8, Army TM 5-634 (Reference (l)), or their successor documents.

C7.2.31. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.32. Solid Wastes. Garbage, refuse, sludge, nonhazardous health care waste, and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.32.1. Solid Non-Hazardous Waste. Any solid material or semi-solid which does not have any danger to the environment or to the human health, if it is dealt with in a safe scientific way, they are:

C7.2.32.1.1. Household wastes.

C7.2.32.1.2. Solid materials or semi-solid discarded or produced from residential, commercial, industrial, agricultural and other activities.

C7.2.32.1.3. Construction and demolition debris.

C7.2.32.1.4. Metal scrap including discarded motor vehicles.

C7.2.32.1.5. Dewatered sludge from domestic, industrial or agricultural wastewater treatment always providing that such sludge contains no toxic constituents in concentrations in excess of those acceptable within the terms of the wastewater regulations.

C7.2.32.1.6. Slag and ashes from incineration processes always provided that these materials have an available toxic content within the criteria applied to the characterization of dewatered sludge from wastewater treatment.

C7.2.33. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

C7.2.34. Stationary Compactor. A powered machine that is designed to compact solid waste or recyclable materials and that remains stationary when in operation.

C7.2.35. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

C7.2.36. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

C7.2.37. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

C7.2.38. Treatment Facility. Any sites established for the treatment of solid non-hazardous waste.

C7.2.39. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

C7.2.40. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

C7.3. CRITERIA

C7.3.1. DoD solid wastes will be treated, stored, and disposed of in facilities that have been evaluated against paragraphs C7.3.12., C7.3.14., and C7.3.15. These evaluated facilities will be used to the maximum extent practical.

C7.3.2. Installations will cooperate with Sultanate of Oman officials, to the extent possible, in the solid waste management planning process.

C7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting, and waste minimization efforts.

C7.3.4. All solid wastes or materials that have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled to avoid spillage.

C7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2, "Air Emissions," or hazardous constituents as defined in Chapter 6, "Hazardous Waste." Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 14, and 15 of this FGS.

C7.3.6. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of this FGS, there will be provisions for storage in accordance with these guidelines that will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

C7.3.7. Storage containers should be leak-proof, waterproof, and vermin-proof, including sides, seams and bottoms, and be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking, or deforming in a manner that would impair serviceability. Storage containers should have functional lids.

C7.3.8. Containers should be stored on a firm, level, well-drained surface that is large enough to accommodate all of the containers and that is maintained in a clean, spillage-free condition.

C7.3.9. Recycling programs will be instituted on DoD installations in accordance with the policies in Reference (e).

C7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located, and only after justification that unique circumstances mandate a new unit.

C7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

C7.3.11.1. Location restrictions with regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, and unstable areas; and

C7.3.11.2. Procedures for excluding hazardous waste.

C7.3.11.2.1. No waste other than solid non-hazardous waste shall be disposed of in sanitary landfills.

C7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions, and record keeping requirements; and

C7.3.11.4. Inspection program.

C7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

C7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with the EEA, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

C7.3.12. Installations operating MSWLF units will:

C7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day.

C7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

C7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, PCBs, and wastes determined unsuitable for the specific MSWLF unit.

C7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling.

C7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

C7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

C7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation.

C7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

C7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

C7.3.12.9.1. Install ventilation systems including wells and conduits to control release and disposal of gases in a safe way in order to avoid generation of toxic or explosive gases and to make use of some of these gases if required.

C7.3.12.10. Operate in an aesthetically acceptable manner.

C7.3.12.11. Operate in a manner to protect aquifers.

C7.3.12.12. Control public access to landfill facilities.

C7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

C7.3.12.14. Maintain records on the preceding criteria.

C7.3.12.15. During closure and post-closure operations, installations will:

C7.3.12.15.1. Install a final cover system that is designed to minimize infiltration and erosion.

C7.3.12.15.2. Ensure that the infiltration layer is composed of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or a combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present, or a permeability no greater than.00005 cm/sec, whichever is less.

C7.3.12.15.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earthen material that is capable of sustaining native plant growth.

C7.3.12.15.4. If possible, revegetate the final cap with native plants that are compatible with the landfill design, including the liner.

C7.3.12.15.5. Prepare a written Closure Plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, groundwater monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. The post-closure period will be a minimum of 5 years.

C7.3.13. Open burning will not be the regular method of solid waste disposal. Where burning is the method, incinerators meeting air quality requirements of Chapter 2, "Air Emissions," will be used.

C7.3.14. A composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") will comply with the following criteria:

C7.3.14.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge, and other materials, such as nutrient or bulking agents being composted, including the source and volume or weight of the material.

C7.3.14.1.1. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

C7.3.14.1.2. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically.

C7.3.14.1.3. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system.

C7.3.14.1.4. The temperature and retention time for the material being composted must be monitored and recorded.

C7.3.14.1.5. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate, nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCBs.

C7.3.14.1.6. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

C7.3.14.1.6.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing to maintain aerobic conditions during the composting process; and

C7.3.14.1.6.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55°C. A stabilization period of at least 7 days must follow the decomposition period.

C7.3.15. Classification and Use of Compost from DoD Composting Facilities. Compost produced at a composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

C7.3.15.1. Class A compost must be stored until the compost is matured, i.e., 60 percent decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated below. The compost must be stabilized and contain no greater amounts of inert material than indicated. Allowable average contaminant concentrations in milligrams per kilogram on a dry weight basis are:

PCB	1
Cadmium	10
Chromium	1,000
Copper	500
Lead	500
Mercury	5
Nickel	100
Zinc	1,000

C7.3.15.2. Class B compost consists of any compost generated that fails to meet Class A standards.

C7.3.15.3. Compost distribution and end use:

C7.3.15.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

C7.3.15.3.2. Class B compost may not be distributed for agricultural applications.

C7.3.16. No solid non-hazardous waste should be mixed with any category of hazardous waste at any time.

C7.4 ADDITIONAL REQUIREMENTS

C7.4.1. Any sludge having concentrations of compounds greater than the limits prescribed in C7.T1 shall be disposed of in sanitary landfills.

C7.4.2. The user of commercial, industrial, agricultural or any other sites who produce solid non-hazardous waste except domestic waste, shall collect these waste and transport it in a safe manner.

C7.4.3. Operators of solid non-hazardous waste treatment facilities and sanitary landfills shall keep records of daily operation.

C7.4.4. Import of solid non-hazardous waste to the Sultanate of Oman is prohibited.

C7.4.5. Any building having more than four floors must have a garbage collection room on the ground floor, as follows:

C7.4.5.1. The area of such room shall be 7.5 square meters and the smallest side thereof shall be not less than 2.5 meters.

C7.4.5.2. It shall be constructed with incombustible material.

C7.4.5.3. The surface of its floor and walls must by durable, smooth and resistant to humidity.

C7.4.5.4. It must be provided with water supply and drainage for cleaning the room and the garbage collection bins.

C7.4.5.5. Access to it must be from a back entrance or a side road.

C7.4.5.6. Each unit of the building must have an opening on each floor connected to a main pipe extending alongside the entire building and joined to the garbage collection room.

C7.4.5.7. The waste pipes installed in the buildings must be circular, of not less than 60 cm diameter, made of incombustible and rust-proof material and shall have ventilation openings on the roof top covered with mesh.

C7.4.6. Sludge accumulated in septic tanks must be periodically removed whenever necessary.

C7.4.7. Guidelines for location, design and operation of sanitary landfills for solid non-hazardous waste. Below are the standards and guidelines to be observed for site selection.

C7.4.7.1. The site shall be at a reasonable distance from a network of roads in order to reduce transportation costs and to avoid expenditure in construction of secondary roadways. Nuisance to the public by traffic in highways should be avoided.

C7.4.7.2. The site shall be far away from residential areas and other sensitive areas. The site should be greater than two km from residential areas and one km from other institutions.

C7.4.7.3. The site shall be far away from air navigation lines in order to avoid air incidents arising out of congregation of birds in an around the site. The distance should be greater than 7 km.

C7.4.7.4. The site shall be away from wadi courses and flood plains.

C7.4.7.5. Near the site, there shall be sufficient quantities of non-organic soil. Clay, sandy or alluvial soil to be used for daily cover.

C7.4.7.6. A comprehensive survey shall be conducted at the site including a soil survey as part of a detailed survey addressing technical, topographical, hydrological and geological aspects.

C7.4.7.7. The site should be, as far as possible, on a non-porous or impermeable rocky layer. If this is not possible the site should be lined by impermeable material such as clay soil or plastic or both to prevent seepage of pollutants from the site to the ground water.

C7.4.7.8. Construction of a drainage system to discharge liquids flowing from the site. The system should end with an evaporation pond lined by impermeable material.

C7.4.7.9. The site should be outside the area of direct recharge of underground water.

C7.4.7.10. Preparation of a site plan detailing all development activities, premises if any, geographical features and natural resources including water resources such as wells and aflaj. The plan shall cover a circle of a radius of 10km around the site.

C7.4.8. Equipment necessary at the sanitary landfill.

C7.4.8.1. Compactor and earthmover to be available on daily basis.

C7.4.8.2. Bulldozer to remove and distribute the soil required for the daily covering operation, if this cannot be done by the compactor.

C7.4.8.3. Drilling equipment and tippers for transportation and dispersion of the soil required for daily covering operation.

C7.4.8.4. Simple firefighting equipment.

C7.4.9. The site of sanitary landfill shall include waste receipt area and waste disposal area. The receipt area shall be at the entrance of the landfill. Movement to all directions shall be branched from this point. The disposal area shall be divided into various stages. One stage shall be operative at a time. The design of each stage shall allow accommodation of waste for a period ranging between 3 to 4 years. In order to estimate the site capacity it can be assumed that compacted waste, after a certain degree of stability, may occupy a space reaching 1.2 m^3/ton while incompact waste may occupy a space of 2 m^3/ton. Moreover, materials used for daily and final cover operations must be included in capacity estimation.

C7.4.10. Sludge originating from treated wastewater shall be dried in order to contain at least 20% of dry solid, provided that sludge shall not exceed 15% of the total volume of deposited solids in the sanitary landfill.

C7.4.11. No liquid waste or hazardous waste including hospital waste shall be disposed of in sanitary landfills.

C7.4.12. The site shall be fenced and the entrance shall be closed in order to avoid random waste dumping and dispersion by wind and to keep animals out of the site.

C7.4.13. The entrance should be guarded during work hours and closed by the end of work hours.

C7.4.14. All waste received at the site shall be monitored and recorded by type, quantity, and source.

C7.4.15. Site staff shall be given necessary instructions about management of the site and type of solid waste that is allowed at the site.

C7.4.16. Large refuse heaps should be covered by nets or temporary fences to avoid dispersion of refuse.

C7.4.17. Incoming solid waste shall be discharged at front edge of the sanitary landfill face.

C7.4.18. Disposed solid waste shall be layered with soil on a daily basis and compacted.

C7.4.19. Spaces between waste particles allow penetration of oxygen, which mixes with gases generated by waste decomposition, a process that may lead to internal combustion by heat. Therefore the compactor shall be moved over the waste layers several times daily so as to crush and compress waste particles.

C7.4.20. Depth of each waste layer shall be in the range of 0.5-2.0 meters before compaction. Compacted waste layers shall be covered by a layer of suitable filling material of a thickness of 0.25 meters.

C7.4.21. Sanitary landfill shall always be kept clean and tidy. Sweeping and scavenging are not allowed in order to avoid health hazards and interruption of operation process.

C7.4.22. Use of sludge in agricultural lands. Liquid, wet, dry or composted sludge can be used in different fields, provided that the concentration of pollutants in the sludge shall not exceed the limits shown in Table C7.T2. These types of sludge can also be used in reclamation of non-agricultural lands, such as parks, green playgrounds, graveyards, highways and airport aprons, provided that the concentration of pollutants in the sludge shall not exceed the limits shown in Table C7.T3.

C7.4.23. Use of Non-Dry Sludge in Silviculture (Forestry). Non-dry sludge must be placed in a minimum 50 cm trench. The trench must be covered with a minimum of 30 cm of soil. Mixing of the sludge cannot occur until 3 months after initial disposal.

C7.4.24. Use of Dry Sludge in silviculture, horticulture and productive cultivation, except cultivation of vegetables that have fruits in the soil and that are eaten fresh, such as carrot, radish and green onion. Must have a minimum soil or combination of soil/gravel cover of 20 cm over the dry sludge.

C7.4.25. Provisions for collecting and drying of sludge produced from a DWTS. The following requirements apply to collection and drying of sludge produced from a DWTS:

C7.4.25.1. Collect the sludge in a proper site with the following:

C7.4.25.1.1. Specify a site away from residential areas, with a proper protection wall.

C7.4.25.1.2. Provide the site with required health utilities and facilities.

C7.4.25.1.3. Provide the site with required services (electricity, water, roads)

C7.4.25.1.4. Provide the site with required spreading and mixing machines.

C7.4.25.1.5. Provide technical staff, as well as integrated supervision staff for receiving and distribution.

C7.4.25.2. Cover the sludge with a 50 cm layer as a maximum.

C7.4.25.3. Provide automatic mixing of the sludge periodically for a minimum of 6 months, in order to ensure drying is complete and bacteria are eliminated.

C7.4.26. The maximum limits allowed for the concentrations of heavy metals and organic compounds in the piled sludge in the surface landfill sites are provided in Table C7.T4.

C7.4.27. Maximum limits allowed for concentrations of pollutants in the leachate (TCLP) are provided in Table C7.T5.

Table C7.T1 Reuse of Sludge in Agriculture - Conditions for Application to Land

Compound	Max. Concentration (mg/kg on a dry weight basis	Max. Application Rate (kg/ha/yr)	Max. Permitted Concentration in Soil (mg/kg of dry solids) Based on a 10 year average and a soil pH > 7.0
Arsenic	75	2	14
Cadmium	20	0.150	3
Chromium	1,000	10	400
Cobalt	150	1.8	
Copper	1,000	10	46
Lead	840	15	30
Mercury	10	0.1	1
Molybdenum	20	0.1	3
Nickel	300	3	75
Selenium	10	0.15	5
Zinc	3,000	15	170
Aldrin/diealdrin	Not Available	0.016	Not Available
Benzo (a)pyrene	Not Available	0.13	Not Available
Chloradane	Not Available	1.2	Not Available
DDT/DDE/DDD	Not Available	0.0055	Not Available
Dimethyl nitrosamine	Not Available	0.039	Not Available
Heptachlor	Not Available	0.073	Not Available
Hexachlorobenzene	Not Available	0.039	Not Available
Hexachlorobutadiene	Not Available	0.34	Not Available
Lindane	Not Available	4.6	Not Available
Polychlorindated biphenyl	Not Available	0.0056	Not Available
Toxaphene	Not Available	0.048	Not Available
Trichloroethylene	Not Available	0.013	Not Available

After the spreading of sludge there must be a minimum period of three weeks before grazing or harvesting of forage crops.

Sludge use is prohibited on soils with fruit or vegetable crops except for fruit trees, for 6 months preceding the harvesting of fruit or vegetables which grow in contact with the soil and which are normally eaten raw, and on soils with a pH < 7.0.

Table C7.T2. Maximum Limits Allowed for Biological (Microbiological) Pollutants of Sewage Sludge Used for Agricultural Purposes

#	Pollutants	Maximum limits
1	Total Coliform	1000 bacilli per 1 g
2	Fecal Coliform	100 bacilli per 1 g
3	Salmonella	< 3 bacilli per 4 dry g
4	Viable Helminth Eggs	< 1 egg per 4 dry g
5	Enteric Viruses	< 1 (unit) per 4 dry g

Table C7.T3. Maximum Limits Allowed for Concentrations of Heavy Metals and Organic Compounds in the Dry Sludge Used in Non-Agricultural Lands

#	Pollutants	Mg/kg (Dry Weight)
1	Zinc (Zn)	3600
2	Arsenic (AS)	36
3	Cadmium (Cd)	3100
4	Chromium (Cr)	380
5	Copper (Cu)	3300
6	Lead (Pb)	1600
7	Mercury (Hg)	30
8	Molybdenum (Mo)	230
9	Nickel (Ni)	990
10	Selenium (Se)	64
11	Chlordane	24
12	DDT/DDE/DDD	0.11
13	Toxaphene	0.79
14	Trichloroethylene	180
15	Aldrin/dieldrin	0.33
16	Lindane – insecticide	92
17	Heptachlor	1.5
18	Dimethyl nitrosamine	1.4
19	Hexachlorobenzene	2.8
20	Hexachlorobutadiene	6.8
21	Polychlorindated biphenyl	0.11
22	Benzo (a)pyrene	6.9

Table C7.T4. Maximum Limits Allowed for Concentrations of Heavy Metals and Organic Compounds in the Piled Sludge in Surface Landfill Sites.

#	Pollutants	Mg/kg/DW
1	Arsenic (AS)	36
2	Cadmium (Cd)	385
3	Copper (Cu)	3300.3
4	Lead (Pb)	1622
5	Mercury (Hg)	17
6	Nickel (Ni)	988
7	DDT/DDE/DDD	0.95
8	Lindane – insecticide	2.3
9	Toxaphene	0.5
10	Trichloroethylene	181
11	Chlordane	180
12	Dimethyl nitrosamine	1.4
13	Polychlorindated biphenyls	49
14	Benzene	15
15	Benzo(a)pyrene	99
16	Bis (2-ethylhexyl) phthalate	782

Table C7.T5. Maximum Limits Allowed for Concentrations of Pollutants in the Sanitary Landfill Leachate (TCLP)

#	Pollutants	Leachate concentration, mg/l
1	Arsenic (As)	5
2	Barium (Ba)	10
3	Benzene	0.5
4	Cadmium (Cd)	1
5	Carbon Tetra Choldide (CCI4)	0.5
6	Cholorobenzene	100
7	Chloroform	6
8	Chromium (Cr)	5
9	Cresol	200
10	Para Cresol	200
11	1,4- Dichlorobenzene	7.5
12	1,2- Dichloroethene	10
13	1,1- Dichloroethylene	0.7
14	Dihexyl phthalate	10
15	2,4- Dinitrotoluene	0.13
16	Ethylbenzene	70
17	Hexachlorobenzene	0.13
18	Hexachlorobutadiene	0.5
19	Hexachloroethane	3
20	Iron (Fe)	5
21	Mercury (Hg)	0.2
22	Methyl Ethel Ketone	200
23	Nickel (Ni)	10
24	Nitrobenzene	2
25	Pentachlorophenol	100
26	Pyridine	5
27	Elime	1
28	Silver (Ag)	5
29	Stearine	10
30	Tetrachloridethelene	0.7
31	Toluene	10
32	Trichloroethylene	0.5
33	Tricholorinatedphenyl	400
34	Chlorinated phenyl	0.2
35	Xylene	70

C8. CHAPTER 8

MEDICAL WASTE MANAGEMENT

C8.1. SCOPE

This Chapter contains criteria for the management of medical waste at medical, dental, research and development, and veterinary facilities generated in the diagnosis, treatment, or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This waste also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

C8.2. DEFINITIONS

C8.2.1. Chemical Waste. Chemical waste is considered hazardous if it has any of the following properties:

C8.2.1.1. Toxic, Flammable, Corrosive, Reactive or explosive.

C8.2.1.2. Can cause physical defects in fetuses (teratogenic) or causing genetic mutations (mutagenic), or cause cancer (carcinogenic), or stop the growth of cells (cytostatic).

C8.2.2. Consignment Note. It is the form that contains all the completed information and signed by the generator and the transporter and the disposal facility, which normally consists of several copies that accompany the healthcare waste load being transported from the waste generating facility to the treatment unit.

C8.2.3. Facility. Any hospital, clinic, medical or veterinary center, pharmaceutical company, medical or pharmaceutical research institution, laboratory, public or private wellness centers.

C8.2.4. Generator. Any person, natural or legal, whose activities generate healthcare wastes such as healthcare facilities.

C8.2.5. Healthcare Waste. It is the waste generated by facilities offering various types of healthcare, laboratories, facilities for the manufacture of drugs, pharmaceuticals and vaccines, veterinary institutions, research institutions, and from home treatment and patient care. It consists of two types:

C8.2.5.1. Non-Hazardous Healthcare Waste. It consists of all the wastes that are found in municipal wastes, and it is generated by administrative institutions and by the general cleaning activities in healthcare institutions. This constitutes the major part of healthcare wastes, and it is treated in the same way as municipal waste.

C8.2.5.2. Hazardous Healthcare Waste. It consists of wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C8.2.6. Infectious Agent. Any organism (such as a virus or bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

C8.2.7. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitology laboratory.

C8.2.8. Infectious Medical Waste. Solid waste produced by medical and dental treatment facilities that is specially managed because it has the potential for causing disease in humans and may pose a risk to both individuals or community health if not managed properly, and that includes the following classes:

C8.2.8.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration, are known to cause disease in humans.

C8.2.8.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Animal carcasses, body parts, blood, and bedding from contaminated animals are also included.

C8.2.8.3. Human blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products, that are capable of releasing these materials during handling.

C8.2.8.4. Potentially infectious materials, including human body fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

C8.2.8.5. Sharps, including hypodermic needles, syringes, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste.

C8.2.8.6. Infectious waste from isolation rooms, but only including those items that were contaminated or likely to have been contaminated with infectious agents or pathogens, including excretion exudates and discarded materials contaminated with blood.

C8.2.8.7. Wastes resulting from the manufacture and preparation of drugs and pharmaceutical substances, damaged, expired or contaminated pharmaceutical products, serums, vaccines, including the containers and equipment used in their manufacture, packaging and distribution.

C8.2.8.8. Wastes that can affect genes and cells, causing health problems such as physical defects in fetuses or that can cause cancer or prevent cellular growth. These substances are used in nuclear medicine and in tumor treatment units, and for diagnostic purposes using radioactive substances. This includes tap water from bathrooms used by patients treated with these substances.

C8.2.9. Noninfectious Medical Waste. Solid waste created that does not require special management because it has been determined to be incapable of causing disease in humans or which has been treated to render it noninfectious.

C8.2.10. Pressurized Gas Containers. They include empty or damaged pressurized containers used for packaging inert or potentially harmful gases. These containers may explode if punctured or exposed to high temperatures.

C8.2.11. Radioactive Waste. It includes all solid and liquid substances that has radioactivity, and which are used in medical examination, diagnosis and treatment, and all materials that have been contaminated by them (whether these materials are solid or liquid).

C8.2.12. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

C8.2.13. Storage. It is the temporary storage of hazardous healthcare waste in a specific collection area.

C8.2.14. Transporter. It is the natural or legal person (a company, a public or private institution) who works in the field of transporting hazardous healthcare wastes to the treatment and disposal unit.

C8.2.15. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed.

C8.2.16. Waste Incineration. It is the process by which combustible solid, liquid and gaseous wastes are disposed of in high temperatures, such that the gases, substances or compounds that are produced as a result do not affect the environment, and the burnt materials do not contain hazardous substances.

C8.2.17. Waste Segregation. It is the segregation of the hazardous healthcare waste (by the generator) starting from the point of generation and through the stages of collection, packaging, storage, and transport within the facility.

C8.3. CRITERIA

C8.3.1. Infectious medical waste will be separated, if practical, from other solid waste at the point of origin.

C8.3.1.1. Hazardous healthcare wastes shall be segregated as follows:

C8.3.1.1.1. Infectious waste.

C8.3.1.1.2. Pathological waste.

C8.3.1.1.3. Sharps waste.

C8.3.1.1.4. Pharmaceutical waste.

C8.3.1.1.5. Genotoxic and Cytotoxic waste.

C8.3.1.1.6. Chemical waste.

C8.3.1.1.7. Radioactive waste.

C8.3.1.1.8. Pressurized gas containers.

C8.3.2. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M (Reference (j)) and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. Defense Reutilization and Marketing Offices (DRMOs) have no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

C8.3.3. Solid waste that is classified as a hazardous waste in accordance with Appendix 1 will be managed in accordance with the criteria in Chapter 6, "Hazardous Waste."

C8.3.4. Mixtures of other solid waste and infectious medical waste will be handled as infectious medical waste.

C8.3.5. Radioactive medical waste will be managed in accordance with Service Directives.

C8.3.6. Infectious medical waste will be segregated, transported, and stored in bags or receptacles a minimum of 3 mils thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use.

C8.3.7. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and Arabic, and will include markings that identifies the generator, date of generation, and the contents.

C8.3.7.1. Labeling Requirements. The generator of hazardous healthcare waste shall print or put adhesive stickers on the waste containers and bags before transporting it to the storage area inside the healthcare facility or the treatment unit. These adhesives shall contain the following information:

C8.3.7.1.1. Name of Waste,

C8.3.7.1.2. Name of the location (the department or wing), C8.3.7.1.3. The type of waste generated according to the categories in C8.3.1.1.

C8.3.7.1.4. The weight and amount of waste stored inside the container or bag,

C8.3.7.1.5. The time and date of collection,

C8.3.7.1.6. The time and date of transport.

C8.3.8. Sharps will only be discarded into rigid receptacles. Needles will not be clipped, cut, bent, or recapped before disposal. Sharps waste should be collected in rigid yellow containers that are puncture-proof and leak-proof. The container should be clearly labeled with the words "Sharps Wastes" in English and Arabic and the Infectious Substances Symbol.

C8.3.9. Infectious medical waste will be transported and stored to minimize human exposure, and will not be placed in chutes or dumbwaiters.

C8.3.10. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph C8.3.17. Containers holding sharps will not be compacted.

C8.3.11. All anatomical pathology waste (i.e., large body parts) must be placed in containers lined with plastic bags that comply with paragraph C8.3.6., and may only be disposed of in a landfill or by burial in a designated area after being treated for disposal by incineration or cremation.

C8.3.12. Blood, blood products, and other liquid infectious wastes will be handled as follows:

C8.3.12.1. Bulk blood and blood products may be decanted into a sewer system connection (sinks, drains, etc.), unless pre-treatment is required. If pre-treatment is required, the methods contained in Table C8.T1., "Treatment and Disposal Methods for Infectious Medical Waste," will be employed prior to discharge to the sewer system. The emptied containers will continue to be managed as infectious medical waste.

C8.3.12.2. Suction canister waste from operating rooms will either be decanted into a clinical sink or will be sealed into leak-proof containers and incinerated.

C8.3.13. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

C8.3.13.1. Requirements for collection and transportation inside the healthcare facility. The collection and transportation of hazardous healthcare waste containers and bags require the use of carts or trolleys dedicated solely for that purpose, and handled by trained personnel in order to guarantee the highest levels of safety during the collection and transportation process inside the healthcare facilities, so that the contents of the containers or bags do not spill or leak.

C8.3.14. If infectious medical waste cannot be treated on-site, it will be managed during storage as follows:

C8.3.14.1. Infectious medical waste will be maintained in a nonputrescent state, using refrigeration as necessary.

C8.3.14.2. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

C8.3.15. Storage sites must be:

C8.3.15.1. Specifically designated;

C8.3.15.2. Constructed to prevent entry of insects, rodents, and other pests;

C8.3.15.3. Prevent access by unauthorized personnel; and

C8.3.15.4. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and Arabic.

C8.3.16. Bags and receptacles containing infectious medical waste must be placed into rigid or semi-rigid, leak-proof containers before being transported off-site.

C8.3.17. Infectious medical waste must be treated in accordance with Table C8.T1., "Treatment and Disposal Methods for Infectious Medical Waste," and the following before disposal:

C8.3.17.1. Sterilizers must maintain the temperature at 121 ℃ (250 ℉) for at least 30 minutes at 15 psi.

C8.3.17.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips or an equivalent biological performance test.

C8.3.17.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens, and must meet applicable criteria in Chapter 2, "Air Emissions."

C8.3.17.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6, "Hazardous Waste." Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

C8.3.17.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

C8.3.18. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

C8.3.19. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

C8.3.19.1. Response personnel must comply with paragraph C8.3.13.

C8.3.19.2. Blood, body fluid, and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste.

C8.3.19.3. Surfaces contacted by infectious medical waste must be washed with soap and water and chemically decontaminated in accordance with subparagraph C 8.3.17.5.

C8.3.20. Installations will keep records of the following information concerning infectious medical waste for at least 3 years after the date of disposal:

C8.3.20.1. Type of waste;

C8.3.20.2. Amount of waste (volume or weight);

C8.3.20.3. Treatment, if any, including date of treatment; and

C8.3.20.4. Disposition, including date of disposition, and if the waste was transferred to Sultanate of Oman facilities, and receipts acknowledging subparagraphs C8.3.20.1. - C8.3.20.3. for each transfer.

C8.4. ADDITIONAL REQUIREMENTS

C8.4.1. Generators of hazardous healthcare waste should minimize the rate of generation of these wastes both in terms of size and type of wastes generated.

C8.4.2. The generator of hazardous healthcare wastes should separate them from non-hazardous healthcare wastes at the source of generation. The waste generator is directly responsible for the segregation and packaging in locations designated for these purposes within the healthcare facilities and the medical units according to the following:

C8.4.2.1. Liquid chemical wastes should be collected in yellow containers that are tamper-proof and leak-proof, and clearly labeled with the words "Chemical Waste". Solid chemical waste should be collected in yellow plastic bags with the words "Chemical Waste - Drugs" and the Infectious Substances Symbol.

C8.4.2.2. Pharmaceutical drug residues or potentially contaminated pharmaceutical substances should be disposed of by placing them in impermeable containers, and then placed in yellow plastic bags labeled "Drugs, Pharmaceuticals" and the Infectious Substances Symbol affixed.

C8.4.2.3. Highly infectious and hazardous wastes - resulting from microbial cultures – must be collected in plastic bags suitable for preliminary treatment inside the departments generating these wastes. After preliminary treatment, these plastic bags are put in yellow plastic bags with the words "Hazardous Medical Waste" printed on them, as well as the Infectious Substances Symbol affixed.

C8.4.2.4. Genotoxic and cytotoxic wastes should be collected in leak-proof yellow containers with the words "Cytotoxic Residues" printed on them. They should be returned to where they originally came from, or incinerated at very high temperatures (1200° Celsius or above). They should not be buried or discharged into the domestic (municipal or city) sewage system, and they should not be mixed with other pharmaceutical substances.

C8.4.2.5. The markings on the containers and bags should be of an appropriate size, and with an indelible and waterproof ink.

C8.4.2.6. The Infectious Substances Symbol should be put on the containers or bags.

C8.4.2.7. Requirements for collection and transportation inside the healthcare facility:

C8.4.2.7.1. Before the collection and transportation of hazardous healthcare waste containers and bags, it should be ensured that they are tightly closed, and that they have the consignment note describing the type of waste they contain, and they should have the Infectious Substances Symbol printed on them.

C8.4.2.7.2. The bags should not be more than three-quarters full. They should not be pressed, squeezed, held close to the body, or held by the bottom during transportation. Instead, they should be held from the top during transportation.

C8.4.2.7.3. Hazardous healthcare waste should be transported by means of lidded carts or trolleys inside the healthcare facility and dedicated solely for that purpose. The design should ensure functionality during loading and unloading, they should be rigid and impermeable, in addition to being easily cleaned and disinfected.

C8.4.2.7.4. Hazardous healthcare waste from departments and rooms of infectious diseases and isolation departments should be collected under direct supervision of the person in charge of the waste management department at the facility.

C8.4.2.7.5. Human body parts, tissues, fetal and placental tissues should be collected separately and stored in the refrigerated mortuary, or in a special refrigerator until they are disposed of according to established procedures in place in each country.

C8.4.2.7.6. Animal carcasses and tissues are collected and stored separately in a refrigerator until they are treated and disposed of.

C8.4.2.7.7. The dedicated carts or trolleys are cleaned and washed for the collection and transportation of hazardous healthcare wastes, and are disinfected daily by trained personnel and under the supervision of the person in charge of healthcare waste in the healthcare facility. This is carried out in a dedicated area, and the wastes from the cleaning process are treated before discharge or disposal.

C8.4.2.7.8. Non-hazardous healthcare waste should be collected in black plastic bags, and are not subject to hazardous healthcare waste packaging, collection and transportation inside the facility and storage.

C8.4.2.7.9. The following procedures should be followed by all healthcare institutions that wish to store hazardous healthcare waste temporarily inside the facility until it is transported to the treatment unit:

C8.4.2.7.9.1. Designating an area inside the healthcare facility as a central location for collecting all hazardous healthcare wastes generated by that facility.

C8.4.2.7.9.2. The waste should be packaged in containers or bags before storage.

C8.4.2.7.9.3. The storage area should be suitable such that it does not cause pollution, or poses a health risk or a risk to the environment.

C8.4.2.7.9.4. The storage area should be in a building that is secure, and equipped against leakage or rain water, the spread of odors, rodents, insects, and stray birds and animals. It should have a solid resistant floor that can be washed and disinfected, and equipped with a good drainage system.

C8.4.2.7.9.5. The storage area should be fitted with safety equipment and fire protection systems.

C8.4.2.7.9.6. The storage area should be managed by personnel trained in the field of hazardous healthcare waste management.

C8.4.2.7.9.7. The storage area should be equipped with appropriate air conditioning, well-lit, well-ventilated, and the temperature should be between 15° - 18° Celsius.

C8.4.2.7.9.8. The period of storage for hazardous healthcare waste should not exceed 24 hrs.

C8.4.2.7.9.9. Easy access to the storage area for storage, transportation and cleaning purposes.

C8.4.2.7.9.10. The storage area should be located far from food storage areas and kitchens and places where food is prepared. It should be located away from patient care areas.

C8.4.2.7.9.11. Only permitted employees are allowed access to the storage area.

C8.4.2.7.9.12. Signs should be placed on the storage area indicating the type of materials contained in the area.

C8.4.2.7.9.13. The area should be equipped with appropriate cleaning equipment, disinfectants and sterilization materials for use in the routine cleaning of the location, in emergencies and waste spills.

C8.4.2.7.9.14. The persons in charge of the area will have a contingency plan for spills.

C8.4.2.7.10. The following procedures should be followed by the hazardous healthcare waste generator before transporting the waste outside the facility:

C8.4.2.7.10.1. Packaging the hazardous healthcare waste and putting adhesives on it appropriately as per paragraph C8.3.7.1.

C8.4.2.7.10.2. Hazardous healthcare waste loads should not be delivered for transport to an off-site location without a consignment note accompanying the load.

C8.4.2.7.11. For transportation to an off-site location, hazardous healthcare waste transporters must comply with the following:

C8.4.2.7.11.1. Never transport any waste to a treatment unit that does not have a permit from the relevant authorities to dispose of hazardous healthcare wastes.

C8.4.2.7.11.2. Never transport any waste that is not accompanied by the consignment note with all the information completed by the generator.

C8.4.2.7.11.3. Never mix wastes that have different packaging specifications by putting them in a single container.

C8.4.2.7.11.4. Never accept any container or bag that does not have an adhesive indicating the information in C8.3.7.1.

C8.4.2.7.11.5. Never transport any container or bag that does not comply with the specifications mentioned in C8.4.2.

C8.4.2.7.11.6. Continuous maintenance of the transportation vehicles and equipment in order to reduce the impact on human health and the environment.

C8.4.2.7.11.7. Never drive through residential areas or commercial roads while transporting hazardous healthcare wastes during peak hours.

C8.4.2.7.11.8. Put signs on the vehicle indicating the type of substances being transported. The transporter should be completely aware of the level of its hazardousness, and the necessary steps that should be taken in the event of an emergency during the transportation process.

C8.4.2.7.11.9. To keep all the records and documents relating to the transportation of the waste.

C8.4.2.7.12. Any person or facility that wishes to build and operate a unit for the treatment of hazardous healthcare wastes must comply with the following:

C8.4.2.7.12.1. Implement the guidelines presented in Table C2.T7. (See Chapter 2, Air Emissions).

C8.4.2.7.12.2. Treat any fluid that may result from the treatment process.

C8.4.2.7.12.3. The performance of the technology and the destruction rate should not be less than 99.99%.

C8.4.2.7.12.4. Prepare and implement a training program for the personnel working at the facility in the field of hazardous healthcare waste management.

C8.4.2.7.12.5. Never accept any hazardous healthcare waste that is not accompanied by a duly completed consignment note from the generator and the transporter.

C8.4.2.7.12.6. Never accept any waste that is not accompanied by the information mentioned in the requirements for putting adhesives described in C8.3.7.1.

C8.4.2.7.12.7. To ensure that every load of waste received at the facility matches the specifications mentioned in the consignment note accompanying the load.

C8.4.2.7.13. Operating records. The applicant for operating a hazardous healthcare waste treatment facility should maintain an operating record that contains the following:

C8.4.2.7.13.1. A description of the type and quantity of each load received the name of the generator as written in the consignment note, the date of receipt and the date of treatment.

C8.4.2.7.13.2. The type and the results of the laboratory tests conducted on the residues resulting from the treatment process.

C8.4.2.7.13.3. The type and results of performance tests of the treatment equipment.

C8.4.2.7.13.4. Copies of transportation documents.

C8.4.2.7.13.5. Copies of all safety forms for each waste.

C8.4.2.7.13.6. The quantity of residues resulting from the treatment process, and the methods and location of its disposal.

C8.4.2.7.14. The transportation of hazardous healthcare wastes across national boundaries must be done according to regional and international agreements, and according to the procedures of coordination between GCC countries with respect to the transportation of wastes across their boundaries (as approved by the GCC Heads of states), and in accordance with relevant national regulations.

Table C8.T1. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	Method of Treatment	Method of Disposal
Microbiological	[1] Steam sterilization	[2] Municipal solid waste landfill (MSWLF)
	Chemical disinfection	MSWLF
	Incineration	MSWLF
Pathological	[3] Incineration	MSWLF
	[3] Cremation	Burial
	[4] Chemical Sterilization	[5] Domestic wastewater treatment plant (DWTP)
	[4] Steam sterilization	DWTP
	[6] Steam sterilization Chemical disinfection	DWTP
	[6] Incineration	MSWLF
	Steam sterilization	MSWLF
	Incineration	MSWLF

Notes:

1. Preferred method for cultures and stocks because they can be treated at point of generation
2. See Chapter 7, "Solid Waste," for criteria for solid waste landfills.
3. Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.
4. This only applies to placentas, small organs and small body parts that may be steam sterilized or chemically sterilized, ground, and discharged to a domestic wastewater treatment plant.
5. See Chapter 4, "Wastewater," for criteria for domestic wastewater treatment plants.
6. Bulk blood or suction canister waste known to be infectious must be treated by incineration or steam sterilization before disposal.

C9. CHAPTER 9

PETROLEUM, OIL, AND LUBRICANTS

C9.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 18, "Spill Prevention and Response Planning."

C9.2. DEFINITIONS

C9.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

C9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs, that are exempt from all criteria in Chapter 19, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 19 are counted toward the aggregate thresholds in subparagraph C.9.2.7.2. below

C9.2.3. Loading/ Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

C9.2.4. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

C9.2.5. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

C9.2.6. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

C9.2.7. POL Facility. An installation with either:

C9.2.7.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

C9.2.7.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

C9.2.7.3. A pipeline facility as identified in paragraph C9.2.5.

C9.2.8. POL Storage Container. POL containers with capacities GREATER than 55 gallons (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 19 are EXCLUDED from the definition of POL storage containers.

C9.3. CRITERIA

C9.3.1. Applicability. The below criteria apply only at POL Facilities as defined in paragraph C9.2.7.

C9.3.2. General POL Storage Container Criteria

C9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

C9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criterion for below ground storage containers.

C9.3.2.3. Permeability. Permeability for containment areas will be a maximum of 10^{-7} cm/sec.

C9.3.2.4. Containment Area Drainage. Drainage of storm water from containment areas will be controlled by a valve that is locked closed when not in active use. Storm water will be inspected for petroleum sheen before being drained from containment areas. If petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, “Hazardous Waste.”

C9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

C9.3.3. Additional POL Storage Container Criteria

C9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

C9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

C9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

C9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

C9.3.4.1. POL container cleaning wastes (sludge and wash waters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

C9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

C9.3.5. General Transport and Distribution Criteria

C9.3.5.1. Loading/Unloading Racks and Areas

C9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

C9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

C9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

C9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and / or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL, which reasonably could be expected to cause a sheen on waters of the Sultanate of Oman defined in Chapter 4, "Wastewater."

C9.3.5.2. POL Pipeline Facilities

C9.3.5.2.1. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

C9.3.5.2.1.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies.

C9.3.5.2.1.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

C9.3.5.2.1.3. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

C9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; and the applicable contents of the facility Spill Plan.

C10. CHAPTER 10

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C11. CHAPTER 11

PESTICIDES

C11.1. SCOPE

This Chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

C11.2. DEFINITIONS

C11.2.1. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides and have been formally certified in accordance with DoD 4150.7-M (Reference (m)).

C11.2.2. Container. Device to store a quantity of a pesticide in its various forms; solid, liquid or gaseous.

C11.2.3. Handling. Selling, offering for sale, storage, or possession, regardless of whether permanently or temporarily, or transportation by any means.

C11.2.4. Importation. Entering pesticides into the country on behalf of a public or private organization, regardless of whether through mail packages, independent shipping, or shipped through importers.

C11.2.5. Integrated Pest Management (IPM). A planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods, including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control and, where necessary, the judicious use of least-hazardous pesticides.

C11.2.6. Pesticide Labeling. All information written, printed and painted or attached to a pesticide package explaining its composition, characteristics, uses and the precautions to be taken during the safe period of use for each pesticide, or any other information requested.

C11.2.7. Pesticide Package. A defined amount of a pesticide filled in a container with a protective cover that is used to provide pesticides to their users through the channels of wholesale or retail distribution.

C11.2.8. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities that provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

C11.2.9. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the wellbeing of humans or animals; attack real property, supplies, equipment, or vegetation; or are otherwise undesirable.

C11.2.10. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

C11.2.11. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

C11.2.11.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or Sultanate of Oman authority;

C11.2.11.2. Any pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

C11.2.11.3. Any material used to clean up a pesticide spill; or

C11.2.11.4. Any containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are NOT considered hazardous waste, and can be disposed of as normal solid waste.

C11.2.12. Registered Pesticide. A pesticide registered and approved for sale or use within the United States or the Sultanate of Oman.

C11.3. CRITERIA

C11.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1, "Pest Management Maintenance Report," or a computer-generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910-M (Reference (f)).

C11.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

C11.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

C11.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

C11.3.3.2. Arthropod skin and clothing repellents; and

C11.3.3.3. Pesticides applied as part of an installation's self-help program.

C11.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

C11.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed.

C11.3.6. Installations will only use registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan:

C11.3.7. Pesticides will be included in the installation spill contingency plan. (See Chapter 18, "Spill Prevention and Response Planning.")

C11.3.8. Pest management facilities, including mixing and storage areas, will comply with Military Handbook 1028/8A (Reference (n)).

C11.3.9. All pesticide applications will be in accordance with guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If foreign nationals will be using the pesticides, the precautionary messages and use instructions will be in English and in the prevalent local language(s).

C11.3.10. MSDSs and labels for all pesticides will be available at the storage and holding facility.

C11.3.11. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

C11.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below:

C11.3.12.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6 of this FGS.

C11.3.12.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of this FGS.

C11.3.12.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through DRMO, as a solid waste. The details on pesticides labels shall include warnings in Arabic and English prohibiting reuse of the package. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

C11.4. ADDITIONAL REQUIREMENTS

C11.4.1. Transporting Pesticides. Pesticides shall be transported inside the country using transport means in accordance with the pesticide label and warnings.

C11.4.2. Conditions that must be met for pesticide storage.

C11.4.2.1. Pesticide storage areas shall be secured against pedestrian entrance except through gates that are assigned for entering.

C11.4.2.2. A warning sign shall be mounted to indicate that the pesticide storage area contains dangerous materials. A tag shall be mounted at the external door or the storage entrance.

C11.4.2.3. Floor drains should be secured against pesticide leakage.

C11.4.2.4. Drinking water sources and networks should be protected from pesticide leakage.

C11.4.2.5. Pesticides storage shall have proper spill cleanup equipment to manage any leakage of pesticide concentrates in the storage areas.

C11.4.2.6. Opened or damaged pesticide cans or containers should be closed or refilled to prevent any release of odor or fumes.

C11.4.2.7. The floor of the pesticide storage shall be paved with a material that does not absorb spilled or leaked pesticides.

C11.4.2.8. Safety measures (fire extinguishers, water sources and hoses, and emergency exit doors), and emergency phone numbers for hospitals and fire services shall be readily available at an easily accessible location.

C11.4.2.9. Any persons responsible for storing pesticides shall be trained in initial spill response including use of safety and fire control equipment, and as allowed, spill clean-up.

C11.4.2.10. Based on the type of pesticides stored and per pesticide label, proper personal protective equipment shall be available for workers managing the storage of pesticides.

C11.4.2.11. Pesticides shall be stored and kept in their containers or cans in their original package; any pesticides transferred to other non-original containers must be labeled.

C11.4.3. The following are prohibited:

C11.4.3.1. Changing, destroying, or distorting the data recorded on the container, or a part thereof, before allowing it to be handled.

C11.4.3.2. Importing, manufacturing or handling a pesticide except for disposal, that is corrupted, adulterated or expired.

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C12. CHAPTER 12

HISTORIC AND CULTURAL RESOURCES

C12.1. SCOPE

This Chapter contains criteria for required plans and programs needed to ensure proper protection and management of historic and cultural resources, such as properties on the World Heritage List or the Sultanate of Oman list equivalent to the U.S. National Register of Historic Places.

C12.2. DEFINITIONS

C12.2.1. Adverse Effect. Changes that diminish the quality or significant value of historic or cultural resources.

C12.2.2. Archaeological Excavations. Any research which aims to discover things of an archaeological nature, regardless of whether the discovery entails ground excavations, or regular probing of the ground surface, or at the bottom of the ocean, or at the bottom of regional bodies of water.

C12.2.3. Archaeological Relic. Every ancient building, edifice, hill, burial locations, cave, rock, statue, carving, or single rock conglomerations of historic, archaeological, artistic, or scientific value. Its age must be no less than 60 years, or a decision from the Minister considering it to be relic must be issued. The phrase "archaeological relic" includes the location of the archaeological relic, as well as any part of the land area necessary to photograph the relic or protect its visual appearance or artistic shape, or to keep safe and protect the relic in any pertinent way.

C12.2.4. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal remains, or any portion of any of the foregoing items.

C12.2.5. Building Complexes. Any building complexes separate or joined together which are of special historic, architectural, or scientific value, in terms of their architectural design, archaeological characteristics, or their location in the natural environment.

C12.2.6. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

C12.2.6.1. Limiting the magnitude of the action;

C12.2.6.2. Relocating the action in whole or in part;

C12.2.6.3. Repairing, rehabilitating, or restoring the affected resources, affected property; and

C12.2.6.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered.

C12.2.7. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

C12.2.8. Historic or Cultural Resources. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national, or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object, and also includes natural resources (plants, animals, landscape features, etc.) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or the Sultanate of Oman equivalent of the National Register of Historic Places. Sultanate of Oman lists of properties should be evaluated to determine if they are equivalent with the National Register of Historic Places prior to application.

C12.2.9. Inventory. To determine the location of historic and cultural resources that may have world, national, or local significance.

C12.2.10. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

C12.2.10.1. Surface or subsurface structures;

C12.2.10.2. Surface or subsurface artifact concentrations or scatters;

C12.2.10.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments;

C12.2.10.4. By-products, waste products, or debris resulting from manufacture or use;

C12.2.10.5. Organic waste;

C12.2.10.6. Human remains;

C12.2.10.7. Rock carvings, rock paintings, and intaglios;

C12.2.10.8. Rock shelters and caves;

C12.2.10.9. All portions of shipwrecks; or

C12.2.10.10. Any portion or piece of any of the foregoing.

C12.2.11. Ministry. The Ministry of National Heritage and Culture.

C12.2.12. Movable Cultural Objects. Movable objects which are of value in terms of archaeology, history, art, or science. They must be no less than 60 years old, or a decision from the Minister considering them to be movable cultural objects must be issued. They fall within the following categories:

C12.2.12.1. Rare groups and samples of animal and plant objects, metal objects, anatomical objects, and important artifacts based on their connection to the science of paleontology.

C12.2.12.2. The products of archaeological excavations (authorized as well as unauthorized), and archaeological discoveries.

C12.2.12.3. Severed artifacts which were once part of artistic or historic archaeological artifacts, or artifacts from archaeological sites.

C12.2.12.4. Relics such as excavated carvings, coins, and seals.

C12.2.12.5. Objects of ethnological value related to the origin, distribution, and characteristics of human racial groups.

C12.2.12.6. Objects of artistic value, including the following:

C12.2.12.6.1. Pictures, panels, and drawings all made by hand, irrespective of the materials from which they were made.

C12.2.12.6.2. Original statues and carvings, irrespective of the materials from which they were made.

C12.2.12.6.3. Original carved or drawn images, or imprints on rock.

C12.2.12.6.4. Original works of artistic assembly and construction, irrespective of the materials from which they were made.

C12.2.12.6.5. Rare manuscripts, ancient books, and documents and printed material of special value (in terms of history, art, science, or literature).

C12.2.12.6.6. Furniture objects of a traditional nature, objects made of glazed pottery, musical instruments, jewelry, weapons, and other such objects.

C12.2.13. National Heritage.

C12.2.13.1. All different kinds of archaeological relics.

C12.2.13.2. Movable cultural objects, including yields from archaeological excavations, as well as fragments which were originally part of archaeological relics, or taken from archaeological sites.

C12.2.13.3. Archaeological building complexes.

C12.2.14. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

C12.2.15. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack, or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

C12.3. CRITERIA

C12.3.1. Installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on the applicable country's equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

C12.3.2. Installations shall have access to the World Heritage List. Table C12.T1 lists the World Heritage Protected sites.

C12.3.3. Installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resources management.

C12.3.4. Installations shall, after coordination with the Sultanate of Oman installation commander or similar appropriate Sultanate of Oman authorities, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

C12.3.5. Installations shall, after coordination with the Sultanate of Oman installation commander or similar appropriate Sultanate of Oman authorities, and if financially and otherwise practical:

C12.3.5.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

C12.3.5.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

C12.3.5.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

C12.3.6. Installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the Sultanate of Oman.

C12.3.7. Installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

C12.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the Sultanate of Oman installation commander or similar appropriate Sultanate of Oman authorities.

C12.4. ADDITIONAL REQUIREMENTS

C12.4.1. It is prohibited for any person, whether they are owners of the relics or not, to tear down the relics, move them either completely or in part, divide them up into pieces, deface them, modify them, damage them, change their form in any way whatsoever, or to excavate, probe, till, or create any other change in the land surrounding or neighboring the referenced archaeological relic.

C12.4.2. Without violating the directives of C12.4.1., which is to be applied to all archaeological relics whether registered or not, it is not permissible to begin setting up a building supported against a registered artifact, or within visual range of the artifact, without written permission from the Ministry.

C12.4.3. It is prohibited to engage in any advertising within, upon, or within visual range of any relics, regardless of whether through sticker advertisements, illuminated, audio, or of any other kind.

C12.4.4. All movable archaeological relics discovered during the course of excavation work or by coincidence are to be considered state property, regardless of the legal status of the land on which they are discovered.

C12.4.5. It is prohibited for the owner or any other person to subject movable cultural objects to wear and tear, defacement, damage, or painting.

C12.4.6. It is absolutely prohibited to export any movable cultural object.

C12.4.7. It is not permissible for any person to engage in buying and selling movable cultural objects

Table C12.T1. List of World Heritage Protected Sites

Name	Location	Area
Aflaj Irrigation Systems	N22 59 56, E57 32 9.8 in the Dakhiliya, Sharqiya and Batinah Regions of NE Oman	14.56 km2
Archaeological Sites of Bat, Al-Khutm and Al-Ayn	N23 16 11.496, E56 44 42 in the Al Dhahira Region Of NE Oman	22 km2
Bahla Fort	N22 57 51.012, E57 18 3.996 in the Oasis of Bahla in NE Oman	2 km2
Land of Frankincense	N18 15 11, E53 38 51.324 in the Dhofar Region of Central Oman	20.93

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C13. CHAPTER 13

NATURAL RESOURCES AND ENDANGERED SPECIES

C13.1. SCOPE

This Chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the U.S. or Sultanate of Oman.

C13.2. DEFINITIONS

C13.2.1. Adverse Effect. Changes that diminish the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance, and fitness.

C13.2.2. Aflaj. A channel dug into the earth or running along the earth's surface that is used to collect groundwater or natural spring water or to hold and collect flood water in order to be distributed and used for various purposes.

C13.2.3. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

C13.2.4. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

C13.2.5. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

C13.2.6. Natural Resources Management. Actions taken that combine science, economics, and policy, to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

C13.2.7. Protected Area. The region used for the purpose of protecting wildlife and development.

C13.2.8. Significant Land or Water Area. Land or water area that is normally 500 or more acres outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

C13.2.9. Sultanate of Oman-Protected Species. Any species of flora or fauna listed or designated by the Sultanate of Oman, because continued existence of the species is, or is likely to be, threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

C13.2.10. Threatened and Endangered Species. Any species of fauna, listed in Table C13.T1. This includes any faunal species listed on an equivalent Sultanate of Oman protected species list.

C13.2.11. Wadi. A valley, gully, or streambed that remains dry except during the rainy season.

C13.3. CRITERIA

C13.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and Sultanate of Oman-protected species and their habitat.

C13.3.2. Installations shall maintain, or have access to, Table C13.T1., "Threatened and Endangered Fauna" as well as a current list of Sultanate of Oman-protected faunal and floral species.

C13.3.3. Installations with significant land or water areas shall, after coordination with the Sultanate of Oman installation commander or similar appropriate Sultanate of Oman authorities, develop natural resources management plans.

C13.3.4. Installations with natural resources management plans shall, after coordination with the Sultanate of Oman installation commander or similar appropriate Sultanate of Oman authorities, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

C13.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or Sultanate of Oman-protected species, or support Sultanate of Oman surveys.

C13.3.4.2. Implement natural resources management plans.

C13.3.5. The Sultanate of Oman installation commander or, if there is no Sultanate of Oman installation commander, the U.S. Ambassador will be notified of the discovery of any endangered or threatened species and Sultanate of Oman-protected species not previously known to be present on the installation.

C13.3.6. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent Sultanate of Oman facilities where practical.

C13.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, Sultanate of Oman-protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

C13.3.8. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna.

C13.3.9. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

C13.3.10. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

C13.3.11. Installations shall take all measures necessary to conserve soil and prevent desertification in accordance with the physical characteristics of the soil and the condition of the area. The following are prohibited:

C13.3.11.1. Cut down, uproot or damage any tree, shrub or grass in public forests.

C13.3.11.2. Conduct any activity which may damage quantity or quality of the vegetation cover in any area, or which may lead to desertification or deterioration of the natural environment.

C13.3.11.3. Remove stones, uproot trees, shrubs and grass or remove soil or sand from watercourses, beaches, wadis, ponds and water drainage canals and their banks.

C13.4. ADDITIONAL REQUIREMENTS

C13.4.1. It is prohibited to use the Sultanate of Oman environment for the disposal of pollutants in such quantities and types that may adversely affect the environment, including natural resources, nature conservation areas, and historical and cultural heritage area of the Sultanate.

C13.4.2. No hazardous waste or substances or other environmental pollutants, including untreated wastewater, shall be discharged in wadis, watercourses, groundwater recharge areas, rainwater and flood drainage systems or aflaj and their channels.

C13.4.3. No waste or any other substances may be disposed into the marine environment.

C13.4.4. No ship shall discharge oil or oil mixture or any other environmental pollutants in the internal waters, territorial waters (belt of coastal waters extending at most twelve nautical miles from the baseline-usually the mean low-water mark of a coastal state) or the exclusive economic zone (extends from the outer limit of the territorial waters to a maximum of 200 nautical miles from the territorial water baseline).

C13.4.5. The following conditions shall be maintained during excavation of sand from coasts, beaches and wadis:

C13.4.5.1. No changes to wadi courses.

C13.4.5.2. Prohibition of cutting trees and maintaining a distance of not less than five (5) meters around trees growing within the excavation area.

C13.4.6. It is prohibited to dispose factory, laboratory, or manufacturing plant waste, untreated sewage water, chemical or petroleum substances, ship oils, or any other liquids or solutions in fishing waters, domestic waters, or the sea bottom and its underlying soil, which would lead to aquatic life resource being harmed.

C13.4.7. The following are also prohibited:

C13.4.7.1. Putting in place or setting up dams or barriers which limit the free movement of aquatic life resources.

C13.4.7.2. Seizing and exploiting different species of aquatic plants which are eaten by aquatic life resources.

C13.4.7.3. Using drag line nets and other fishing equipment in shallow waters.

C13.4.7.4. Using methods such as toxins, explosives, chemical substances, electricity, or other such means to kill aquatic life resources.

C13.4.7.5. Using harmful means, equipment, and methods against the eggs of aquatic life resources.

C13.4.8. For protected areas within the Sultanate of Oman, the following measures need to be taken to ensure that the environment is not impacted. This includes:

C13.4.8.1. Fishing in all its forms.

C13.4.8.2. Grazing or agricultural activities.

C13.4.8.3. Harvesting or collection of plant material.

C13.4.8.4. Firewood collection or destruction of living trees.

C13.4.8.5. Collection of organisms or their products.

C13.4.8.6. Establishment of recreational camps.

C13.4.8.7. Access by all types of vehicles.

C13.4.8.8. Prohibition of the introduction of any type of exotic animals (domesticated or wild) to the protected area.

C13.4.8.9. Any other activities that have a negative impact on the biology of the protected area.

C13.4.9. To the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species.

Table C13.T1. Threatened and Endangered (T&E) Fauna

Common Name	Scientific Name	T&E Fauna
Badger, honey	Mellivora capensis	Oman
Bustard, Houbara	Chalmydotis undulata	Oman
Cat, sand	Felis margarite	Oman
Cat, wild	Felis Silvestris	Oman
Fox, Red	Vulpes vulpes arabica	Oman
Gazelle, Arabian	Gazella gazella	Arabian Peninsula
Gazelle, sand	Gazella subgutturosa marica	Arabian Peninsula
Gazelle, Saudi Arabian	Gazella dorcas saudiya	Arabian Peninsula
Hare	Not specified	Oman
Hyena, Stri[ed	Chelonia myds	Oman
Ibex, Nubian	Capra aegagrus	Oman
Lynx, caracal	Felis caracal	Oman
Oryx, Arabian	Oryx leucoryx	Arabian Peninsula
Tahr, Arabian	Hemitragus jayakari	Oman
Wolf, gray	Canis lupus	Oman
Eagle	All species	Oman
Falcon	All species	Oman
Flamingo	All species	Oman
Gull	All species	Oman
Owl	All species	Oman
Tern	All species	Oman
Vulture	All species	Oman
Turtle, Hawksbill	Eretmochelys	Oman

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C14. CHAPTER 14

POLYCHLORINATED BIPHENYLS

C14.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage, and disposal of polychlorinated biphenyls (PCB). These criteria include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers, and cables.

C14.2. DEFINITIONS

C14.2.1. Capacitor. A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

C14.2.2. Chemical Waste Landfill. A landfill at which a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.

C14.2.3. In or Near Commercial Buildings. Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters of a non-industrial, non-substation building.

C14.2.4. Incinerator. An engineered device using controlled-flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.

C14.2.5. Leak or Leaking. Any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

C14.2.6. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to this FGS.

C14.2.7. Marked. PCB items and PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

C14.2.8. Non-PCB Transformers. Any transformer that contains less than 50 ppm PCB.

C14.2.9. PCB Article. Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

C14.2.10. PCB Article Container. Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.

C14.2.11. PCB Container. Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.

C14.2.12. PCB-Contaminated Electrical Equipment. Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain 50 ppm or greater PCB, but less than 500 ppm PCB.

C14.2.13. PCB Equipment. Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

C14.2.14. PCB Item. Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of 50 ppm or greater.

C14.2.15. PCB Large High Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at 2,000 volts (alternating current (ac) or direct current (dc)) or above.

C14.2.16. PCB Large Low Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates below 2,000 volts (ac or dc).

C14.2.17. PCB Transformer. Any transformer that contains 500 ppm PCB or greater.

C14.2.18. Restricted Access Area. Areas where access by unauthorized personnel is controlled by fences, other man-made structures, or naturally occurring barriers such as mountains, cliffs, or rough terrain.

C14.2.19. Substantial Contact Area. An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

C14.3. CRITERIA

C14.3.1. General

C14.3.1.1. The installation spill contingency plan will address PCB items, including temporary storage items. Chapter 18, "Spill Prevention and Response Planning," provides criteria on how to prepare these plans.

C14.3.1.2. Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up in accordance with the following:

C14.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms (μg) per 100 square centimeters (cm^2).

C14.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 μg per 100 cm^2.

C14.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing less than 1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling, and a reference to any reports documenting the site conditions.

C14.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing less than 1 ppm PCBs.

C14.3.1.3. All PCB transformers, PCB large high voltage capacitors, PCB containers, and certain PCB items containing PCBs at concentrations 50 ppm or greater (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and Arabic. The marking must identify the item as containing PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criterion also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB large low voltage capacitors and equipment containing a PCB transformer or PCB large high voltage capacitor.

C14.3.1.4. Each installation having PCB items will maintain a written inventory that includes a current list by type of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of for that year. Inventory records should be maintained for a period of time at least 3 years after disposal of the last item on the list.

C14.3.1.5. Disposal of PCB items will only be through the servicing DRMO in accordance with DoD 4160.21-M (Reference (j)) or paragraph C14.3.5. of this FGS.

C14.3.1.6. All periodic inspections as required in this Chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for 3 years after disposal of the transformer.

C14.3.2. PCB transformers (500 ppm PCB or greater)

C14.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

C14.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

C14.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

C14.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed 1 year.

C14.3.2.5. PCB transformers will be serviced as follows:

C14.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C14.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

C14.3.2.5.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of in accordance with paragraph C14.3.5.;

C14.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

C14.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing less than 500 ppm PCBs that are mixed with fluids containing 500 ppm or greater PCBs will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be greater than 500 ppm PCBs; and

C14.3.2.5.6. Dielectric fluids containing 500 ppm PCBs or greater will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

C14.3.2.6. All in-service PCB transformers (greater than 500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100 percent of dielectric fluid or PCB transformers tested and found to contain less than 60,000 ppm PCBs will be inspected at least every 12 months.

C14.3.2.7. If any PCB transformer is involved in a fire and was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and treated if required.

C14.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

C14.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

C14.3.3. <u>Other PCB Items</u>

C14.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

C14.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C14.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of 500 ppm or greater that requires the removal and rework of the internal components is prohibited;

C14.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

C14.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of 500 ppm or greater will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

C14.3.3.1.5. Dielectric fluids containing 500 ppm or greater will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

C14.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

C14.3.3.2.1. Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors that pose an exposure risk to food or feed is prohibited;

C14.3.3.2.2. Use of PCB large high-voltage and PCB large low-voltage capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have adequate roof, walls, and floor to contain any release of PCBs; and

C14.3.3.3. Any PCB item removed from service will be marked with the date it is removed from service.

C14.3.4. Storage

C14.3.4.1. PCBs and PCB items at concentrations 50 ppm or greater that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

C14.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

C14.3.4.1.2. A containment berm, at least 6 inches high, sufficient to contain twice the internal volume of the largest PCB article, or 25 percent of the total internal volume of all PCB articles or containers stored, whichever is greater;

C14.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines, or other openings constructed to prevent any release from the bermed area;

C14.3.4.1.4. Continuous, smooth, and impervious flooring material; and

C14.3.4.1.5. To the maximum extent possible, a new PCB storage area will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where there is a high possibility of such risks, the installation spill prevention and control plan will address the risk.

C14.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

C14.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

C14.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

C14.3.4.2.3. PCB containers in which non-liquid PCBs have been placed; and

C14.3.4.2.4. PCB containers in which PCBs at a concentration between 50-499 ppm have been placed, and whose containers are marked to indicate there is less than 500 ppm PCB.

C14.3.4.3. Non-leaking and structurally undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting the criteria of paragraph C14.3.4. if they are inspected weekly.

C14.3.4.4. All other PCB storage areas will be inspected at least monthly.

C14.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing DRMO.

C14.3.5. Disposal

C14.3.5.1. Installations that generate PCB waste of 50 ppm or greater PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, "Hazardous Waste." Installations will coordinate and obtain concurrence with the Sultanate of Oman for in-country PCB disposal as for HW disposal.

C14.3.5.2. PCB-contaminated dielectric fluid with concentrations greater than 500 ppm will only be disposed in an incinerator with 99.9 percent combustion efficiency.

C14.3.5.3. PCB-contaminated dielectric fluid with concentrations 50 ppm or greater, but less than 500 ppm, will only be disposed as follows:

C14.3.5.3.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.3.2. In a high-efficiency boiler that is rated at a minimum of 50 MBtu/hr and is fueled by natural gas, oil, or coal.

C14.3.5.4. Rags, soil, and other debris with PCBs at concentrations of 50 ppm or greater will be disposed of:

C14.3.5.4.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.4.2. In a chemical waste landfill.

C14.3.5.5. PCB transformers will be disposed of:

C14.3.5.5.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.5.2. In a chemical waste landfill, provided the transformers, and all their inner workings, are first drained of all free-flowing liquids.

C14.3.5.6. PCB capacitors will be disposed of as follows:

C14.3.5.6.1. PCB capacitors will be disposed of in an incinerator with 99.9 percent combustion efficiency, except,

C14.3.5.6.2. Intact non-leaking small PCB capacitors may be disposed of in a solid waste landfill unless large quantities (more than 100 pounds) are identified at the same time.

C14.3.5.7. PCB hydraulic machines containing PCBs may be disposed of as municipal solid waste if:

C14.3.5.7.1. The machines containing PCBs at concentrations of 50 ppm or greater are drained of all free-flowing liquid.

C14.3.5.7.2. The machines containing PCB liquid of 1,000 ppm or greater are flushed prior to disposal with a solvent containing less than 50 ppm PCB.

C14.3.5.8. PCB-contaminated electrical equipment, except capacitors, will be disposed of as municipal solid waste only after draining all free-flowing liquid.

C14.3.5.9. PCB articles, other than those already described, will be disposed of:

C14.3.5.9.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.9.2. In a chemical waste landfill, provided the articles are first drained of all free-flowing liquids.

C14.3.5.10. PCB containers with concentrations of 500 ppm or greater may be disposed of:

C14.3.5.10.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.10.2. In a chemical waste landfill, provided the containers are first drained of all free-flowing liquids.

C14.3.5.11. Where PCB fluids, items, or articles are disposed of in a high-temperature boiler, the following procedures will be followed:

C14.3.5.11.1. The boiler must be rated at a minimum of 50 million BTU hours;

C14.3.5.11.2. If the boiler uses natural gas or oil as the primary fuel, the carbon monoxide concentration in the stack must be 50 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C14.3.5.11.3. If the boiler uses coal as the primary fuel, the carbon monoxide concentration in the stack is 100 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C14.3.5.11.4. The mineral oil dielectric fluid does not comprise more than 10 percent, by volume, of the total fuel feed rate;

C14.3.5.11.5. The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start up or shut down operations;

C14.3.5.11.6. The performance of the boiler is continuously monitored for carbon monoxide and excess oxygen percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning less than 112,500 liters (30,000 gallons) of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes;

C14.3.5.11.7. The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes; and

C14.3.5.11.8. The flow of mineral oil dielectric fluid is stopped if the criteria respecting carbon monoxide or excess oxygen are exceeded.

C14.3.5.12. Where PCB fluids, items or articles are disposed of in an incinerator, the following procedures will be followed:

C14.3.5.12.1. Combustion criteria shall maintain the introduced liquids for a 2-second dwell time at 1,200℃, plus or minus 100℃ (2,200℉ +/- 212℉), and 3-percent excess oxygen in the stack gas or maintenance of the introduced liquids for a 1-1/2 second dwell time at 1,600℃, plus or minus 100℃ (3,050℉ +/- 212℉) and 2-percent excess oxygen in the stack gas;

C14.3.5.12.2. Combustion efficiency, measured by the ratio of the concentration of carbon dioxide to the total concentration of both carbon dioxide and carbon monoxide, will be maintained at least 99.9 percent;

C14.3.5.12.3. The rate and quantity of PCBs that are fed to the combustion system shall be measured and recorded at regular intervals not greater than 15 minutes;

C14.3.5.12.4. The temperatures of the incineration process shall be continuously measured and recorded;

C14.3.5.12.5. The flow of PCBs to the incinerator shall stop automatically if temperature criteria are not met;

C14.3.5.12.6. Monitoring is conducted sufficient to determine that an incinerator to be used for disposal the first time will operate within the criteria above; and

C14.3.5.12.7. Continuous monitoring is conducted during incineration of PCBs for oxygen and carbon monoxide and periodic monitoring for carbon dioxide.

C14.3.5.13. PCB containers used to contain only PCBs at a concentration less than 500 ppm may be disposed of as municipal solid waste only after draining all free-flowing liquid.

C14.3.5.14. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the United States will be returned to the United States for delivery to a permitted disposal facility if host country or third country disposal is not possible, is prohibited, or would not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with criteria in subparagraph C 14.3.1.3.

C14.3.6. Elimination of PCB Products

C14.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

C14.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

C14.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs (less than 2 ppm) at the time of shipment.

C14.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

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C15. CHAPTER 15

ASBESTOS

C15.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from asbestos exposure, refer to DoDI 6050.05 and service instructions.

C15.2. DEFINITIONS

C15.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions coming from ACM are observed, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

C15.2.2. Asbestos. Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated and/or altered.

C15.2.3. Asbestos-Containing Material (ACM). Any material containing more than one percent asbestos by weight.

C15.2.4. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos.

C15.2.5. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing more than one percent asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.6. Friable Asbestos. Any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.7. Regulated ACM. Means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

C15.3. CRITERIA

C15.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

C15.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

C15.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

C15.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

C15.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

C15.3.2.4. Work control/permit systems to control activities that might disturb ACM;

C15.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM;

C15.3.2.6. Record keeping to document O&M activities related to asbestos identification management and abatement;

C15.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

C15.3.2.8. Procedures to assess and prioritize identified hazards for abatement; and

C15.3.2.9. Procedures to prevent the use of ACM in new construction.

C15.3.3. Prior to demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

C15.3.4. Prior to demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

C15.3.5. Installations will remove friable ACM when the ACM poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

C15.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all regulated ACM.

C15.3.7. When disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leak-proof container, and properly dispose of it in an MSWLF as defined in Chapter 7, "Solid Waste." Containers will be labeled in English and Arabic: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD." Permanent records documenting the disposal action and site will be maintained.

C15.3.8. DoD schools will comply with applicable requirements of 15 U.S.C. 2643(l) (Reference (o)) and implementing regulations in 40 CFR Part 763, Subpart E (Reference (p)).

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C16. CHAPTER 16

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C17. CHAPTER 17

LEAD-BASED PAINT

C17.1. SCOPE

This Chapter contains criteria to establish and implement a lead hazard management program to identify, control, or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from lead exposure, refer to DoDI 6055.05 (Reference (g)), and service instructions.

C17.2. DEFINITIONS

C17.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead-contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

C17.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

C17.2.3. Bare Soil. Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

C17.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least two different days within any week, provided that each day's visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.

C17.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exist in a facility frequented by children under the age of six.

C17.2.6. Deteriorated Paint. Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking, or is otherwise damaged or separated from the substrate.

C17.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 .g/dl (micrograms of lead per deciliter) for a single test, or 15-19 .g/dl in two tests taken at least 3 months apart.

C17.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

C17.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

C17.2.10. Evaluation. A visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, lead-based paint, or a lead-based paint hazard.

C17.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

C17.2.12. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through various methods, including interim controls or abatement or a combination of the two.

C17.2.13. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

C17.2.14. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.

C17.2.15. Lead-Based Paint. Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per cm^2, or 0.5 percent by weight or 5,000 ppm by weight.

C17.2.16. Lead-based Paint Hazard. Iincludes paint-lead-hazard, dust-lead hazard or soil-lead hazard as identified below:

C17.2.16.1. Paint-lead hazard. A paint-lead hazard is any of the following:

C17.2.16.1.1. Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill, or floor) are equal to or greater than the dust-lead hazard levels identified in subparagraph C17.2.16.2.

C17.2.16.1.2. Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe).

C17.2.16.1.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

C17.2.16.1.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

C17.2.16.2. Dust-lead hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

C17.2.16.3. Soil-lead hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm (µg/g) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

C17.2.17. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint, and the provision of a report explaining the results of the investigation.

C17.2.18. Permanent. An expected design life of at least 20 years.

C17.2.19. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

C17.2.20. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

C17.2.21. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

C17.2.22. Risk Assessment Screen. A sampling protocol that is used in dwellings that are in relatively good condition and where the probability of finding lead-based hazards are low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.

C17.3. CRITERIA

C17.3.1. Installations will:

C17.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

C17.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement.

C17.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

C17.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 .g/ft^2 for floors, >125 .g/ft^2 for interior window sills, a lead-based paint risk assessment should be performed.

C17.3.1.3.2. Lead-based paint risk assessments.

C17.3.1.3.3. Routine facility inspection for fire and safety.

C17.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

C17.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

C17.3.1.3.6. Lead-based paint reevaluations.

C17.3.1.3.7. Review of construction, painting, and maintenance histories.

C17.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

C17.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-base paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

C17.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

C17.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, "Hazardous Waste," paragraph C6.2.7.

C18. CHAPTER 18

SPILL PREVENTION AND RESPONSE PLANNING

C18.1. SCOPE

This Chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8 (Reference (q)).

C18.2. DEFINITIONS

C18.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

C18.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

C18.2.3. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

C18.2.4. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

C18.2.5. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in Appendix 1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

C18.2.5.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

C18.2.5.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C18.2.6. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

C18.2.7. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

C18.2.8. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

C18.2.8.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

C18.2.8.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 400 liters (110 gallons);

C18.2.8.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

C18.2.8.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

C18.2.8.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

C18.2.9. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

C18.3. CRITERIA

C18.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT.

C18.3.1.1. The plan will be updated at least every 5 years or:

C18.3.1.1.1. Within 6 months of any significant changes to operations.

C18.3.1.1.2. When there have been two significant spills to navigable waters in any 12-month period;

C18.3.1.1.3. When there has been a spill of 1,000 gallons or greater.

C18.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification.

C18.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

C18.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate.

C18.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in subparagraph C18.3.2.3, critical water resources, land uses, and possible migration pathways.

C18.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure.

C18.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in subparagraph C 18.3.2.3.

C18.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of non-destructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

C18.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," subparagraph C9.3.2.5.

C18.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

C18.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

C18.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground storage tanks, pesticides, and PCBs provide specific criteria for containment structure requirements.

C18.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

C18.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

C18.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

C18.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

C18.3.2.14. Written procedures for:

C18.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

C18.3.2.14.2. Inspections; and

C18.3.2.14.3. Record keeping requirements.

C18.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

C18.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and to provide assistance to other agencies when requested. At a minimum, this section of the plan will contain:

C18.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills.

C18.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered.

C18.3.3.3. The responsibilities, composition, and training requirements of the FRT.

C18.3.3.4. The command structure that will be established to manage a worst case discharge. Include an organization chart and the responsibilities and composition of the organization.

C18.3.3.5. Procedures for FRT alert and response to include provisions for:

C18.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill.

C18.3.3.5.2. Public affairs involvement.

C18.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours.

C18.3.3.7. The plan will provide for notification of the FIC, installation commander, and local authorities in the event of hazard to human health or environment.

C18.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers.

C18.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills.

C18.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill.

C18.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation.

C18.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation.

C18.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations.

C18.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions.

C18.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

C18.3.4. Reporting Section. The reporting section of the spill plan will address the following:

C18.3.4.1. Recordkeeping when emergency procedures are invoked.

C18.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill.

C18.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency and the EEA and submit a follow-up written report when:

C18.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

C18.3.4.3.2. The spill exceeds 400 liters (110 gallons) of POLs;

C18.3.4.3.3. A water resource has been polluted; or

C18.3.4.3.4. The FIC has determined that the spill is significant.

C18.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local Sultanate of Oman drinking water resource, the appropriate in-theater component commander and/or Defense Agency, EEA, and Sultanate of Oman authorities will be notified immediately.

C18.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in subparagraph C18.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

C18.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment.

C18.3.6. After completion of the initial response, any remaining free product and/or obviously contaminated soil will be appropriately removed and managed. Further action will be governed by Reference (q).

C19. CHAPTER 19

UNDERGROUND STORAGE TANKS

C19.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing hazardous wastes are covered in Chapter 6, "Hazardous Waste." Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, "Petroleum, Oil, and Lubricants."

C19.2. DEFINITIONS

C19.2.1. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

C19.2.1.1. A hydrant fuel distribution system; or

C19.2.1.2. A field-constructed tank.

C19.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, "Hazardous Material." The term does not include:

C19.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

C19.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C19.2.3. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

C19.2.4. POL. Refined petroleum, oils, and lubricants.

C19.2.5. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

C19.2.6. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, larger than 416 liters (110 gallons), that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10 percent or more beneath the surface of the ground, but does not include:

C19.2.6.1. Tanks containing heating oil used for consumption on the premises where it is stored;

C19.2.6.2. Septic tanks;

C19.2.6.3. Storm water or wastewater collection systems;

C19.2.6.4. Flow through process tanks;

C19.2.6.5. Surface impoundments, pits, ponds, or lagoons;

C19.2.6.6. Field constructed tanks;

C19.2.6.7. Hydrant fueling systems;

C19.2.6.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

C19.2.6.9. UST containing *de minimis* concentrations of regulated substances, except where subparagraph C 19.3.2.7. is applicable; and

C19.2.6.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

C19.3. CRITERIA

C19.3.1. All installations will maintain a UST inventory.

C19.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

C19.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

C19.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fill pipe. Overfill prevention will be provided by one of the following methods:

C19.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity).

C19.3.2.2.2. High level alarm (set at 90% of tank capacity).

C19.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or one percent of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

C19.3.2.3.1. USTs will use at least one of the following leak detection methods:

C19.3.2.3.1.1. Automatic tank gauging;

C19.3.2.3.1.2. Vapor monitoring;

C19.3.2.3.1.3. Groundwater monitoring; or

C19.3.2.3.1.4. Interstitial monitoring.

C19.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

C19.3.2.3.3. Suction piping will either have a line tightness test conducted every 3 years or use monthly monitoring.

C19.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

C19.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

C19.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.8 (Reference (q)). Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

C19.3.2.7. When a UST has not been used for 1 year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.3.

C19.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

C19.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

C19.3.2.9.1. Vent lines must be left open and functioning; and

C19.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

C19.3.3. UST Recordkeeping. Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

C19.3.4. Hazardous material USTs

C19.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults.

C19.3.4.2. Leak Detection. The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

C19.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in subparagraph C19.3.4.1. shall be immediately removed from service and upgraded or replaced as necessary.

C19.3.5. Deferred USTs. Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

AP1. APPENDIX 1

CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

AP1.1. CHARACTERISTICS OF HAZARDOUS WASTE

AP1.1.1. General

AP1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

AP1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

AP1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

AP1.1.2. Characteristic of Ignitability

AP1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

AP1.1.2.1.1. It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

AP1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

AP1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

AP1.1.2.1.4. It is an oxidizer.

AP1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

AP1.1.3. Characteristic of Corrosivity

AP1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

AP1.1.3.1.1. It is aqueous and has a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter.

AP1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

AP1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

AP1.1.4. Characteristic of Reactivity

AP1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

AP1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

AP1.1.4.1.2. It reacts violently with water.

AP1.1.4.1.3. It forms potentially explosive mixtures with water.

AP1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

AP1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

AP1.1.4.1.8. It is a forbidden explosive.

AP1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

AP1.1.5. Toxicity Characteristic

AP1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste contains any of the contaminants listed in Table AP1.T1., "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section AP 1.1. at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself is considered to be the extract for the purpose of this section.

AP1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table AP1.T1 or section AP1.2., which corresponds to the toxic contaminant causing it to be hazardous.

AP1.2. LISTS OF HAZARDOUS WASTES

AP1.2.1. General

AP1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

AP1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

AP1.2.1.3. Each hazardous waste listed in section AP1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

AP1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table AP1.T3., "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

AP1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table AP1.T4., annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

AP1.2.4. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.

AP1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel.

AP1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

AP1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA ITW#, such waste will be listed in paragraph AP1.2.2. above or will be identified as a hazardous waste by the characteristics set forth in section AP1.1. of this Appendix.]

AP1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4., annotated "P" as the first character in the USEPA ITW# are hereby identified as acute hazardous waste (IT). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA ITW#s are listed in Table AP1.T4., annotated "P" as the first character in the USEPA ITW#.

AP1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table AP1.T4., subparagraphs AP1.2.4.1.1.1. through AP1.2.4.1.1.4. of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

Table AP1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

USEPA HW No.[1]	Contaminant	CAS No.[2]	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-2	1.0
D007	Chromium	7440-47-3	5.0
D016	2,4-D	94-75-7	10.0
D012	Endrin	72-20-8	0.02
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D010	Selenium	7782-49-2	1.0
D01 I	Silver	7440-22-4	5.0
D015	Toxaphene	8001-35-2	0.5
D017	2,4,5-TP (Silvex)	93-72-1	1.0

Table AP1.T2. Maximum Concentration of Contaminants for Non-Wastewater

USEPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/kg)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23 -5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D03 I	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
DO33	Hexachlorobutadiene	87-68-3	0.5
DO34	Hexachloroethane	67-72-1	3.0
DO35	Methyl Ethyl Ketone	78-93-3	200.0
DO36	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl Chloride	75-01-4	0.2

Notes:

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1 -trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1 -trichloroethane, chlorobenzene, 1,1,2-trichloro- 1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10% or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)[2]
F004	The following spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent	(T)
F005	The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Spent cyanide plating bath solutions from electroplating operations.	(R,T)
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F01 1	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	(T)
F0 19	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process.	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (this listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (this listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (this listing does not include wastewater, wastewater treatment sludges, spent catalysts, and wastes listed separately in this table or wastes listed in Table AP1.T4 and having a USEPA HW# beginning with "K").	(T)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (this listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027.	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F032	Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F035	Wastewater (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F037	Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling water segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K05 1 wastes are not included in this listing.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater and oily cooling wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in dissolved air flotation (DAF) units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste listed in Tables AP1.T3 or AP1.T4. (leachate resulting from the disposal of one or more of the following USEPA hazardous wastes and no other hazardous wastes retains its USEPA HW#(s): F020, F021, F022, F026, F027, and/or F028).	(T)

Notes:

1. USEPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Acenaphthene	83329			100
Acenaphthylene	208968			5,000
Acetaldehyde (I)	75070		U001	1,000
Acetaldehyde, chloro-	107200		P023	1,000
Acetaldehyde, trichloro-	75876		U034	5,000
Acetamide	60355			100
Acetamide, N-(aminothioxomethyl)-	591082		P002	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442		U1 87	100
Acetamide, 2-fluoro-	640197		P057	100
Acetamide, N-9H-fluoren-2-yl-	53963		U005	1
Acetic acid	64197			5,000
Acetic acid (2,4-dichlorophenoxy)-salts and esters	94757		U240	100
Acetic acid, lead(2+) salt	301042		U144	10
Acetic acid, thallium(1+) salt	563688		U214	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765		U232	1,000
Acetic acid, ethyl ester (I)	141786		U1 12	5,000
Acetic acid, fluoro-, sodium salt	62748		P058	10
Acetic anhydride	108247			5,000
Acetone (I)	67641		U002	5,000
Acetone cyanohydrin	75865	1,000	P069	10
Acetone thiosemicarbazide	1752303	1,000/10,000		1
Acetonitrile (I,T)	75058		U003	5,000
Acetophenone	98862		U004	5,000
2-Acetylaminofluorene	53963		U005	1
Acetyl bromide	506967			5,000
Acetyl chloride (C,R,T)	75365		U006	5,000
1-Acetyl-2-thiourea	591082		P002	1
Acrolein	107028	500	P003	1
Acrylamide	79061	1,000/10,000	U007	5,000
Acrylic acid (I)	79107		U008	5,000
Acrylonitrile	107131	10,000	U009	100
Acrylyl chloride	814686	100		1
Adipic acid	124049			5,000
Adiponitrile	111693	1,000		1
Aldicarb	116063	100/10,000	P070	1
Aldrin	309002	500/10,000	P004	1
Allyl alcohol	107186	1,000	P005	100
Allylamine	107119	500		1
Allyl chloride	107051			1,000
Aluminum phosphide (R,T)	20859738	500	P006	100
Aluminum sulfate	10043013			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
4-Aminobiphenyl	92671			1
5-(Aminomethyl)-3-isoxazolol	2763964		P007	1,000
Aminopterin	54626	500/10,000		1
4-Aminopyridine	504245		P008	1,000
Amiton	78535	500		1
Amiton oxalate	3734972	100/10,000		1
Amitrole	61825		U011	10
Ammonia	7664417	500		100
Ammonium acetate	631618			5,000
Ammonium benzoate	1863634			5,000
Ammonium bicarbonate	1066337			5,000
Ammonium bichromate	7789095			10
Ammonium bifluoride	1341497			100
Ammonium bisulfite	10192300			5,000
Ammonium carbamate	1111780			5,000
Ammonium carbonate	506876			5,000
Ammonium chloride	12125029			5,000
Ammonium chromate	7788989			10
Ammonium citrate, dibasic	3012655			5,000
Ammonium fluoborate	13826830			5,000
Ammonium fluoride	12125018			100
Ammonium hydroxide	1336216			1,000
Ammonium oxalate	6009707 5972736 14258492			5,000
Ammonium picrate (R)	131748		P009	10
Ammonium silicofluoride	16919190			1,000
Ammonium sulfamate	7773060			5,000
Ammonium sulfide	12135761			100
Ammonium sulfite	10196040			5,000
Ammonium tartrate	14307438 3164292			5,000
Ammonium thiocyanate	1762954			5,000
Ammonium vanadate	7803556		P119	1,000
Amphetamlne	300629	1,000		1
Amyl acetate	628637			5,000
Iso-Amyl acetate	123922			
Sec-Amyl acetate	626380			
Tert-Amyl acetate	625161			
Aniline (I,T)	62533	1,000	U012	5,000
Aniline, 2,4,6- trimethyl	88051	500		1
o-Anisidine	90040			100
Anthracene	120127			5,000
Antimony++	7440360			5,000
Antimony pentachloride	7647189			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Antimony pentafluoride	7783702	500		1
Antimony potassium tartrate	28300745			100
Antimony tribromide	7789619			1,000
Antimony trichloride	10025919			1,000
Antimony trifluoride	7783564			1,000
Antimony trioxide	1309644			1,000
Antimycin A	1397940	1,000/10,000		1
ANTU (Thiourea 1-Naphthalenyl)	86884	500/10,000		100
Argentate(1-), bis(cyano-C)-, potassium	506616		P099	1
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
Aroclors	1336363			1
Arsenic++	7440382			1
Arsenic acid H_3AsO_4	1327522 7778394		P010	1
Arsenic disulfide	1303328			1
Arsenic oxide As_2O_3	1327533		P012	1
Arsenic oxide As_2O_5	1303282		P011	1
Arsenic pentoxide	1303282	100/10,000	P011	1
Arsenic trichloride	7784341			1
Arsenic trioxide	1327533		P012	1
Arsenic trisulfide	1303339			1
Arsenous oxide	1327533	100/10,000	P012	1
Arsenous trichloride	7784341	500		5,000
Arsine	7784421	100		1
Arsine, diethyl-	692422		P038	1
Arsinic acid, dimethyl-	75605		U136	1
Arsorous dichloride, phenyl-	696286		P036	1
Asbestos+++	1332214			1
Auramine	492808		U014	100
Azaserine	115026		U015	1
Aziridine	151564		P054	1
Azindine, 2-methyl-	75558		P067	1
Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1,1 a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1 aS-(1 a-alpha, 8-beta, 8a-alpha, 8b-alpha)]-	50077		U010	10
Azinphos-ethyl	2642719	100/10,000		100
Azinphos-methyl	86500	10/10,000		1
Barium cyanide	542621		P013	10
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495		U1 57	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Benz[c]acridine	225514		U016	100
Benzal chloride	98873	500	U017	5,000
Benzamide, 3,5-dichloro-N-(1, 1 -dimethyl-2-propynyl)-	23950585		U1 92	5,000
Benz[a]anthracene	56553		U018	10
1,2-Benzanthracene	56553		U01 8	10
Benz[a]anthracene, 7,12-dimethyl-	57976		U094	1
Benzenamine (I,T)	62533		U012	5,000
Benzenamine, 3-(Trifluoromethyl)	98168	500		1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808		U014	100
Benzenamine, 4-chloro-	106478		P024	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933		U049	100
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117		U093	10
Benzenamine, 2-methyl-	95534		U328	100
Benzenamine, 4-methyl-	106490		U353	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		U1 58	10
Benzenamine, 2-methyl-, hydrochloride	636215		U222	100
Benzenamine, 2-methyl-5-nitro-	99558		U181	100
Benzenamine, 4-nitro-	100016		P077	5,000
Benzene (I,T)	71432		U109	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	500/10,000		1
Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156		U038	10
Benzene, 1-bromo-4-phenoxy-	101553		U030	100
Benzenearsonic Acid	98055	10/10,000		1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033		U035	10
Benzene, chloro-	108907		U037	100
Benzene, chloromethyl-	100447		P028	100
Benzenediamin, ar-methyl-	25376458 95807 496720 823405		U221	10
1,2-Benzenedicarboxylic acid, dioctyl ester	117840		U107	5,000
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817		U028	100
1,2-Benzenedicarboxylic acid, dibutyl ester	84742		U069	10
1,2-Benzenedicarboxylic acid, diethyl ester	84662		U088	1,000
1,2-Benzenedicarboxylic acid, dimethyl ester	131113		U1 02	5,000
Benzene, 1,2-dichloro-	95501		U070	100
Benzene, 1,3-dichloro-	541731		U071	100
Benzene, 1,4-dichloro-	106467		U072	100
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548		U060	1
Benzene, dichloromethyl-	98873		U017	5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Benzene, 1,3-diisocyanotomethyl- (R,T)	584849 91087 264716254		U223	100
Benzene, dimethyl (I,T)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
1,3-Benzenediol	108463		U201	5,000
1,2-Benzenediol, 4-[1 -hydroxy-2-(methylamino)ethyl]- (R) -	51434		P042	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098		P046	5,000
Benzene, hexachloro-	118741		U127	10
Benzene, hexahydro- (I)	110827		U056	1,000
Benzene, hydroxy-	108952		U188	1,000
Benzene, methyl-	108883		U220	1,000
Benzene, 2-methyl-1,3-dinitro-	606202		U106	100
Benzene, 1-methyl-2,4-dinitro-	121142		U105	10
Benzene, 1-methylethyl- (I)	98828		U055	5,000
Benzene, nitro-	98953		U169	1,000
Benzene, pentachloro-	608935		U1 83	10
Benzene, pentachloronitro-	82688		U1 85	100
Benzenesulfonic acid chloride (C,R)	98099		U020	100
Benzenesulfonyl chloride	98099		U020	100
Benzene, 1,2,4,5-tetrachloro-	95943		U207	5,000
Benzenethiol	108985		P014	100
Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro-	50293		U061	1
Benzene, 1,1 '-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435		U247	1
Benzene, (trichloromethyl)-	98077		U023	10
Benzene, 1,3,5-trinitro-	99354		U234	10
Benzidine	92875		U021	1
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	500/1 0,000		1
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072		U202	100
Benzo[a]anthracene	56553		U018	10
Benzo[b]fluoranthene	205992			1
Benzo[k]fluoranthene	207089			5,000
Benzo[j,k]fluorene	206440		U120	100
1,3-Benzodioxole, 5-(1-propenyl)-	120581		U141	100
1,3-Benzodioxole, 5-(2-propenyl)-	94597		U203	100
1,3-Benzodioxole, 5-propyl-	94586		U090	10
Benzoic acid	65850			5,000
Benzonitrile	100470			5,000
Benzo[rst]pentaphene	189559		U064	10
Benzo[ghi]perylene	191242			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812		P001	100
Benzo[a]pyrene	50328		U022	1
3,4-Benzopyrene	50328		U022	1
p-Benzoquinone	106514		U197	10
Benzotrichloride (C,R,T)	98077	500	U023	10
Benzoyl chloride	98884			1,000
1,2-Benzphenanthrene	218019		U050	100
Benzyl chloride	100447	500	P028	100
Benzyl cyanide	140294	500		1
Beryllium++	7440417		P015	10
Beryllium chloride	7787475			1
Beryllium fluoride	7787497			1
Beryllium nitrate	13597994 7787555			1
alpha-BHC	319846			10
beta-BHC	319857			1
delta-BHC	319868			1
gamma-BHC	58899		U129	1
Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1 s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-	15271417	500/10,000		1
2,2'-Bioxirane	1464535		U085	10
Biphenyl	92524			100
(1,1 '-Biphenyl)-4,4'diamine	92875		U021	1
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941		U073	1
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904		U091	10
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937		U095	10
Bis(chloromethyl) ketone	534076	10/10,000		1
Bis(2-chloroethyl)ether	111444		U025	10
Bis(2-chloroethoxy)methane	111911		U024	1,000
Bis(2-ethylhexyl)phthalate	117817		U028	100
Bitoscanate	4044659	500/10,000		1
Boron trichloride	10294345	500		1
Boron trifluoride	7637072	500		1
Boron trifluoride compound with methyl ether (1:1)	353424	1,000		1
Bromoacetone	598312		P017	1,000
Bromadiolone	28772567	100/10,000		1
Bromine	7726956	500		1
Bromoform	75252		U225	100
4-Bromophenyl phenyl ether	101553		U030	100
Brucine	357573		P018	100
1,3-Butadiene	106990			10
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683		U128	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
1-Butanamine, N-butyl-N-nitroso-	924163		U172	10
1-Butanol	71363		U031	5,000
2-Butanone	78933		U159	5,000
2-Butanone peroxide (R,T)	1338234		U160	10
2-Butanone, 3,3-dimethyl-1 -(methylthio)-, O[(methylamno)carbonyl] oxime	39196184		P045	100
2-Butenal	123739 4170303		U053	100
2-Butene, 1,4-dichloro- (I,T)	764410		U074	1
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1 -oxobutoxy] methyl] -2,3,5,7a-tetrahydro-1H-pyrrolizin-1 -yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]-	303344		U143	10
Butyl acetate	123864			5,000
iso-Butyl acetate	110190			
sec-Butyl acetate	105464			
tert-Butyl acetate	540885			
n-Butyl alcohol (I)	71363		U031	5,000
Butylamine	109739			1,000
iso-Butylamine	78819			
sec-Butylamine	513495			
tert-Butylamine	13952846 75649			
Butyl benzyl phthalate	85687			100
n-Butyl phthalate	84742		U069	10
Butyric acid	107926			5,000
iso-Butyric acid	79312			
Cacodylic acid	75605		U136	1
Cadmium++ (2+)	7440439			10
Cadmium acetate	543908			10
Cadmium bromide	7789426			10
Cadmium chloride	10108642			10
Cadmium oxide	1306190	100/10,000		1
Cadmium stearate	2223930	1,000/10,000		1
Calcium arsenate	7778441	500/10,000		1
Calcium arsenite	52740166			1
Calcium carbide	75207			10
Calcium chromate	13765190		U032	10
Calcium cyanamide	156627			1,000
Calcium cyanide Ca(CN)2	592018		P021	10
Calcium dodecylbenzenesulfonate	26264062			1,000
Calcium hypochlorite	7778543			10
Camphechlor	8001352	500/10,000		1
Camphene, octachloro-	8001352		P123	1
Cantharidin	56257	100/10,000		1
Carbachol chloride	51832	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Captan	133062			10
Carbamic acid, ethyl ester	51796		U238	100
Carbamic acid, methylnitroso-, ethyl ester	615532		U178	1
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	100/10,000		1
Carbamic chloride, dimethyl-	79447		U097	1
Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546		U1 14	5,000
Carbamothioic acid, bis(1 -methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164		U062	100
Carbaryl	63252			100
Carbofuran	1563662	10/10,000		10
Carbon disulfide	75150	10,000	P022	100
Carbon oxyfluoride (R,T)	353504		U033	1,000
Carbon tetrachloride	56235		U21 1	10
Carbonic acid, dithallium(1+) salt	6533739		U21 5	100
Carbonic dichloride	75445		P095	10
Carbonic difluoride	353504		U033	1,000
Carbonochloridic acid, methyl ester	79221		U1 56	1,000
Carbonyl Sulfide	463581			100
Carbophenothion	786196	500		1
Catechol	120809			100
Chloral	75876		U034	5,000
Chlorambem	133904			100
Chlorambucil	305033		U035	10
Chlordane	57749	1,000	U036	1
Chlordane, alpha & gamma isomers	57749		U036	1
Chlordane, technical	57749		U036	1
Chlorfenvinfos	470906	500		1
Chlorinated champhene (Campheclor)	8001352			1
Chlorine	7782505	100		10
Chlormephos	24934916	500		1
Chlormequat chloride	999815	100/10,000		1
Chlornaphazine	494031		U026	100
Choroacetaldehyde	107200		P023	1,000
Chloroacetophenone	532274			100
Chloroacetic acid	79118	100/10,000		100
p-Chloroaniline	106478		P024	1,000
Chlorobenzene	108907		U037	100
Chlorobenzilate	510156		U038	10
p-Chloro-m-cresol (4)	59507		U039	5,000
1-Chloro-2,3-epoxypropane	106898		U041	100
Chlorodibromomethane	124481			100
Chloroethane	75003			100
Chloroethanol	107073	500		1
Chloroethyl chlorofomate	627112	1,000		1
2-Chloroethyl vinyl ether	110758		U042	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Chloroform	67663	10,000	U044	10
Chloromethane	74873		U045	100
Chloromethyl ether	542881	100	P016	1
Chloromethyl methyl ether	107302	100	U046	10
beta-Chloronaphthalene	91587		U047	5,000
2-Chloronaphthalene	91587		U047	5,000
Chlorophacinone	3691358	100/10,000		1
o-Chlorophenol (2)	95578		U048	100
4-Chlorophenyl phenyl ether	7005723			5,000
1 -(o-Chlorophenyl)thiourea	5344821		P026	100
Chloroprene	126998			100
3-Chloropropionitrile	542767		P027	1,000
Chlorosulfonic acid	7790945			1,000
4-Chloro-o-toluidine, hydrochloride	3165933		U049	100
Chlorpyrifos	2921882			1
Chloroxuron	1982474	500/10,000		1
Chlorthiophos	21923239	500		1
Chromic acetate	1066304			1,000
Chromic acid	11115745 7738945			10
Chromic acid H_2CrO_4, calcium salt	13765190		U032	10
Chromic chloride (Chromium chloride)	10025737	1/10,000		1
Chromic sulfate	10101538			1,000
Chromium++	7440473			5,000
Chromous chloride	10049055			1,000
Chrysene	218019		U050	100
Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-,	62207765	100/10,000		1
Cobaltous bromide	7789437			1,000
Cobalt carbonyl	10210681	10/10,000		1
Cobaltous formate	544183			1,000
Cobaltous sulfamate	14017415			1,000
Coke Oven Emissions	NA			1
Colchicine	64868	10/10,000		1
Copper++	7440508			5,000
Copper cyanide	544923		P029	10
Coumaphos	56724	100/10,000		10
Coumatetralyl	5836293	500/10,000		1
Creosote	8001589		U051	1
Cresol(s) (Phenol, Methyl)	1319773		U052	100
m-Cresol	108394	1,000/10,000		100
o-Cresol	95487			100
p-Cresol	106445			100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Cresylic acid	1319773		U052	100
m-Cresylic acid	108394			100
o-Cresylic acid	95487			100
p-Cresylic acid	106445			100
Crimidine	535897	100/10,000		1
Crotonaldehyde	123739 4170303	1,000 1,000	U053	100 100
Cumene (I)	98828		U055	5,000
Cupric acetate	142712			100
Cupric acetoarsenite	12002038			1
Cupric chloride	7447394			10
Cupric nitrate	3251238			100
Cupric oxalate	5893663			100
Cupric sulfate	7758987			10
Cupric sulfate, ammoniated	10380297			100
Cupric tartrate	815827			100
Cyanides (soluble salts and complexes) not otherwise specified	57125		P030	10
Cyanogen	460195		P031	100
Cyanogen bromide	506683	500/10,000	U246	1,000
Cyanogen chloride	506774		P033	10
Cyanogen iodide (Iodine cyanide)	506785	1,000/10,000		1
Cyanophos	2636262	1,000		1
Cyanuric fluoride	675149	100		1
2,5-Cyclohexadiene-1,4-dione	106514		U197	10
Cyclohexane (I)	110827		U056	1,000
Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)-	58899		U129	1
Cyclohexanone (I)	108941		U057	5,000
2-Cyclohexanone	131895		P034	100
Cycloheximide	66819	100/10,000		1
Cyclohexylamine	108918	10,000		1
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474		U1 30	10
Cyclophosphamide	50180		U058	10
2,4-D Acid	94757		U240	100
2,4-D Ester	94111 94791 94804 1320189 1928387 1928616 1929733 2971382 25168267 53467111			100
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757		U240	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Daunomycin	20830813		U059	10
Decarborane(14)	17702419	500/10,000		1
Demeton	8065483	500		1
Demeton-S-Methyl	919868	500		1
DDD, 4,4'DDD	72548		U060	1
DDE, 4,4'DDE	72559			1
DDT, 4,4'DDT	50293		U061	1
DEHP (Diethylhexyl phthalate)	117817		U028	100
Diallate	2303164		U062	100
Dialifor	10311849	100/10,000		1
Diazinon	333415			1
Diazomethane	334883			100
Dibenz[a,h]anthracene	53703		U063	1
1,2:5,6-Dibenzanthracene	53703		U063	1
Dibenzo[a,h]anthracene	53703		U063	1
Dibenzofuran	132649			100
Dibenz[a,i]pyrene	189559		U064	10
1,2-Dibromo-3-chloropropane	96128		U066	1
Dibromoethane	106934		U067	1
Diborane	19287457	100		1
Dibutyl phthalate	84742		U069	10
Di-n-butyl phthalate	84742		U069	10
Dicamba	1918009			1,000
Dichlobenil	1194656			100
Dichlone	117806			1
Dichlorobenzene	25321226			100
m-Dichlorobenzene (1,3)	541731		U071	100
o-Dichlorobenzene (1,2)	95501		U070	100
p-Dichlorobenzene (1,4)	106467		U072	100
3,3'-Dichlorobenzidine	91941		U073	1
Dichlorobromomethane	75274			5,000
1,4-Dichloro-2-butene (I,T)	764410		U074	1
Dichlorodifluoromethane	75718		U075	5,000
1,1 -Dichloroethane	75343		U076	1,000
1,2-Dichloroethane	107062		U077	100
1,1 -Dichloroethylene	75354		U078	100
1,2-Dichloroethylene	156605		U079	1,000
Dichloroethyl ether	11444	10,000	U025	10
Dichloroisopropyl ether	108601		U027	1,000
Dichloromethoxy ethane	111911		U024	1,000
Dichloromethyl ether	542881		P016	10
Dichloromethylphenylsilane	149746	1,000		1
2,4-Dichlorophenol	120832		U081	100
2,6-Dichlorophenol	87650		U082	100
Dichlorophenylarsine	696286		P036	1
Dichloropropane	26638197			1,000
1,1 -Dichloropropane	78999			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
1,3-Dichloropropane	142289			
1,2-Dichloropropane	78875		U083	1,000
Dichloropropane--Dichloropropene (mixture)	8003198			100
Dichloropropene	26952238			100
2,3-Dichloropropene	78886			
1,3-Dichloropropene	542756		U084	100
2,2-Dichloropropionic acid	75990			5,000
Dichlorvos	62737	1,000		10
Dicofol	115322			10
Dicrotophos	141662	100		1
Dieldrin	60571		P037	1
1,2:3,4-Diepoxybutane (I,T)	1464535	500	U085	10
Diethanolamine	111422			100
Diethyl chlorophosphate	814493	500		1
Diethylamine	109897			1,000
Diethylarsine	692422		P038	1
Diethylcarbmazine citrate	1642542	100/10,000		1
1,4-Diethylenedioxide	123911		U1 08	100
Diethylhexyl phthalate	117817		U028	100
N,N-Diethylaniline	91667			1,000
N,N'-Diethylhydrazine	1615801		U086	10
O,O-Diethyl S-methyl dithiophosphate	3288582		U087	5,000
Diethyl-p-nitrophenyl phosphate	311455		P041	100
Diethyl phthalate	84662		U088	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972		P040	100
Diethylstilbestrol	56531		U089	1
Diethyl sulfate	64675			10
Digitoxin	71636	100/10,000		1
Diglycidyl ether	2238075	1,000		1
Digoxin	20830755	10/10,000		1
Dihydrosafrole	94586		U090	10
Diisopropyfluorophosphate	55914		P043	100
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a-beta)-	309002		P004	1
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)-	465736		P060	1
2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1 a,2,2a,3,6,6a,7,7a-octahydro-,(1 a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)-	60571		P037	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro- 1 a,2,2a,3,6,6a,7,7a-octa-hydro-, (1a-alpha, 2-beta, 2a-beta, 3-alpha, 6-alpha, 6a-beta, 7-beta, 7a-alpha)-	72208		P051	1
Dimethoate	60515		P044	10
3,3'-Dimethoxybenzidine	119904		U091	10
Dimefox	115264	500		1
Dimethoate	60515	500/10,000		10
Dimethyl Phosphorochloridothioate	2524030	500		1
Dimethyl sulfate	77781	500		100
Dimethylamine (l)	124403		U092	1,000
p-Dimethylaminoazobenzene	60117		U093	10
7, 12-Dimethylbenz[a]anthracene	57976		U094	1
3,3'-Dimethylbenzidine	119937		U095	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159		U096	10
Dimethylcarbamoyl chloride	79447		U097	1
Dimethylformamide	68122			100
Dimethyldichlorosilane	75785	500		1
1,1 -Dimethylhydrazine	57147	1,000	U098	10
1,2-Dimethylhydrazine	540738		U099	1
alpha, alpha-Dimethylphenethylamine	122098		P046	5,000
Dimethyl-p-phenylenediamine	99989	10/10,000		1
2,4-Dimethylphenol	105679		U101	100
Dimethyl phthalate	131113		U102	5,000
Dimethyl sulfate	77781		U103	100
Dimetilan	644644	500/10,000		1
Dinitrobenzene (mixed)	25154545			100
m-Dinitrobenzene	99650			
o-Dinitrobenzene	528290			
p-Dinitrobenzene	100254			
4,6-Dinitro-o-cresol and salts	534521	10/10,000	P047	10
Dinitrophenol	25550587			10
2,5-Dinitrophenol	329715			
2,6-Dinitrophenol	573568			
2,4-Dinitrophenol	51285		P048	10
Dinitrotoluene	25321146			10
3,4-Dinitrotoluene	610399			
2,4-Dinitrotoluene	121142		U105	10
2,6-Dinitrotoluene	606202		U106	100
Dinoseb	88857	100/10,000	P020	1,000
Dinoterb	1420071	500/10,000		1
Di-n-octyl phthalate	117840		U107	5,000
1,4-Dioxane	123911		U108	100
Dioxathion	78342	500		1
Diphacinone	82666	10/10,000		1
1,2-Diphenylhydrazine	122667		U109	10
Diphosphoramide, octamethyl-	152169	100	P085	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Diphosphoric acid, tetraethyl ester	107493		P111	10
Dipropylamine	142847		U110	5,000
Di-n-propylnitrosamine	621647		U1 11	10
Diquat	85007 2764729			1,000
Disulfoton	298044	500	P039	1
Dithiazanine iodide	514738	500/10,000		1
Dithiobiuret	541537	100/10,000	P049	100
Diuron	330541			100
Dodecylbenzenesulfonic acid	27176870			1,000
Emetine, Dihydrochloride	316427	1/10,000		1
Endosulfan	115297	10/10,000	P050	1
alpha-Endosulfan	959988			1
beta-Endosulfan	33213659			1
Endosulfant sulfate	1031078			1
Endothall	145733		P088	1,000
Endothion	2778043	500/10,000		1
Endrin	72208	500/10,000	P051	1
Endrin aldehyde	7421934			1
Endrin & metabolites	72208		P051	1
Epichlorohydrin	106898	1,000	U041	100
Epinephrine	51434		P042	1,000
EPN	2104645	100/10,000		1
1,2-Epoxybutane	106887			100
Ergocalciferol	50146	1,000/10,000		1
Ergotamine tartrate	379793	500/10,000		1
Ethanal	75070		U001	1,000
Ethanamine, N-ethyl-N-nitroso-	55185		U174	1
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805		U1 55	5,000
Ethane, 1,2-dibromo-	106934		U067	1
Ethane, 1,1 -dichloro-	75343		U076	1,000
Ethane, 1,2-dichloro-	107062		U077	100
Ethanedinitrile	460195		P031	100
Ethane, hexachloro-	67721		U131	100
Ethane, 1,1 '-[methylenebis(oxy)]bis(2-chloro-	111911		U024	1,000
Ethane, 1,1'-oxybis-	60297		U117	100
Ethane, 1,1 '-oxybis(2-chloro-	111444		U025	10
Ethane, pentachloro-	76017		U1 84	10
Ethanesulfonyl chloride, 2-chloro	1622328	500		1
Ethane, 1,1,1,2-tetrachloro-	630206		U208	100
Ethane, 1,1,2,2-tetrachloro-	79345		U209	100
Ethanethioamide	62555		U218	10
Ethane, 1,1,1-trichloro-	71556		U226	1,000
Ethane, 1,1,2-trichloro-	79005		U227	100
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752775		P066	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Ethanol, 1,2-Dichloro-, acetate	10140871	1,000		1
Ethanol, 2-ethoxy-	110805		U359	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547		U173	1
Ethanone, 1-phenyl-	98862		U004	5,000
Ethene, chloro-	75014		U043	1
Ethene, 2-chloroethoxy-	110758		U042	1,000
Ethene, 1,1 -dichloro-	75354		U078	100
Ethene, 1,2-dichloro- (E)	156605		U079	1,000
Ethene, tetrachloro-	127184		U210	100
Ethene, trichloro-	79016		U228	100
Ethion	563122	1,000		10
Ethoprophos	13194484	1,000		1
Ethyl acetate (I)	141786		U1 12	5,000
Ethyl acrylate (I)	140885		U113	1,000
Ethylbenzene	100414			1,000
Ethylbis(2-Chloroethyl)amine	538078	500		1
Ethyl carbamate (urethane)	51796		U238	100
Ethyl chloride	75003			100
Ethyl cyanide	107120		P101	10
Ethylenebisdithiocarbamic acid, salts & esters	111546		U1 14	5,000
Ethylenediamine	107153			5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004			5,000
Ethylene dibromide	106934		U067	1
Ethylene dichloride	107062		U077	100
Ethylene fluorohydrin	371620	10		1
Ethylene glycol	107211			5,000
Ethylene glycol monoethyl ether	110805		U359	1,000
Ethylene oxide (1,T)	75218	1,000	U115	10
Ethylenediamine	107153	10,000		5,000
Ethylenethiourea	96457		U1 16	10
Ethyleneimine	151564	500	P054	1
Ethyl ether (I)	60297		U1 17	100
Ethylthiocyanate	542905	10,000		1
Ethylidene dichloride	75343		U076	1,000
Ethyl methacrylate	97632		U1 18	1,000
Ethyl methanesulfonate	62500		U1 19	1
Famphur	52857		P097	1,000
Fenamlphos	22224926	10/1 0,000		1
Fenltrothion	122145	500		1
Fensulfothion	115902	500		1
Ferric ammonium citrate	1185575			1,000
Ferric ammonium oxalate	2944674 55488874			1,000
Ferric chloride	7705080			1,000
Ferric fluoride	7783508			100
Ferric nitrate	10421484			1,000
Ferric sulfate	10028225			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Ferrous ammonium sulfate	10045893			1,000
Ferrous chloride	7758943			100
Ferrous sulfate	7720787 7782630			1,000
Fluenetil	4301502	100/10,000		1
Fluoranthene	206440		U120	100
Fluorene	86737			5,000
Fluorine	7782414	500	P056	10
Fluoroacetamide	640197	100/10,000	P057	100
Fluoracetic acid	144490	10/10,000		1
Fluoroacetic acid, sodium salt	62786		P058	10
Fluoroacetyl chloride	359068	10		1
Fluorouracil	51218	500/10,000		1
Fonofos	944229	500		1
Formaldehyde	50000	500	U122	100
Formaldehyde cyanohydrin	107164	1,000		1
Formetanate hydrochloride	23422539	500/10,000		1
Formothion	2540821	100		1
Formparanate	17702577	100/10,000		1
Formic acid (C,T)	64186		U123	5,000
Fosthletan	21548323	500		1
Fubendazole	3878191	100/10,000		1
Fulminic acid, mercury(2+) salt (R,T)	628864		P065	10
Fumaric acid	110178			5,000
Furan (I)	110009	500	U124	100
Furan, tetrahydro- (I)	109999		U213	1,000
2-Furancarboxaldehyde (I)	98011		U125	5,000
2,5-Furandione	108316		U147	5,000
Furfural (I)	98011		U125	5,000
Furfuran (I)	110009		U124	100
Gallium trichloride	13450903	500/10,000		1
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664		U206	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664		U206	1
Glycidylaldehyde	765344		U126	10
Glycol ethers[4]				**
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257		U1 63	10
Guthion	86500			1
Heptachlor	76448		P059	1
Heptachlor epoxide	1024573			1
Hexachlorobenzene	118741		U127	10
Hexachlorobutadiene	87683		U128	1
Hexachlorocyclohexane (gamma isomer)	58899		U129	1
Hexachlorocyclopentadiene	77474	100	U130	10
Hexachloroethane	67721		U131	100
Hexachlorophene	70304		U132	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Hexachloropropene	1888717		U243	1,000
Hexaethyl tetraphosphate	757584		P062	100
Hexamethylene-1, 6-diisocyanate	822060			100
Hexamethylphosphoramide	680319			1
Hexamethylenediamine, N,N'-Dibutyl	4835114	500		1
Hexane	110543			5,000
Hexone (Methyl isobutyl ketone)	108101		U161	5,000
Hydrazine (R,T)	302012	1,000	U133	1
Hydrazine, 1,2-diethyl-	1615801		U086	10
Hydrazine, 1, 1-dimethyl-	57147		U098	10
Hydrazine, 1,2-dimethyl-	540738		U099	1
Hydrazine, 1,2-diphenyl-	122667		U1 09	10
Hydrazine, methyl-	60344		P068	10
Hydrazinecarbothioamide	79196		P116	100
Hydrochloric acid	7647010			5,000
Hydrocyanic acid	74908	100	P063	10
Hydrofluoric acid	7664393		U134	100
Hydrogen chloride (gas only)	7647010	500		5,000
Hydrogen cyanide	74908		P063	10
Hydrogen fluoride	7664393	100	U134	100
Hydrogen peroxide (Conc. >52%)	7722841	1,000		1
Hydrogen phosphide	7803512		P096	100
Hydrogen selenide	7783075	10		1
Hydrogen sulfide	7783064	500	U135	100
Hydroperoxide, 1-methyl-1 -phenylethyl-	80159		U096	10
Hydroquinone	123319	500/1 0,000		100
2-Imidazolidinethione	96457		U1 16	10
Indeno(1,2,3-cd)pyrene	193395		U1 37	100
Iodomethane	74884		U138	100
Iron, Pentacarbonyl-	13463406	100		1
Isobenzan	297789	100/10,000		1
1,3-Isobenzofurandione	85449		U1 90	5,000
Isobutyronitrile	78820	1,000		1
Isobutyl alcohol (1,T)	78831		U140	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	500/10,000		1
Isodrin	465736	100/1 0,000	P060	1
Isofluorphate	55914	100		100
Isophorone	78591			5,000
Isophorone Diisocyanate	4098719	500		1
Isoprene	78795			100
Isopropanolamine dodecylbenzene sulfonate	42504461			1,000
Isopropyl chloroformate	108236	1,000		1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	500		1
Isosafrole	120581		U141	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964		P007	1,000
Kepone	143500		U142	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Lactonitrile	78977	1,000		1
Lasiocarpine	303344		U143	10
Lead acetate	301042		U144	#
Lead arsenate	7784409 7645252 10102484			1
Lead, bis(acetato-O)tetrahydroxytri	1335326		U146	10
Lead chloride	7758954			10
Lead fluoborate	13814965			10
Lead fluoride	7783462			10
Lead iodide	10101630			10
Lead nitrate	10099748			10
Lead phosphate	7446277		U145	10
Lead stearate	7428480 1072351 52652592 56189094			10
Lead subacetate	1335326		U146	10
Lead sulfate	15739807 7446142			10
Lead sulfide	1314870			10
Lead thiocyanate	592870			10
Leptophos	21609905	500/10,000		1
Lewisite	541253	10		1
Lindane	58899	1,000/10,000	U129	1
Lithium chromate	14307358			10
Lithium hydride	7580678	100		1
Malathion	121755			100
Maleic acid	110167			5,000
Maleic anhydride	108316		U147	5,000
Maleic hydrazide	123331		U148	5,000
Malononitrile	109773	500/10,000	U149	1,000
Manganese, tricarbonyl methylcyclopentadienyl	12108133	100		1
MDI (Methylene diphenyl diisocyanate)	101688			5,000
Mechlorethamine	51752	10		1
MEK (Methyl ethyl ketone)	78933		U1 59	5,000
Melphalan	148823		U150	1
Mephosfolan	950107	500		1
Mercaptodimethur	2032657			10
Mercuric acetate	1600277	500/10,000		1
Mercuric chloride	7487947	500/10,000		1
Mercuric cyanide	592041			1
Mercuric nitrate	10045940			10
Mercuric oxide	21908532	500/10,000		1
Mercuric sulfate	7783359			10
Mercuric thiocyanate	592858			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Mercurous nitrate	10415755 7782867			10
Mercury	7439976		U151	1
Mercury (acetate-O)phenyl-	62384		P092	100
Mercury fulminate	628864		P065	10
Methacrolein diacetate	10476956	1,000		1
Methacrylic anhydride	760930	500		1
Methacrylonitrile (I,T)	126987	500	U1 52	1,000
Methacryloyl chloride	920467	100		1
Methacryloyloxyethyl isocyanate	30674807	100		1
Methamidophos	10265926	100/10,000		1
Methanamine, N-methyl-	124403		U092	1,000
Methanamine, N-methyl-N-nitroso-	62759		P082	10
Methane, bromo-	74839		U029	1,000
Methane, chloro- (1,T)	74873		U045	100
Methane, chloromethoxy-	107302		U046	10
Methane, dibromo-	74953		U068	1,000
Methane, dichloro-	75092		U080	1,000
Methane, dichlorodifluoro-	75718		U075	5,000
Methane, iodo-	74884		U138	100
Methane, isocyanato-	624839		P064	10
Methane, oxybis(chloro-	542881		P016	10
Methanesulfenyl chloride, trichloro-	594423		P118	100
Methanesulfonyl fluoride	558258	1,000		1
Methanesulfonic acid, ethyl ester	62500		U1 19	1
Methane, tetrachloro-	56235		U21 1	10
Methane, tetranitro- (R)	509148		P112	10
Methane, tribromo-	75252		U225	100
Methane, trichloro-	67663		U044	10
Methane, trichlorofluoro-	75694		U121	5,000
Methanethiol (1,T)	74931		U1 53	100
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115297		P050	1
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one, 1,1 a,3,3a,4,5,5a,5b,6-decachloroctahydro-	143500		U142	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro-	76448		P059	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro-	57749		U036	1
Methanol (I)	67561		U1 54	5,000
Methapyrilene	91805		U155	5,000
Methidathion	950378	500/10,000		1
Methiocarb	2032657	500/10,000	P199	10
Methomyl	16752775	500/10,000	P066	100
Methoxychlor	72435		U247	1
Methoxyethylmercuric acetate	151382	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Methyl alcohol (I)	67561		U1 54	5,000
Methyl aziridine	75558		P067	1
Methyl bromide	74839	1,000	U029	1,000
1 -Methylbutadiene (I)	504609		U1 86	100
Methyl chloride (I,T)	74873		U045	100
Methyl 2-chloroacrylate	80637	500		1
Methyl chlorocarbonate (I,T)	79221		U1 56	1,000
Methyl chloroform	71556		U226	1,000
Methyl chloroformate	79221	500	U1 56	1,000
3-Methylcholanthrene	56495		U1 57	10
4,4'-Methylenebis(2-chloroaniline)	101144		U1 58	10
Methylene bromide	74953		U068	1,000
Methylene chloride	75092		U080	1,000
4,4'-Methylenedianiline	101779			10
Methylene diphenyl diisocyanate (MDI)	101688			5,000
Methyl ethyl ketone (MEK) (I,T)	78933		U1 59	5,000
Methyl ethyl ketone peroxide (R,T)	1338234		U160	10
Methyl hydrazine	60344	500	P068	10
Methyl iodide	74884		U138	100
Methyl isobutyl ketone	108101		U161	5,000
Methyl isocyanate	624839	500	P064	10
Methyl isothiocyanate	556616	500		1
2-Methyllactonitrile	75865		P069	10
Methyl mercaptan	74931	500	U153	100
Methyl methacrylate (I,T)	80626		U1 62	1,000
Methyl parathion	298000		P071	100
Methyl phenkapton	3735237	500		1
Methyl phosphonic dichloride	676971	100		1
4-Methyl-2-pentanone (I)	108101		U161	5,000
Methyl tert-butyl ether	1634044			1,000
Methyl thiocyanate	556649	10,000		1
Methylthiouracil	56042		U164	10
Methyl vinyl ketone	78944	10		1
Methylmercuric dicyanamide	502396	500/10,000		1
Methyltrichlorosilane	75796	500		1
Metolcarb	1129415	100/10,000		1
Mevinphos	7786347	500		10
Mexacarbate	315184	500/10,000		1,000
Mitomycin C	50077	500/10,000	U010	10
MNNG	70257		U163	10
Monocrotophos	6923224	10/10,000		1
Monoethylamine	75047			100
Monomethylamine	74895			100
Muscimol	2763964	500/1 0,000	P007	1,000
Mustard gas	505602	500		1
Naled	300765			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
5, 12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9, 10-tetrahydro-6,8,11 -trihydroxy-1 -methoxy-, (8S-cis)-	20830813		U059	10
1-Naphthalenamine	134327		U167	100
2-Naphthalenamine (beta-Naphthylamine)	91598		U168	1
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031		U026	100
Naphthalene	91203		U165	100
Naphthalene, 2-chloro-	91587		U047	5,000
1,4-Naphthalenedione	130154		U1 66	5,000
2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1, 1 '-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-tetrasodium salt	72571		U236	10
Naphthenic acid	1338245			100
1,4-Naphthoquinone	130154		U166	5,000
alpha-Naphthylamine	134327		U167	100
beta-Naphthylamine (2-Naphthalenamine)	91598		U168	1
alpha-Naphthylthiourea	86884		P072	100
Nickel++	7440020			100
Nickel ammonium sulfate	15699180			100
Nickel carbonyl	13463393	1	P073	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393		P073	10
Nickel chloride	7718549 37211055			100
Nickel cyanide	557197		P074	10
Nickel hydroxide	12054487			10
Nickel nitrate	14216752			100
Nickel sulfate	7786814			100
Nicotine & salts	54115	100	P075	100
Nicotine sulfate	65305	100/10,000		1
Nitric acid	7697372	1,000		1,000
Nitric acid, thallium(1+) salt	10102451		U217	100
Nitric oxide	10102439	100	P076	10
p-Nitroaniline	100016		P077	5,000
Nitrobenzene (I,T)	98953	10,000	U169	1,000
4-Nitrobiphenyl	92933			10
Nitrocyclohexane	1122607	500		1
Nitrogen dioxide	10102440 10544726	100	P078	10
Nitrogen oxide	10102439		P076	10
Nitroglycerine	55630		P081	10
Nitrophenol (mixed)	25154556			100
m-Nitrophenol	554847			100
o-Nitrophenol (2)	88755			100
p-Nitrophenol (4)	100027		U170	100
2-Nitropropane (I,T)	79469		U171	10
N-Nitrosodi-n-butylamine	924163		U1 72	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
N-Nitrosodiethanolamine	1116547		U173	1
N-Nitrosodiethylamine	55185		U174	1
N-Nitrosodimethylamine	62759	1,000	P082	10
N-Nitrosodiphenylamine	86306			100
N-Nitroso-N-ethylurea	759739		U176	1
N-Nitroso-N-methylurea	684935		U177	1
N-Nitroso-N-methylurethane	615532		U178	1
N-Nitrosomethylvinylamine	4549400		P084	10
N-Nitrosomorpholine	59892			1
N-Nitrosopiperidine	100754		U179	10
N-Nitrosopyrrolidine	930552		U180	1
Nitrotoluene	1321126			1,000
m-Nitrotoluene	99081			
o-Nitrotoluene	88722			
p-Nitrotoluene	99990			
5-Nitro-o-toluidine	99558		U181	100
Norbromide	991424	100/10,000		1
Octamethylpyrophosphoramide	152169		P085	100
Organorhodium complex (PMN-82-147)	0	10/10,000		1
Osmium tetroxide	20816120		P087	1,000
Ouabain	630604	100/10,000		1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733		P088	1,000
Oxamyl	23135220	100/10,000	P194	1
1,2-Oxathiolane, 2,2-dioxide	1120714		U193	10
2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180		U058	10
Oxetane, 3,3-bis(chloromethyl)-	78717	500		1
Oxirane (1,T)	75218		U115	10
Oxiranecarboxyaldehyde	765344		U126	10
Oxirane, (chloromethyl)-	106898		U041	100
Oxydisulfoton	2497076	500		1
Ozone	10028156	100		1
Paraformaldehyde	30525894			1,000
Paraldehyde	123637		U182	1,000
Paraquat	1910425	10/10,000		1
Paraquat methosulfate	2074502	10/10,000		1
Parathion	56382	100	P089	10
Parathion-methyl	298000	100/10,000		100
Paris green	12002038	500/10,000		100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
PCBs	1336363			
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
PCNB (Pentachloronitrobenzene)	82688		U1 85	100
Pentaborane	19624227	500		1
Pentachlorobenzene	608935		U1 83	10
Pentachloroethane	76017		U1 84	10
Pentachlorophenol	87865		U242	10
Pentachloronitrobenzene (PCNB)	82688		U1 85	100
Pentadecylamine	2570265	100/10,000		1
Paracetic acid	79210	500		1
1,3-Pentadiene (I)	504609		U1 86	100
Perachloroethylene	127184		U210	100
Perchloromethylmercaptan	594423	500		100
Phenacetin	62442		U187	100
Phenanthrene	85018			5,000
Phenol	108952	500/10,000	U188	1,000
Phenol, 2-chloro-	95578		U048	100
Phenol, 4-chloro-3-methyl-	59507		U039	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895		P034	100
Phenol, 2,4-dichloro-	120832		U081	100
Phenol, 2,6-dichloro-	87650		U082	100
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531		U089	1
Phenol, 2,4-dimethyl-	105679		U101	100
Phenol, 2,4-dinitro-	51285		P048	10
Phenol, methyl-	1319773		U052	1,000
m-Cresol	108394			
o-Cresol	95487			
p-Cresol	106445			
Phenol, 2-methyl-4,6-dinitro-and salts	534521		P047	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304		U132	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	100/10,000		1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857		P020	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	500/10,000		1
Phenol, 4-nitro-	100027		U170	100
Phenol, pentachloro-	87865		U242	10
Phenol, 2,3,4,6-tetrachloro-	58902		U212	10
Phenol, 2,4,5-trichloro-	95954		U230	10
Phenol, 2,4,6-trichloro-	88062		U23 1	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748		P009	10
Phenoxarsine, 10,1 0'-oxydi-	58366	500/1 0,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823		U150	1
Phenyl dichloroarsine	696286	500		1
1,1 0-(1,2-Phenylene)pyrene	193395		U1 37	100
p-Phenylenediamine	106503			5,000
Phenylhydrazine hydrochloride	59881	1,000/10,000		1
Phenylmercury acetate	62384	500/10,000	P092	100
Phenylsilatrane	2097190	100/10,000		1
Phenylthiourea	103855	100/10,000	P093	100
Phorate	298022	10	P094	10
Phosacetim	4104147	100/10,000		1
Phosfolan	947024	100/10,000		1
Phosgene	75445	10	P095	10
Phosmet	732116	10/10,000		1
Phosphamidon	13171216	100		1
Phosphine	7803512	500		100
Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester	2587908	500		1
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	500		1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	100		1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	500		1
Phosphoric acid	7664382			5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455		P041	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	500		1
Phosphoric acid, lead(2+) salt (2:3)	7446277	500	U145	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044		P039	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022		P094	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582		U087	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515		P044	10
Phosphorofluondic acid, bis(1-methylethyl) ester	55914		P043	100
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382		P089	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857		P097	1,000
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000		P071	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972		P040	100
Phosphorus	7723140	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No.[2]	RQ (Pounds)[3]
Phosphorus oxychloride	10025873	500		1,000
Phosphorous pentachloride	10026138	500		1
Phosphorus pentasulfide (R)	1314803		U189	100
Phosphorus pentoxide	1314563	10		1
Phosphorus trichloride	7719122	1,000		1,000
Phthalic anhydride	85449		U190	5,000
Physostigmine	57476	100/10,000	P204	1
Phosostigmine, salicylate (1:1)	57647	100/10,000		1
2-Picoline	109068		U191	5,000
Picotoxin	124878	500/10,000		1
Piperidine	110894	1,000		1
Piperidine, 1-nitroso-	100754		U179	10
Pirimifos-ethyl	23505411	1,000		1
Plumbane, tetraethyl-	78002		P110	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363			1
Potassium arsenate	7784410			1
Potassium arsenite	10124502	500/10,000		1
Potassium bichromate	7778509			10
Potassium chromate	7789006			10
Potassium cyanide	151508	100	P098	10
Potassium hydroxide	1310583			1,000
Potassium permanganate	7722647			100
Potassium silver cyanide	506616	500	P099	1
Promecarb	2631370	500/10,000		1
Pronamide	23950585		U192	5,000
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063		P070	1
1-Propanamine (I,T)	107108		U194	5,000
1-Propanamine, N-propyl-	142847		U1 10	5,000
1-Propanamine, N-nitroso-N-propyl-	621647		U1 11	10
Propane, 1,2-dibromo-3-chloro	96128		U066	1
Propane, 2-nitro- (I,T)	79469		U171	10
1,3-Propane sultone	1120714		U193	10
Propane 1,2-dichloro-	78875		U083	1,000
Propanedinitrile	109773		U149	1,000
Propanenitrile	107120		P101	10
Propanenitrile, 3-chloro-	542767		P027	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865		P069	10
Propane, 2,2'-oxybis[2-chloro-	108601		U027	1,000
1,2,3-Propanetnol, trinitrate- (R)	55630		P081	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		U235	10
1-Propanol, 2-methyl- (I,T)	78831		U140	5,000
2-Propanone (I)	67641		U002	5,000
2-Propanone, 1 -bromo-	598312		P017	1,000
Propargite	2312358			10
Propargyl alcohol	107197		P102	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Propargyl bromide	106967	10		1
2-Propenal	107028		P003	1
2-Propenamide	79061		U007	5,000
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717		U243	1,000
1-Propene, 1,3-dichloro-	542756		U084	100
2-Propenenitrile	107131		U009	100
2-Propenenitrile, 2-methyl- (I,T)	126987		U1 52	1,000
2-Propenoic acid (I)	79107		U008	5,000
2-Prepenoic acid, ethyl ester (I)	140885		U1 13	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632		U1 18	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626		U1 62	1,000
2-Propen-1-o1	107186		P005	100
Propiolactone, beta-	57578	500		1
Propionaldehyde	123386			1,000
Propionic acid	79094			5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721		U233	100
Propionic anhydride	123626			5,000
Propoxor (Baygon)	114261		U411	100
Propionitrile	107120	500		10
Propionitrile, 3-chloro-	542767	1,000		1,000
Propiophenone, 1, 4-amino phenyl	70699	100/10,000		1
n-Propylamine	107108		U194	5,000
Propyl chloroformate	109615	500		1
Propylene dichloride	78875		U083	1,000
Propylene oxide	75569	10,000		100
1,2-Propylenimine	75558	10,000	P067	1
2-Propyn-1-o1	107197		P102	1,000
Prothoate	2275185	100/1 0,000		1
Pyrene	129000	1,000/1 0,000		5,000
Pyrethrins	121299 121211 8003347			1
3,6-Pyridazinedione, 1,2-dihydro-	123331		U148	5,000
4-Pyridinamine	504245		P008	1,000
Pyridine	110861		U196	1,000
Pyridine, 2-methyl-	109068		U191	5,000
Pyridine, 2-methyl-5-vinyl-	140761	500		1
Pyridine, 4-amino-	504245	500/10,000		1,000
Pyridine, 4-nitro-, 1-oxide	1124330	500/10,000		1
Pyridine, 3-(1 -methyl-2-pyrrolidinyl)-, (S)	54115		P075	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751		U237	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042		U164	10
Pyriminil	53558251	100/10,000		1
Pyrrolidine, 1 -nitroso-	930552		U1 80	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Quinoline	91225			5,000
Quinone (p-Benzoquinone)	106514		U197	10
Quintobenzene	82688		U185	100
Reserpine	50555		U200	5,000
Resorcinol	108463		U201	5,000
Saccharin and salts	81072		U202	100
Salcomine	14167181	500/10,000		1
Sarin	107448	10		1
Safrole	94597		U203	100
Selenious acid	7783008	1,000/10,000	U204	10
Selenious acid, dithallium (1+) salt	12039520		P114	1,000
Selenium ++	7782492			100
Selenium dioxide	7446084		U204	10
Selenium oxychloride	7791233	500		1
Selenium sulfide (R,T)	7488564		U205	10
Selenourea	630104		P103	1,000
Semicarbazide hydrochloride	563417	1,000/10,000		1
L-Serine, diazoacetate (ester)	115026		U01 5	1
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1,000		1
Silver ++	7440224			1,000
Silver cyanide	506649		P104	1
Silver nitrate	7761888			1
Silvex (2,4,5-TP)	93721		U233	100
Sodium	7440235			10
Sodium arsenate	7631892	1,000/10,000		1
Sodium arsenite	7784465	500/10,000		1
Sodium azide	26628228	500	P105	1,000
Sodium bichromate	10588019			10
Sodium bifluoride	1333831			100
Sodium bisulfite	7631905			5,000
Sodium cacodylate	124652	100/10,000		1
Sodium chromate	7775113			10
Sodium cyanide	143339	100	P106	10
Sodium dodecylbenzenesulfonate	25155300			1,000
Sodium fluoride	7681494			1,000
Sodium fluoroacetate	62748	10/10,000		10
Sodium hydrosulfide	16721805			5,000
Sodium hydroxide	1310732			1,000
Sodium hypochlorite	7681529 10022705			100
Sodium methylate	124414			1,000
Sodium nitrite	7632000			100
Sodium prentachlorophenate	131522	100/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Sodium phosphate, dibasic	7558794 10039324 10140655			5,000
Sodium phosphate, tribasic	7601549 7758294 7785844 10101890 10124568 10361894			5,000
Sodium selenate	13410010	100/10,000		1
Sodium selenite	10102188 7782823	100/10,000		100
Sodium tellurite	10102202	500/10,000		1
Stannane, acetoxytriphenyl	900958	500/10,000		1
Streptozotocin	18883664		U206	1
Strontium chromate	7789062			10
Strychnidin-10-one	57249		P108	10
Strychnidin-1 0-one, 2,3-dimethoxy-	357573		P018	100
Strychnine, & salts	572494	100/10,000	P108	10
Strychnine sulfate	60413	100/10,000		1
Styrene	100425			1,000
Styrene oxide	96093			100
Sulfotep	3689245	500		100
Sulfoxide, 3-chloropropyl octyl	3569571	500		1
Sulfur monochloride	12771083			1,000
Sulfur dioxide	7446095	500		1
Sulfur phosphide (R)	1314803		U189	100
Sulfur tetrafluoride	7783600	100		1
Sulfur trioxide	7446119	100		1
Sulfuric acid	7664939 8014957	1,000		1,000
Sulfuric acid, dithallium (1+) salt	7446186 10031591		P115	100
Sulfuric acid, dimethyl ester	77781		U103	100
Tabun	77816	10		1
2,4,5-T acid	93765		U232	1,000
2,4,5-T amines	2008460 1319728 3813147 6369966 6369977			5,000
Tellurium	13494809	500/10,000		1
Tellurium hexafluoride	7783804	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2,4,5-T esters	93798 1928478 2545597 25168154 61792072			1,000
2,4,5-T salts	13560991			1,000
2,4,5-T	93765		U232	1,000
TDE (Dichloro diphenyl dichloroethane)	72548		U060	1
TEPP (Tetraethyl ester diphosphoric acid)	107493	100		10
Terbufos	13071799	100		1
1,2,4,5-Tetrachlorobenzene	95943		U207	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016			1
1,1,1,2-Tetrachloroethane	630206		U208	100
1,1,2,2-Tetrachloroethane	79345		U209	100
Tetrachloroethene	127184		U21 0	100
Tetrachloroethylene	127184		U21 0	100
2,3,4,6-Tetrachlorophenol	58902		U212	10
Tetraethyl lead	78002	100	P110	10
Tetraethyl pyrophosphate	107493		P111	10
Tetraethyldithiopyrophosphate	3689245		P109	100
Tetraethyltin	597648	100		1
Tetramethyllead	75741	100		1
Tetrahydrofuran (I)	109999		U21 3	1,000
Tetranitromethane (R)	509148	500	P112	10
Tetraphosphoric acid, hexaethyl ester	757584		P062	100
Thallic oxide	1314325		P113	100
Thallium ++	7440280			1,000
Thallium acetate	563688		U214	100
Thallium carbonate	6533739		U21 5	100
Thallium chloride	7791120		U216	100
Thallium nitrate	10102451		U217	100
Thallium oxide	1314325		P113	100
Thallium selenite	12039520		P114	1,000
Thallium sulfate	7446186 10031591	100/10,000	P115	100
Thallous carbonate (Thallium (I) carbonate)	6533739	100/10,000	U215	100
Thallous chloride (Thallium (I) chloride)	7791120	100/10,000	U216	100
Thallous malonate (Thallium (I) malonate)	2757188	100/10,000		1
Thallous sulfate (Thallium (I) sulfate)	7446186	100/10,000	P115	100
Thioacetamide	62555		U218	10
Thiocarbazide	2231574	1,000/10,000		1
Thiodiphosphoric acid, tetraethyl ester	3689245		P109	100
Thiofanox	39196184	100/10,000	P045	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537		P049	100
Thiomethanol (I,T)	74931		U1 53	100
Thionazin	297972	500		100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl-	137268		U244	10
Thiophenol	108985	500	P104	100
Thiosemicarbazide	79196	100/10,000	P116	100
Thiourea	62566		U219	10
Thiourea, (2-chlorophenyl)-	5344821	100/10,000	P026	100
Thiourea, (2-methylphenyl)-	614788	500/10,000		1
Thiourea, 1 -naphthalenyl-	86884		P072	100
Thiourea, phenyl-	103855		P093	100
Thiram	137268		U244	10
Titanium tetrachloride	7550450	100		1,000
Toluene	108883		U220	1,000
Toluenediamine	95807 496720 823405 25376458		U221	10
Toluene diisocyanate (R,T)	584849 91087 26471625	500 100	U223	100 100
o-Toluidine	95534		U328	100
p-Toluidine	106490		U353	100
o-Toluidine hydrochloride	636215		U222	100
Toxaphene	8001352		P123	1
2,4,5-TP acid	93721		U233	100
2,4,5-TP acid esters	32534955			100
1H-1,2,4-Triazol-3 -amine	61825		U01 1	10
Trans-1,4-dichlorobutene	110576	500		1
Triamiphos	1031476	500/10,000		1
Triazofos	24017478	500		1
Trichloroacetyl chloride	76028	500		1
Trichlorfon	52686			100
1,2,4-Trichlorobenzene	120821			100
1,1,1-Trichloroethane	71556		U226	1,000
1,1,2-Trichloroethane	79005		U227	100
Trichloroethene	79016		U228	100
Trichloroethylene	79016		U228	100
Trichloroethylsilane	115219	500		1
Trichloronate	327980	500		1
Trichloromethanesulfenyl chloride	594423		P118	100
Trichloromonofluoromethane	75694		U121	5,000
Trichlorophenol	21567822			10
2,3,4-Trichlorophenol	15950660			
2,3,5-Trichlorophenol	933788			
2,3,6-Trichlorophenol	933755			
2,4,5-Trichlorophenol	95954		U230	10
2,4,6-Trichlorophenol	88062		U231	10
3,4,5-Trichlorophenol	609198			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**	**USEPA HW No.** [2]	**RQ (Pounds)**[3]
Trichlorophenylsilane	98135	500		1
Trichloro(chloromethyl)silane	1558254	100		1
Trichloro(dichlorophenyl)silane	27137855	500		1
Triethanolamine dodecylbenzene-sulfonate	27323417			1,000
Triethoxysilane	998301	500		1
Trifluralin	1582098			10
Triethylamine	121448			5,000
Trimethylamine	75503			100
Trimethylchlorsilane	75774	1,000		1
2,2,4-Trimethylpentane	540841			1,000
Trimethylolpropane phosphite	824113	100/10,000		1
Trimethyiltin chloride	1066451	500/10,000		1
1,3,5-Trinitrobenzene (R,T)	99354		U234	10
1,3,5-Trioxane, 2,4,6-trimethyl-	123637		U1 82	1,000
Triphenyltin chloride	639587	500/10,000		1
Tris(2-chloroethyl)amine	555771	**100**		1
Tris(2,3-dibromopropyl) phosphate	126727		U235	10
Trypan blue	72571		U236	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA		D001	100
Unlisted Hazardous Wastes Characteristic of **Corrosivity**	NA		D002	100
Unlisted Hazardous Wastes Characteristic of **Reactivity**	NA		D003	100
Unlisted Hazardous Wastes Characteristic of **Toxicity**				

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Arsenic			D004	1
Barium			D005	1,000
Benzene			D018	10
Cadmium			D006	10
Carbon Tetrachloride			D019	10
Chlordane			D020	1
Chlorobenzene			D021	100
Chloroform			D022	10
Chromium			D007	10
o-Cresol			D023	100
m-Cresol			D024	100
p-Cresol			D025	100
Cresol			D026	100
2,4-D (Dichlorophenoxyacetic acid)			D016	100
1,4-Dichlorobenzene			D027	100
1,2-Dichloroethane			D028	100
1,1 -Dichloroethylene			D029	100
2,4-Dinitrotoluene			D030	10
Endrin			D012	1
Heptachlor (and epoxide)			D03 1	1
Hexachlorobenzene			D032	10
Hexachlorobutadiene			D033	1
Hexachloroethane			D034	100
Lead			D008	10
Lindane			D013	1
Mercury			D009	1
Methoxychlor			D014	1
Methyl ethyl ketone			D035	5,000
Nitrobenzene			D036	1,000
Pentachlorophenol			D037	10
Pyridine			D038	1,000
Selenium			D010	10
Silver			D011	1
Tetrachloroethylene			D039	100
Toxaphene			D015	1
Trichloroethylene			D040	100
2,4,5 Trichlorophenol			D041	10
2,4,5-TP			D017	100
Vinyl chloride			D043	1
Uracil mustard	66751		U237	10
Uranyl acetate	541093			100
Uranyl nitrate	10102064 36478769			100
Urea, N-ethyl-N-nitroso	759739		U176	1
Urea, N-methyl-N-nitroso	684935		U177	1
Urethane (Carbamic acid ethyl ester)	51796		U238	100
Valinomycin	2001958	1,000/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Vanadic acid, ammonium salt	7803556		P119	1,000
Vanadic oxide V_2O_5	1314621		P120	1,000
Vanadic pentoxide	1314621		P120	1,000
Vanadium pentoxide	1314621	100/10,000		1,000
Vanadyl sulfate	27774136			1,000
Vinyl chloride	75014		U043	1
Vinyl acetate	108054			5,000
Vinyl acetate monomer	108054	1,000		5,000
Vinylamine, N-methyl-N-nitroso-	4549400		P084	10
Vinyl bromide	593602			100
Vinylidene chloride	75354		U078	100
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	500/10,000	P001	100
Warfarin sodium	129066	100/10,000		100
Xylene (mixed)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
Xylenol	1300716			1,000
Xylylene dichloride	28347139	100/10,000		1
Yohimban-16-carboxylic acid, 11,17 dimethoxy-1 8-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,1 7-alpha, 1 8-beta,20-alpha)-	50555		U200	5,000
Zinc ++	7440666			1,000
Zinc acetate	557346			1,000
Zinc ammonium chloride	52628258 14639975 14639986			1,000
Zinc borate	1332076			1,000
Zinc bromide	7699458			1,000
Zinc carbonate	3486359			1,000
Zinc chloride	7646857			1,000
Zinc cyanide	557211		P121	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	100/10,000		1
Zinc fluoride	7783495			1,000
Zinc formate	557415			1,000
Zinc hydrosulfite	7779864			1,000
Zinc nitrate	7779886			1,000
Zinc phenosulfonate	127822			5,000
Zinc phosphide	1314847	500	P122	100
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847		P122	100
Zinc silicofluoride	16871719			5,000
Zinc sulfate	7733020			1,000
Zirconium nitrate	13746899			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**	**USEPA HW No.**[2]	**RQ (Pounds)**[3]
Zirconium potassium fluoride	16923958			1,000
Zirconium sulfate	14644612			5,000
Zirconium tetrachloride	10026116			5,000
F001			**F001**	**10**
The following spent halogenated solvents used in degreasing: all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Trichloroethylene	79016		U228	100
(c) Methylene chloride	75092		U080	1,000
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Carbon tetrachloride	56235		U211	10
(f) Chlorinated fluorocarbons	NA			5,000
F002			**F002**	**10**
The following spent halogenated solvents: All spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Methylene chloride	75092		U080	1,000
(c) Trichloroethylene	79016		U228	100
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Chlorobenzene	108907		U037	100
(f) 1,1,2-Trichloro-1,2,2 trifluoroethane	76131			5,000
(g) o-Dischlorobenzene	95501		U070	100
(h) Trichlorofluoromethane	75694		U121	5,000
(i) 1,1,2-Trichloroethane	79005		U227	100
F003			**F003**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Xylene	1330207			1,000
(b) Acetone	67641			5,000
(c) Ethyl acetate	141786			5,000
(d) Ethylbenzene	100414			1,000
(e) Ethyl ether	60297			100
(f) Methyl isobutyl ketone	108101			5,000
(g) n-Butyl alcohol	71363			5,000
(h) Cyclohexanone	108941			5,000
(i) Methanol	67561			5,000
F004			**F004**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319773		U052	100
(b) Nitrobenzene	98953		U169	1,000
F005			**F005**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a)	Toluene		108883	U220
(b)	Methyl ethyl ketone		78933	U159
(c)	Carbon disulfide		75150	P022
(d)	Isobutanol		78831	U140
(e)	Pyndine		110861	U196

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
F006 Wastewater treatment sludges from electroplating operations, except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.			**F006**	**10**
F007 Spent cyanide plating bath solutions from electroplating operations.			**F007**	**10**
F008 Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.			**F008**	**10**
F009 Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.			**F009**	**10**
F010 Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.			**F010**	**10**
F011 Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.			**F011**	**10**
F012 Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.			**F012**	**10**
F019 Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process.			**F019**	**10**
F020 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)			**F020**	**1**
F021 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.			**F021**	**1**
F022 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.			**F022**	**1**
F023 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.)			**F023**	**1**
F024 Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent desicants, wastewater treatment sludges, spent catalysts, and wastes listed in separately in Table AP1.T3 or wastes listed in Table AP1.T4 and having a USEPA HW No. beginning with "K.")			**F024**	**1**
F025 Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.			**F025**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
F026			**F026**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions.				
F027			**F027**	**1**
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.)				
F028			**K028**	**1**
Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027.				
F032			**F032**	**1**
Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F034			**F034**	**1**
Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F035			**F035**	**1**
Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F037			**F037**	**1**
Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K05 1 wastes are not included in this listing.				
F038			**F038**	**1**
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from once-through non-contact cooling water segregated from treatment from other process or oil cooling wastes, ; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.				

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K001 Bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**K001**	**1**
K002 Wastewater treatment sludge from the production of chrome yellow and orange pigments.			**K002**	**10**
K003 Wastewater treatment sludge from the production of molyodate orange pigments.			**K003**	**10**
K004 Wastewater treatment sludge from the production of zinc yellow pigments.			**K004**	**10**
K005 Wastewater treatment sludge from the production of chrome green pigments.			**K005**	**10**
K006 Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).			**K006**	**10**
K007 Wastewater treatment sludge from the production of iron blue pigments.			**K007**	**10**
K008 Oven residue from the production of chrome oxide green pigments.			**K008**	**10**
K009 Distillation bottoms from the production of acetaldehyde from ethylene.			**K009**	**10**
K010 Distillation side cuts from the production of acetaldehyde from ethylene.			**K010**	**10**
K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.			**K011**	**10**
K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.			**K013**	**10**
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile.			**K014**	**5,000**
K015 Still bottoms from the distillation of benzyl chloride.			**K015**	**10**
K016 Heavy ends or distillation residues from the production of carbon tetrachloride.			**K016**	**1**
K017 Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.			**K017**	**10**
K018 Heavy ends from the fractionation column in ethyl chloride production.			**K018**	**1**
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride			**K019**	**1**
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer			**K020**	**1**
K021 Aqueous spent antimony catalyst waste from fluoromethanes production.			**K021**	**10**
K022 Distillation bottom tars from the production of phenol/acetone from cumene.			**K022**	**1**
K023 Distillation light ends from the production of ophthalic anhydride from naphthalene.			**K023**	**5,000**
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene.			**K024**	**5,000**
K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene.			**K025**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K026 Stripping still tails from the production of methyl ethyl pyridines.			**K026**	**1,000**
K027 Centrifuge and distillation residues from toluene diisocyanate production.			**K027**	**10**
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1, 1-trichloroethane.			**K028**	**1**
K029 Waste from the product steam stripper in the production of 1,1,1 -trichloroethane.			**K029**	**1**
K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.			**K030**	**1**
K031 By-product salts generated in the production of MSMA and cacodylic acid.			**K031**	**1**
K032 Wastewater treatment sludge from the production of chlordane.			**K032**	**10**
K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.			**K033**	**10**
K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.			**K034**	**10**
K035 Wastewater treatment sludges generated in the production of creosote.			**K035**	**1**
K036 Still bottoms from toluene reclamation distillation in the production of disulfoton.			**K036**	**1**
K037 Wastewater treatment sludges from the production of disulfoton.			**K037**	**1**
K038 Wastewater from the washing and stripping of phorate production.			**K038**	**10**
K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.			**K039**	**10**
K040 Wastewater treatment sludge from the production of phorate.			**K040**	**10**
K041 Wastewater treatment sludge from the production of toxaphene.			**K041**	**1**
K042 Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.			**K042**	**10**
K043 2,6-Dichlorophenol waste from the production of 2,4-D.			**K043**	**10**
K044 Wastewater treatment sludges from the manufacturing and processing of explosives.			**K044**	**10**
K045 Spent carbon from the treatment of wastewater containing explosives.			**K045**	**10**
K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.			**K046**	**10**
K047 Pink/red water from TNT operations.			**K047**	**10**
K048 Dissolved air flotation (DAF) float from the petroleum refining industry.			**K048**	**10**
K049 Slop oil emulsion solids from the petroleum refining industry.			**K049**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry.			**K050**	**10**
K051 API separator sludge from the petroleum refining industry.			**K051**	**10**
K052 Tank bottoms (leaded) from the petroleum refining industry.			**K052**	**10**
K060 Ammonia still lime sludge from coking operations.			**K060**	**1**
K061 Emission control dust/sludge from the primary production of steel in electric furnaces.			**K061**	**10**
K062 Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).			**K062**	**10**
K064 Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.			**K064**	**10**
K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting			**K065**	**10**
K066 Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.			**K066**	**10**
K069 Emission control dust/sludge from secondary lead smelting.			**K069**	**10**
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.			**K071**	**1**
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.			**K073**	**10**
K083 Distillation bottoms from aniline extraction.			**K083**	**100**
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K084**	**1**
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.			**K085**	**10**
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.			**K086**	**10**
K087 Decanter tank tar sludge from coking operations.			**K087**	**100**
K088 Spent potliners from primary aluminum reduction.			**K088**	**10**
K090 Emission control dust or sludge from ferrochromiumsilicon production.			**K090**	**10**
K091 Emission control dust or sludge from ferrochromium production.			**K091**	**10**
K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.			**K093**	**5,000**
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.			**K094**	**5,000**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K095 Distillation bottoms from the production of 1,1,1 -trichloroethane.			**K095**	**100**
K096 Heavy ends from the heavy ends column from the production of 1,1,1 -trichloroethane.			**K096**	**100**
K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.			**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.			**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.			**K099**	**10**
K100 Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.			**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.			**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.			**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.			**K105**	**10**
K106 Wastewater treatment sludge from the mercury cell process in chlorine production.			**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1 -dimethylhydrazine (unsymmetrical dimethylhydrazine [UDMH]) from carboxylic acid hydrazines.			**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K109**	**10**
K110 Condensed column overheads from intermediate separation from the production of 1,1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.			**K111**	**10**
K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K114**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.			**K116**	**10**
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.			**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.			**K118**	**1**
K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.			**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.			**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.			**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.			**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.			**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.			**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.			**K136**	**1**
K141 Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).			**K141**	**1**
K142 Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal.			**K142**	**1**
K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.			**K143**	**1**
K144 Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.			**K144**	**1**
K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.			**K145**	**1**
K147 Tar storage tank residues from coal tar refining.			**K147**	**1**
K148 Residues from coal tar distillation, including, but not limited to, still bottoms.			**K148**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K149			**K149**	10
Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. (This waste does not include still bottoms from the distillation of benzyl chloride.)				
K150			**K150**	10
Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.				
K151			**K151**	10
Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.				
K157			**K157**	++
Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.)				
K158			**K158**	++
Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.				
K159			**K159**	++
Organics from the treatment of thiocarbamate wastes.				
K160			**K160**	++
Solids (including filter wastes, separation solids, and spent catalysts) from the production of thio-carbamates and solids from the treatment of thiocarbamate wastes.				
K161			**K161**	++
Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)				

Notes:

1 Chemical Abstract Service (CAS) Registry Number.
2 USEPA Hazardous Waste Number.
3 Reportable quantity release that requires notification. (See Chapter 18, "Spill Prevention and Response Planning").
4 Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR'. Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.
++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).
+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.
# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.
The statutory RQ for this hazardous substance may be adjusted in a future rulemaking; until then the statutory RQ applies.
1* Indicates that the 1-pound RQ is a statutory RQ.
** Indicates that no RQ is being assigned to the generic or broad class.
(1+) Indicates that the statutory source for designation of this hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is Clean Water Act (CWA) Section 31 1(b)(4).
(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 3071 1(a)(4).
(3+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA section 112.
(4+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is Resource Conservation and Recovery Act, Section 3001.

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AP2. APPENDIX 2

DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

AP2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

AP2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

AP2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

AP2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

AP2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

AP2.4. For installations with POL Storage Containers:

AP2.4.1. Single POL Storage Container Facilities. For facilities containing only one above-ground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

AP2.4.2. Multiple POL Storage Container Facilities

AP2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

AP2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single above ground oil or hazardous substance storage container.

AP2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

AP2.4.2.3.1. The total capacity of the above ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

AP2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

AP2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.

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STATE OF QATAR
FINAL GOVERNING STANDARDS

1 March 2011

Prepared by
U.S. Air Forces Central
United States Central Command

On behalf of
United States Central Command (USCENTCOM)

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FORWARD

This DoD Publication is issued under the authority and requirements of DoD Instruction (DoDI) 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996. This Final Governing Standard (FGS) provides criteria, standards, and management practices for environmental compliance at DoD installations in the State of Qatar. The FGS is derived from DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document," dated May 2007.

To produce the FGS for the State of Qatar, a comprehensive review of environmental regulations was conducted. A review was also conducted of Gulf Cooperation Council (GCC) environmental requirements of which the State of Qatar is a party. Furthermore, any treaty, convention, protocols, etc., of which the State of Qatar may be a party to, were also reviewed. The regulatory analysis consisted of reviewing each regulation that included an environmental requirement, per the scope of the OEBGD. Thus, State of Qatar occupational or industrial health and safety regulations were not addressed as they are not part of the 16 OEBGD chapters. Local regulations were not included as part of the regulatory review and only those regulations available via the internet were analyzed.

This FGS applies to the Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components").

This FGS is effective immediately and its use is mandatory by the DoD Components, pursuant to DoDI 4715.5. The Heads of the DoD Components may only issue supplementary instructions when deemed necessary to provide for unique requirements within their organizations.

FOR THE COMMANDER:

MICHAEL D. JONES
Major General, U.S. Army
Chief of Staff
USCENTCOM

METHODOLOGY

Chapters 2-19 of the FGS include the scope, definitions and criteria. Appendices and tables are also presented. The applicable State of Qatar environmental regulations were compared to the May 2007 Overseas Environmental Baseline Guidance Document (OEBGD), and determinations were made as to whether a State of Qatar environmental regulation was more or less stringent, equivalent to, or in addition to, the OEBGD standard.

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APPENDICES

TABLES

REFERENCES

Department of Defense

(a) DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996
(b) Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982
(c) Section 7158 of title 42, United States Code
(d) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(e) DoD Instruction 4715.4, "Pollution Prevention," June 18, 1996
(f) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
(g) DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006
(h) Defense Logistics Agency Instruction 4145.11, Army Technical Manual 38-410, Naval Supply Publication 573, Air Force Joint Manual 23-209, and Marine Corps Order 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999
(i) Air Force Interservice Manual 24-204(I), Army Technical Order 3 8-250, Naval Supply Publication 505, Marine Corps Order P4030.19I, and Defense Logistics Agency Instruction 4145.3, Defense Contract Management Agency D1, Ch3.4 (HM24), "Preparing Hazardous Materials for Military Air Shipments," 15 April 2007, Incorporating Change 1, 4 May 2007.
(j) DoD 4160.21 -M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993
(k) DoD Directive 4001.1, "Installation Management," September 4, 1986
(l) Naval Facility Manual of Operation-213, Air Force Regulation 9 1-8, and Army Technical Manual 5-634, "Solid Waste Management," May 1990
(m) DoD 4150.7-M, "DoD Pest Management Training and Certification," April 24, 1997
(n) Military Handbook 1 028/8A, "Design of Pest Management Facilities," November 1, 1991
(o) DoD Instruction 6055.1, "DoD Safety and Occupational Health (SOH) Program," August 19, 1998
(p) DoD Instruction 6055.5, "Industrial Hygiene and Occupational Health," January 10, 1989
(q) Section 2643 of title 15, United States Code
(r) Title 40, Code of Federal Regulations, Part 763, Subpart E, "Asbestos-Containing Materials in Schools," current edition
(s) DoD Instruction 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998

C1. CHAPTER 1

OVERVIEW

C1.1. PURPOSE

The primary purpose of this Final Governing Standard (FGS) is to provide criteria and management practices to be used by DoD Components to protect human health and the environment for the State of Qatar where the Department of Defense maintains substantial installations.

C1.2. APPLICABILITY

This FGS applies to actions of the DoD Components at installations in the State of Qatar.

C1.3. EXEMPTIONS

This FGS does not apply to:

C1.3.1. DoD installations that do not have more than *de minimis* potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices, and other similar organizations), or for which the DoD Components exercise control only on a temporary or intermittent basis.

C1.3.2. Leased, joint use, and similar facilities to the extent that the Department of Defense does not control the instrumentality or operation that a criterion seeks to regulate.

C1.3.3. When U.S. forces are operating as part of a multi-national force not under full control of the United States. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DoD Directives (DoDD) and DoDIs, and environmental annexes incorporated into operation plans or operation orders. However, this FGS does apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DoD Components, including management or disposal of off-loaded waste or material.

C1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order (E.O.) 12344 (Reference (b)) and conducted pursuant to 42 United States Code (U.S.C.) 7158 (Reference (c)).

C1.3.5. The determination or conduct of remediation to correct environmental problems caused by the Department of Defense's past activities.

C1.3.6. Environmental analyses conducted under E.O. 12114 (Reference (d)).

C1.4. DEFINITIONS

For purposes of this FGS, unless otherwise indicated, the following definitions apply:

C1.4.1. Criteria and Management Practices. Particular substantive provisions of the OEBGD that are used by the EEA to develop this FGS.

C1.4.2. Existing Facility. Any facility and/or building, source, or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified.

C1.4.3. Final Governing Standards. A comprehensive set of country-specific substantive provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice.

C1.4.4. New Facility. Any facility and/or building, source, or project with a construction start date on or after 1 October 1994, or a pre-existing facility that has been substantially modified since 1 October 1994.

C1.4.5. Requirements

C1.4.5.1. Particular provisions of U.S. law respecting environmental protection on DoD installations within the United States

C1.4.5.2. State of Qatar law of general applicability, including those specifically delegated to regional or local governments for implementation, respecting environmental protection and which are generally applied to State of Qatar military.

C1.4.5.3. Applicable international treaty provisions that are used in determining FGS. DoD installations overseas shall use FGS as standards for environmental compliance rather than the individual source documents that have been reconciled by the EEA in the creation of FGS.

C1.4.6. Substantial Modification. Any modification to a facility and/or building the cost of which exceeds $1 million, regardless of funding source.

C1.5. ADDITIONAL INFORMATION

C1.5.1. FGS shall not expressly indicate the source of the standard, whether domestic, State of Qatar, or international agreement. EEAs may retain draft working documents and references used in developing FGS, but may not officially issue any compilation of such materials. DoD EEAs shall maintain, for purposes INTERNAL TO THE EEA AND DEPARTMENT OF DEFENSE, a record of their decision-making process which clearly identifies the comparative analysis strategy regarding how a particular FGS requirement was derived.

C1.5.2. The DoD Components shall establish and implement an environmental audit program to ensure that overseas installations assess compliance with FGS at least once every 3 years at all installations.

C1.5.3. DoDI 4715.4 (Reference (e)) implements policy, assigns responsibility, and prescribes procedures for implementation of pollution prevention programs throughout the Department of Defense. As a matter of DoD policy, Reference (e) should be consulted for particular requirements that apply to activities outside the United States. Pollution prevention should be considered in developing the criteria and management practices for FGS. Where economically advantageous and consistent with mission requirements, pollution prevention shall be the preferred means for attaining compliance with this FGS.

C1.5.4. Where State of Qatar analytical methods and QA/QC procedures are documented; they should be reviewed to determine if they are as precise as US EPA analytical methods and QA/QC procedures. For all parameters, the more precise method and procedure should be used.

C1.5.5. Unless otherwise specified, all record keeping requirements, including assessments, inspection records, logs, manifests, notices, forms, and formats, are described in accordance with paragraph C4.4.2. of DoD 8910.1-M (Reference (f)).

C1.5.6. This FGS does not create any rights or obligations enforceable against the United States, the Department of Defense, or any of its components, nor does it create any standard of care or practice for individuals. Although this FGS refers to other DoDDs and DoDIs, it is intended only to coordinate the requirements of those directives as required to implement the policies found in Reference (a). This FGS does not change other DoDDs or DoDIs or alter DoD policies.

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C2. CHAPTER 2

AIR EMISSIONS

C2.1. SCOPE

This Chapter contains standards for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 15, "Asbestos."

C2.2. DEFINITIONS

C2.2.1. Coal Refuse. Waste products from coal mining, cleaning, and coal preparation operations (e.g., culm and gob) containing coal, matrix material, clay, and other organic and inorganic material.

C2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soil and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, nonboiling solvent to clean the parts are classified as cold cleaning machines.

C2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

C2.2.4. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

C2.2.5. Freeboard Ratio. The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

C2.2.6. Healthcare Waste. Waste generated by facilities offering various types of healthcare, laboratories, facilities for the manufacture of drugs, pharmaceuticals and vaccines, veterinary institutions, research institutions, and from home treatment and patient care. It consists of two types:

C2.2.6.1. Hazardous Healthcare Waste. Wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C2.2.6.2. Non-hazardous Healthcare Waste. Wastes that are found in municipal wastes, and it is generated by administrative institutions and by the general cleaning activities in healthcare institutions. This constitutes the major part of healthcare wastes, and it is treated in the same way as municipal waste.

C2.2.7 Healthcare Waste Treatment Unit. A facility where the biological, chemical or physical properties of the hazardous healthcare waste are altered with the aim of eliminating its hazard so that it becomes safe, both for human health and the environment.

C2.2.8. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depleting Substances (ODS).

C2.2.9. Incinerator. Any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

C2.2.10. Motor Vehicle. Any commercially available vehicle that is not adapted to military use which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to, passenger cars, light duty vehicles, and heavy duty vehicles.

C2.2.11. Municipal Solid Waste (MSW). Any household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (nonmedical), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

C2.2.12. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (MSW) including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

C2.2.13. Ozone-Depleting Substances (ODS). Substances characterized as being chemically stable in the atmosphere near the surface of the earth and contain one or more atoms of chlorine or bromine, or both, which produce a chain reaction in the stratosphere resulting in depletion of the ozone layer. Those substances listed in Table C2.T2.

C2.2.14. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

C2.2.15. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

C2.2.16. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

C2.2.17. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

C2.2.18. Stack. Any point in a source covered by criteria contained in C2.3.1., C2.3.2., C2.3.3., C2.3.4., or C2.3.5. designed to emit pollutants.

C2.2.19. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

C2.2.20. Substantially-Modified. Any modification to a facility/building, the cost of which exceeds $1 million, regardless of funding source.

C2.2.21. Vapor Cleaning Machine. A batch or in-line solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

C2.2.22. Wood Residue. Bark, sawdust, slabs, chips, shavings, mill trim, and other wood products derived from wood processing and forest management operations.

C2.3. CRITERIA

C2.3.1. Steam/Hot Water Generating Units. The following standards apply to units that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994.

C2.3.1.1. Air Emission Standards. The following criteria apply to units with a maximum design heat input capacity greater or equal to 10 million Btu/hr.

C2.3.1.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards for specific sized units shown in Table C2.T1. at all times, except during periods of start up, shut down, soot blowing, malfunction, or when emergency conditions exist.

C2.3.1.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight percent) and higher heating value will be measured and recorded for each new shipment of fuel. Use these data to calculate sulfur dioxide (SO_2) emissions and document compliance with the SO_2 limits using the equation in Table C2.T1. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for SO_2 and either oxygen (O_2) or carbon dioxide (CO_2).

C2.3.1.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or nitrogen oxides (NOx) standards in C2.T1. must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

C2.3.1.2.1. For units with a maximum design heat input capacity greater than 30 million Btu/hr: Opacity, except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

C2.3.1.2.2. For fossil fuel fired units with a maximum design heat input capacity greater than 100 million Btu/hr: NOx and either O_2 or CO_2.

C2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration.

C2.3.2.1. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Table C2.T3. and operating limits in Table C2.T4.

C2.3.2.2. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table C2.T3. and operating limits in Table C2.T4.

C2.3.2.3. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994 and that burn more than 1 ton per day (tpd) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of start up, shut down, malfunction, or when emergency conditions exist.

C2.3.2.4. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

C2.3.2.4.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

C2.3.2.4.1.1. Unit design: dual chamber.

C2.3.2.4.1.2. Minimum temperature in primary chamber: 1400-1600°F.

C2.3.2.4.1.3. Minimum temperature in secondary chamber: 1800-2200°F.

C2.3.2.4.1.4. Minimum residence time in the secondary chamber: 2 seconds.

C2.3.2.4.1.5. Incinerator operators must be trained in accordance with applicable Service requirements.

C2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. These requirements do not apply to coin-operated machines.

C2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than 2000 gallons per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed. The temperature of the refrigerated condenser must be maintained at 45F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at 45F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that is most appropriate to suit local conditions:

C2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm). Control devices/methods must be operated according to manufacturer recommendations.

C2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

C2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet (ft^2); K = a conversion factor, 425 dscm/(ft^2-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

C2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains more than 5 percent by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), carbon tetrachloride (CAS No. 56-23-5), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents.

C2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 1-inch water layer or a freeboard ratio of at least 0.75.

C2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

C2.3.6. Units Containing ODS Listed in Table C2.T2. The following criteria apply to direct atmospheric emissions of ODS, HFCs, and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment.

C2.3.6.1. Refrigerant Recovery/Recycling. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or State of Qatar equivalent.

C2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant shall not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners. *De minim is* releases associated with good faith attempts to recycle or recover ODS, HFC, and PFC refrigerants are not subject to this prohibition.

C2.3.6.3. Refrigerant Leak Monitoring and Repair. Monitor and repair refrigeration equipment for ODS leakage in accordance with the following criteria and repair, if found to be leaking.

C2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing more than 50 pounds of refrigerant and not covered by subparagraphs C2.3.6.3. 1. or C2.3.6.3.2. of this chapter must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period.

C2.3.6.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following halon releases:

C2.3.6.4.1. *De minimis* releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

C2.3.6.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

C2.3.6.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulant agent cannot be used.

C2.3.7. Motor Vehicles. This criteria applies to DoD-owned motor vehicles as defined in paragraph C2.2.8.

C2.3.7.1. All vehicles shall be inspected every two years to ensure that no tampering with factory-installed emission control equipment has occurred.

C2.3.7.2. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

C2.3.8. Stack Heights. H_g is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures.

C2.3.8.1. Stacks shall be designed and constructed to heights at least equal to the largest H_g calculated from either of the following two criteria:

C2.3.8.1.1. $H_g = H + 1.5L$, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but not greater than 0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest H_g.

C2.3.8.1.2. H_g is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum ground-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40 percent in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means not greater than 0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height (H_t) of the feature, not to exceed 2 miles if such feature achieves a height (H_t) 0.8 km from the stack that is at least 40 percent of the good engineering practice stack height determined by the formulae provided in C2.3.8.1.1. of this part or 26 meters, whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

C2.4. ADDITIONAL REQUIREMENTS

C2.4.1. Ambient Air Quality Standards. Ambient air quality standards that cannot be exceeded are included in Table C2.T5.

C2.4.2. If a hazardous healthcare waste treatment facility is in operation, maintain records of the concentration of emissions released into the atmosphere as a result of the treatment process.

C2.4.3. Table C2.T6. provides the guidelines regulating the standards of emissions resulting from the incineration of hazardous healthcare wastes.

C2.4.4. If the DOD is going to manufacture or use controlled substances, appliances, equipment and products that are harmful to the ozone layer, DoD is allowed to use or manufacture Ozone Depleting Substances listed in Table C2.T7.

Table C2.T1. Emission Standards for Steam Generating Units[a]

	Maximum Design Heat Input Capacity						
	10 – 100 million BTU/hr			**Size >100 million BTU/hr**			
Fuel Type	**PM**	**Opacity[b]**	**SO_2[c]**	**PM**	**Opacity[b]**	**SO_2[c]**	**NOx[d]**
Gaseous	N/A	N/A	N/A	N/A	N/A	N/A	0.20
Gaseous - Coal Derived	N/A	N/A	N/A	N/A	N/A	N/A	***0.50***
Liquid Fossil Fuel	N/A	20%	0.50[e]	0.10	20%	0.80	0.30
Solid Fossil Fuel	0.10	20%	1.20	0.10	20%	1.20	0.70
Other Solid Fuel [f]	0.30	20%	N/A	0.20	20%	N/A	N/A

N/A = Not applicable.

a. Standards apply to units constructed or substantially modified after 1 October 1994. Standards do not apply during periods of startup, shutdown, malfunction, soot blowing, or when emergency conditions exist. Unless specified otherwise, emission standards are in lb/million BTU.

b. The opacity standards do not apply to units < 30 million BTU/hr. The 20% standard applies to the average opacity over a six-minute period. A 30% opacity value is allowed for one six-minute period per hour.

c. SO_2 is best controlled and compliance documented by limiting fuel sulfur content.
SO_2 emissions (lb/ million BTU) = 0.02 X sulfur content of fuel (%) / heat content of fuel (HHV, million BTU/lb fuel).
[E.g., for fuel oil with 0.5% sulfur, SO_2 = 0.02 X 0.5 / 0.019 = 0.53 lb/million BTU.]

d. Emission limitation for NOx is based on a 30-day rolling average. NOx standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.

e. Instead of 0.5 lb/million BTU of SO_2, fuel oil combustion units may comply with a 0.5% average fuel sulfur content limit (weight percent) which is statistically equivalent to 0.5 lb/million BTU.

f. Other solid fuels include wood or waste derived fuels.

Table C2.T2. Class I and II Ozone-Depleting Substances

Class I			
CFC - 11	CFC - 114	CFC - 215	Halon - 1211
CFC - 12	CFC - 115	CFC - 216	Halon - 1301
CFC - 13	CFC - 211	CFC - 217	Halon - 2402
CFC - 111	CFC - 212		Carbon Tetrachloride
CFC - 112	CFC - 213		Methyl Chloroform
CFC - 113	CFC - 214		Methyl Bromide
$CHFBr_2$	$C_2H_2F_3Br$	C_3HF_6Br	$C_3H_3F_4Br$
HBFC-2201 (CHF_2Br)	$C_2H_3FBr_2$	$C_3H_2FBr_5$	$C_3H_4FBr_3$
CH_2FBr	$C_2H_3F_2Br$	$C_3H_2F_2Br_4$	$C_3H_4F_2Br_2$
C_2HFBr_4	C_2H_4FBr	$C_3H_2F_3Br_3$	$C_3H_4F_3Br$
$C_2HF_2Br_3$	C_3HFBr_6	$C_3H_2F_4Br_2$	$C_3H_5FBr_2$
$C_2HF_3Br_2$	$C_3HF_2Br_5$	$C_3H_2F_5Br$	$C_3H_5F_2Br$
C_2HF_4Br	$C_3HF_3Br_4$	$C_3H_3FBr_4$	C_3H_6FBr
$C_2H_2FBr_3$	$C_3HF_4Br_3$	$C_3H_3F_2Br_3$	Chlorobromomethane
$C_2H_2F_2Br_2$	$C_3HF_5Br_2$	$C_3H_3F_3Br_2$	
Class II			
HCFC - 21	HCFC - 133a	HCFC - 225cb	HCFC - 243
HCFC - 22	HCFC – 141b	HCFC - 226	HCFC - 244
HCFC - 31	HCFC – 142b	HCFC - 231	HCFC - 251
HCFC - 121	HCFC - 151	HCFC - 232	HCFC - 252
HCFC - 122	HCFC - 221	HCFC - 233	HCFC - 253
HCFC - 123	HCFC - 222	HCFC - 234	HCFC - 261
HCFC - 124	HCFC - 223	HCFC - 235	HCFC - 262
HCFC - 131	HCFC - 224	HCFC - 241	HCFC - 271
HCFC - 132b	HCFC - 225ca	HCFC - 242	

Note: All isomers of the above chemicals are ODS, except isomers of (1,1,1 -trichloroethane (also known as methyl chloroform)) such as 1,1,2-trichloroethane.

* Where a range of ODPs is indicated, the highest value in that range shall be used for the purposes of the Protocol. The ODPs listed as a single value have been determined from calculations based on laboratory measurements. Those listed as a range are based on estimates and are less certain. The range pertains to an isomeric group. The upper value is the estimate of the ODP of the isomer with the highest ODP, and the lower value is the estimate of the ODP of the isomer with the lowest ODP.
** Identifies the most commercially viable substances with ODP values listed against them to be used for the purposes of the Protocol.

Table C2.T3. Emission Standards for Incinerators

Pollutant	Emission Standards [1]				
Incinerator Type	Existing MWC units[2]		MWC units that begin new construction or undergo substantial modification[2]		CISWI units
Rated Capacity	35-250 tpd	> 250 tpd	35-250 tpd	> 250 tpd	All units
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm
Opacity	10 percent		10 percent		10 percent
NOx	N/A	See Note 3	500 ppmv	1 50ppmv	388 ppmv
SO2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv
Dioxins/furans	125 ng/dscm	See Note 4	13 ng/dscm		0.41 ng/dscm
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.47 mg/dscm
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	62 ppmv
Fugitive Ash	5% of hourly observation period		5% of hourly observation period		N/A

Notes:

[1] Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

[3] NOx limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.

[4] Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

Table C2.T4. Carbon Monoxide Operating Limits for Incinerators[1]

Incinerator Type	Existing MWC units[2]		MWC units that begin new construction or undergo substantial modification[2]		CISWI units All units
Rated Capacity	**35-250 tpd**	**35-250 tpd**	**35-250 tpd**	**> 250 tpd**	**All**
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		157 ppmv
Fluidized bed, mixed fuel, (wood/refuse-derived fuel)	200 ppmv (24-hour average)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)	100 ppmv (4-hr avg)	100 ppmv (24-hr avg)		
Mass burn rotary waterwall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		
Mass burn waterwall and refractory	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Mixed fuel-fired, (pulverized coal/refuse-	150 ppmv (4-hr avg)		150 ppmv (4-hr avg)		
Modular starved-air and excess air	50 ppmv (4-hr avg)		50 ppmv (4-hr avg)		
Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel)	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		
Stoker, refuse-derived fuel	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		

Notes:

[1] Compliance is determined by continuous emission monitoring systems.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

Table C2.T5. Ambient Air Quality Standards

Pollutant	Standard		Average Period	Measuring Method
	ppm	$\mu g/m^3$		
Sulfur Dioxide (SO_2)	0.169	441	One hour	UV-Fluorescence
	0.083	217	24 hours	
	0.076	65	One year	
Hydrogen Sulfide (H_2S)	0.140	200	One hour	UV-Fluorescence
	0.030	40	24 hours	
Nitrogen Dioxide (NO_2)	0.350	660	One hour	Chemiluminscence
	0.050	100	One year	
Ozone (O_3)	0.120	235	One hour	UV-Fluorescence
	0.080	157	8 hours	
(PM_{10}) inhalable Particulates		340	24 hours	
		80	One hour	
Carbon Monoxide (CO)	35	40,000	One hour	Non Dispersive IR
	9	10,000	8 hours	
Nonmetha Hydrocarbons	0.24	160	3 hours	GC-FID\PID
Lead (Pb)	NA	NA	24 hours	Gravimetry + AAS
Sulfates (SO_4)		23	24 hours	Gravimetry + Ion Chromatograph
Fluorides (F)		1.0	One month	Colorimetric
Ammonia (NH_3)	0.8		One hour	Chemiluminscence

Table C2.T6. Guidelines Regulating the Standards of Emissions Resulting From the Incineration of Hazardous Healthcare Wastes

Pollutants	Measurements
Total suspended particles	34 mg/m^3 (1) (modified to 7% Oxygen)
Opacity	10 % except for 6 minutes during any hour
Carbon monoxide	50 mg/m^3
Brimstone dioxide	150 mg/m^3
Hydrogen chloride	100 mg/m^3 or removal of at least 97 %
Nitrogen oxides	400 mg/m^3
Organic compounds	8 parts out of million or removal of at least 99.99 %
Hydrogen fluoride	5mg/m^3
Dioxin and furan	125 ng/m^3
cadmium	0.16 mg/m^3
Lead	1.2 mg/m^3
arsenic	1.2 mg/m^3
mercury	0.55 mg/m^3

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C3. CHAPTER 3

DRINKING WATER

C3.1. SCOPE

This Chapter contains criteria for providing potable water.

C3.2. DEFINITIONS

C3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

C3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater DoD Component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the DoD Component's installations.

C3.2.3. Artesian Water. Water obtained from a confined aquifer. A confinded aquifer is usually above the normal water table and the water is confined by an impermeable layer of soil or rock above and below the water. The water can be under pressure.

C3.2.4. Concentration/Time (CT). The product of residual disinfectant concentration, C, in milligrams per liter (mg/L) determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables C3.T11. through C3.T24.

C3.2.5. Conventional Treatment. Water treatment, including chemical coagulation, flocculation, sedimentation, and filtration.

C3.2.6. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited onto a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.

C3.2.7. Direct Filtration. Water treatment, including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

C3.2.8. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

C3.2.9. DoD Water System. A public or non-public water system.

C3.2.10. Emergency Assessment. Evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service caused by natural disasters, accidents, and sabotage.

C3.2.11. <u>First Draw Sample.</u> A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.

C3.2.12. <u>Groundwater Under the Direct Influence of Surface Water (GWUDISW).</u> Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

C3.2.13. <u>Haloacetic Acids.</u> The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

C3.2.14. <u>Lead-free.</u> A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

C3.2.15. <u>Lead Service Line.</u> A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

C3.2.16. <u>Maximum Contaminant Level (MCL).</u> The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

C3.2.17. <u>Maximum Residual Disinfectant Level (MRDL).</u> The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

C3.2.18. <u>Point-of-Entry (POE) Treatment Device.</u> A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

C3.2.19. <u>Point-of-Use (POU) Treatment Device.</u> A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

C3.2.20. <u>Potable Water.</u> Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

C3.2.21. <u>Public Water System (PWS).</u> A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

C3.2.21.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

C3.2.21.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

C3.2.21.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least six months per year, but not year- round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

C3.2.21.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least six months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

C3.2.22. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

C3.2.23. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (1.2 ft/hr), resulting in particulate removal by physical and biological mechanisms.

C3.2.24. Spring Water. Water flowing naturally from an underground water source through cracks to the ground surface.

C3.2.25. Thermopile Bacteria. Bacteria that prefer temperatures above 55°C and can tolerate temperatures up to 75-80°C.

C3.2.26. Total Trihalomethanes. The sum of the concentration in milligrams per liter of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

C3.2.27. Unbottled Drinking Water. Water fit for human consumption supplied to consumers by means of a public or limited distribution network, from wells, springs or any other source of surface water used for drinking.

C3.2.28. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever the principal function of the well is emplacement of any fluid.

C3.2.29. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities, which provide a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

C3.2.30. Well Water. Water obtained from an opening which has been drilled or dug or constructed in any other way in the ground and which reaches the water table.

C3.3. CRITERIA

C3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:

C3.3.1.1. Maintain a map/drawing of the complete potable water system.

C3.3.1.2. Update the potable water system master plan at least every 5 years.

C3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintaining septic systems and on- site treatment units, and by appropriate land use management on DoD installations. Mark all springs or drinking water supply sources with a sign indicating it as a drinking water supply source.

C3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years for systems using surface water, and every 5 years for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with State of Qatar authorities.

C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, at a minimum, must be disinfected.

C3.3.1.6. Maintain a continuous positive pressure of at least 20 pounds per square inch (psi) in the water distribution system.

C3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

C3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority);

C3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing);

C3.3.1.7.3. An effective annual water main flushing program;

C3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs; and

C3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

C3.3.1.8. Establish an effective cross connection control and backflow prevention program.

C3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

C3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

C3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption:

C3.3.1.10.2. Identification of key personnel;

C3.3.1.10.3. Procedures to restore service;

C3.3.1.10.4. Procedures to isolate damaged lines;

C3.3.1.10.5. Identification of alternative water supplies; and

C3.3.1.10.6. Installation public notification procedures.

C3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years.

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least three years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

C3.3.1.14. Conduct vulnerability assessments, which include, but are not limited to, a review of:

C3.3.1.14.1. Pipes and constructed conveyances, physical barriers, water collection, pretreatment, treatment, storage, and distribution facilities, electronic, computer, or other automated systems utilized by the PWS;

C3.3.1.14.2. Use, storage, or handling of various chemicals; and

C3.3.1.14.3. Operation and maintenance of the water storage, treatment, and distribution systems.

C3.3.2. Regardless of whether a DoD water system produces or purchases water, it will, by independent testing or validated supplier testing, ensure conformance with the following:

C3.3.2.1. <u>Total Coliform Bacteria Requirements</u>

C3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining 40 or more samples a month, and no more than one positive sample per month when a system analyzes less than 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms, *E. coli* or thermopile coliform bacteria or any repeat sample is positive for total coliforms. Unbottled drinking water must be totally free of microbes causing diseases and viruses detrimental to human health.

C3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table C3.T2., "Total Coliform Monitoring Frequency."

C3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

C3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

C3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection C3.3.3. to:

C3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

C3.3.2.2. <u>Inorganic Chemical Requirements</u>

C3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed for human consumption does not exceed applicable limitations set out in Table C3.T3. Except for nitrate, nitrite, and total nitrate/nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For nitrate, nitrite, and total nitrate/nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

C3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table C3.T4., "Inorganics Monitoring Requirements."

C3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph C3.3.3. as soon as possible. If the nitrate, nitrite, or total nitrate and nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

C3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table C3.T4., "Inorganics Monitoring Requirements," until remedial actions are completed and authorities determine the system is reliable and consistent.

C3.3.2.2.4. The MCL for arsenic applies to CWS and NTNCWS.

C3.3.2.3. Fluoride Requirements

C3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L, as stated in Table C3.T3., "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample annually at the entry point to the distribution system for surface water systems, and once every three years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table C3.T5., "Recommended Fluoride Concentrations at Different Temperatures."

C3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.4. Lead and Copper Requirements

C3.3.2.4.1. DoD CWS and NTNCWS will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead or copper levels are exceeded in more than 10% of all sampled taps.

C3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table C3.T6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table C3.T6.

C3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table C3.T6., "Monitoring Requirements for Lead and Copper Water

Quality Parameters." Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and State of Qatar) within 60 days and will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.5. Synthetic Organics Requirements

C3.3.2.5.1. An installation responsible for CWS and NTNCWS will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table C3.T7., "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

C3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements."

C3.3.2.5.3. If a system is out of compliance, the notification set out in paragraph C3.3.3. shall be completed as soon as possible, but in no case later than 14 days after the violation. The installation will immediately begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL, as noted in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements," and will continue until the installation commander determines the system is back in compliance, and all necessary remedial measures have been implemented.

C3.3.2.6. Disinfectant/Disinfection Byproducts (DDBP) Requirements

C3.3.2.6.1. An installation responsible for a CWS and NTNCWS that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

C3.3.2.6.1.1. Ensure that the MCL of 0.001 mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of 0.7 mg/L for chlorite, and the MCL of 0.01 mg/L for bromate are met in drinking water.

C3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of 0.5 mg/L for chlorine (after staying at least for 30 minutes at a pH value of less than 5), the MRDL of ***3.0*** mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are met in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections. The chlorine content shall be increased in case of epidemics- consult the installation Bioenvironmental Engineer for recommendations.

C3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table C3.T9., "Disinfectant/Disinfection Byproducts Monitoring Requirements." Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone are also included in Table C3.T9.

C3.3.2.6.3. For TTHM and HAA5 a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table C3.T9. for chlorine, chloramine, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table C3.T9., the installation will accomplish the notification requirements outlined in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

C3.3.2.7. Radionuclide Requirements

C3.3.2.7.1. An installation responsible for a CWS will test the system for conformance with the applicable radionuclide limits contained in Table C3.T10., "Radionuclide MCLs and Monitoring Requirements."

C3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table C3.T10.

C3.3.2.7.3. If the average annual MCL for gross alpha activity for radium is exceeded, the installation will complete the notification according to the procedures in paragraph C3.3.3. within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

C3.3.2.7.4. The concentration of the radiation activity of radon in drinking water shall not exceed 100 be/l.

C3.3.2.7.5. The concentration of the radiation activity of radionuclides in drinking water must conform with the values in Table C3.T25.

C3.3.2.8. Surface Water Treatment Requirements. DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table C3.T1. If the turbidity readings in Table C3.T1. are exceeded, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DDBP requirements (C3.3.2.6.), will ensure that protection from microbial pathogens is not compromised.

C3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored for total coliforms, at a minimum, and disinfectant residuals periodically.

C3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources, including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

C3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct and conventional filtration processes. This requirement only applies to DoD PWSs that:

C3.3.2.11.1. Use surface water or GWUDISW;

C3.3.2.11.2. Use direct or conventional filtration processes; and

C3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

C3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and State of Qatar) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps being taken to correct the violation, the necessity for seeking an alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.

C3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

C3.3.5. Quality-Related Properties

C3.3.5.1. Drinking water shall be free of any substances that can adversely affect its color, taste, odor or appearance. It shall also be free of any extraneous substances such as soil, dust, threads, hair or similar substances visible to the naked eye.

C3.3.5.2. The pH value of unbottled drinking water shall range between 6.5 and 8.

C3.3.5.3. The total dissolved solids concentration in unbottled drinking water shall range between 100 and 1000 ppm.

C3.3.5.3. Permitted levels of chemical components in drinking water are shown in Tables C3.T25, C3.T26, C3.T27 and C3.T28.

C3.3.6. Organic (biological) properties. Unbottled drinking water must be totally free of any algae, fungi and insects and their eggs, spores or parts as well as any protozoa, including amoeba.

Table C3.T1. Surface Water Treatment Requirements

1. Unfiltered Systems

a. Systems which use unfiltered surface water or GUDISW will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily, and must continue as long as the unfiltered system is in operation. If the total coliforms and/or fecal coliforms exceed 100/100 milliliters (mL) and 20/1 00 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU).

b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T1 1. through C3.T24.

c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.

d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made at the same times as total coliforms are sampled.

e. Disinfectant residual of water entering the distribution system cannot be less than 0.2 mg/L for greater than four hours.

f. Water in a distribution system with a heterotrophic bacteria concentration less than or equal to 500/mL measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.

g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

2. Filtered Systems

a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.

b. The turbidity of filtered water will be monitored at least once every four hours. The turbidity of filtered water for direct and conventional filtration systems will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.

c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

*Proper conventional treatment typically removes 2.5-log *Giardia*/ 2.0-log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0-log *Giardia*/ 1.0-log viruses. Slow sand filtration removes typically removes 2.0-log *Giardia*/ 2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.

3. SW or GWUDISW systems will provide at least 99% (2-log) removal of *Cryptosporidium*. A system is considered to be compliant with the *Cryptosporidium* removal requirements if:

a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU

Table C3.T1. Surface Water Treatment Requirements (continued)

b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs.

c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of *Giardia lamblia* cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of *Cryptosporidium* oocysts.

d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1 a above to remain unfiltered.

4. Individual Filter Effluent Monitoring. Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for three months in a row (for the same filter), the installation must conduct a self assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.

5. Covers for Finished Water Storage Facilities. Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table C3.T2. Total Coliform Monitoring Frequency

Population Served	Number of Samples [1]	Population Served	Number of Samples [1]
25 to 1,000 [2]	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes:

1. Minimum Number of Routine Samples Per Month
2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve less than 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table C3.T3. Inorganic Chemical MCLs

Contaminant	MCL	
Arsenic [1]	0.010	mg/L
Antimony [1]	0.006	mg/L
Asbestos [1]	7 million	fibers/L (longer than 10 µm)
Barium	0.7	mg/L
Beryllium [1]	0.004	mg/L
Cadmium [1]	0.003	mg/L
Chromium [1]	0.05	mg/L
Cyanide [1]	0.07	mg/L (as free cyanide)
Fluoride [2]	4.0	mg/L
Mercury [1]	0.001	mg/L
Nickel [1]	0.07	mg/L
Nitrate [3]	10	mg/L (as N)
Nitrite [3]	1	mg/L (as N)
Total Nitrite and Nitrate [3]	10	mg/L (as N)
Nitrite (Long-term exposure)	0.2	mg/L (as NO_2)
Selenium [1]	0.01	mg/L
Sodium [4]		
Thallium	0.002	mg/L
Boron	0.5	mg/L
Manganese	0.4	mg/L
Molybdenum	0.07	mg/L
Iodine	0.015	mg/L

Notes:

1. MCLs apply to CWS and NTNCWS.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNCWS, and TNCWS.
4. No MCL established. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis.

Table C3.T4. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---
Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos[3]	1 sample every 9 years	1 sample every 9 years	>MCL	Yes
Total Nitrate/Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [6]
Nitrite	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [7]
Corrosivity [8]	Once	Once	---	---

Notes:

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a sanitary survey conducted by the PWS.
4. Any sampling point with an analytical value greater than or equal to 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50% of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country-specific FGS to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Saturation Index.

Table C3.T5. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (°F)	Control Limits (mg/L)		
	Lower	Optimum	Upper
50.0 - 53.7	0.9	1.2	*1.5*
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table C3.T6. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	No. of Sites for Standard Monitoring [1, 2]	No. of Sites for Reduced Monitoring[3]	No. of Sites for Water Quality Parameters[4]
>100,000	100	50	25
10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes:

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multi-family residences with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNCWS, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6-month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every three years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table C3. T7. Organic Chemical MCLs

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
Pesticides/PCBs		
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008
Aldicarb sulfoxide	0.004	0.0005
Aldrine and dialdrine	0.00003	
Andrine	0.0006	
Atrazine	0.002	0.0001
Benzo[a]pyrene	0.0002	
Carbofuran	0.007	0.0009
Chlordane	0.0002	0.0002
Chlorotoluron	0.03	
Dalapon	0.2	
2,4-D	0.07	0.0001
2,4 – DB	0.09	
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
2,1 Dibromo-3-chloropropane	0.001	
2,1 Dibromoethane	0.0004	
Dicarb	0.01	
Dichlorobrob	0.1	
2,3 Dichlorophenox-yacetic acid	0.03	
2,1 Dichloropropane	0.04	
3,1 Dichloropropane	0.02	
Di (2-ethylhexyl) adipate	0.4	
Dimethoate	0.006	
Di (2-ethylhexyl) phthalate	0.006	
Dinoseb	0.007	
Diquat	0.02	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.0000 1
Glyphosphate	0.7	
Heptachlor	0.0004	0.00004
Heptachlorepoxide	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Isoproturon	0.009	
Lindane	0.0002	0.00002
MCBA	0.002	
Methoxychlor	0.02	0.0001
Metolachlor	0.01	
Microbrob	0.01	
Molinate	0.006	
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.000 1
Pendimethaline	0.02	
Pentachlorophenol	0.00 1	0.00004
Phenobrob	0.009	
Picloram	0.5	

Table C3.T7. Synthetic Organic Chemical MCLs (continued)

Sianazin	0.0006	
Simazine	0.002	
4,2,5 T	0.009	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Terbuthylazine	0.007	
Toxaphene	0.003	0.001
2,4,5-TP (Silvex)	0.05	0.0002
Trifluoraline	0.02	
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Carbon tetrachloride	0.004	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1,2-Dichloroethylene	0.05	0.0005
trans-1,2-Dichloroethylene	0.05	0.0005
1,1-Dichloroethylene	0.007	0.0005
1,1,1-Trichloroethane	0.20	0.0005
1,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.005	
1,1,2-Trichloroethane	0.005	
1,2,4-Trichloro-benzene	0.07	
1,2-Dichloropropane	0.005	0.0005
4,1-Dioxin	0.05	
EDTA	0.6	
Ethylbenzene	0.3	0.0005
Hexachlorobutadiene	0.0006	
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Pentachlorovinyl	0.009	
Styrene	0.02	0.0005
Tetrachloroethane	0.04	
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	0.7	0.0005
Trichloroethane	0.02	
Vinyl chloride	0.002	0.0005
Xylene (total)	10	0.0005
Yacetid acid	0.2	
Zeoline	0.5	
Other Organics		
Acrylamide	0.05% dosed at 1 ppm [1]	
Epihydrochlorin	treatment technique 0.0 1% dosed at 20 ppm[1]	

Note:

1. Only applies when adding these polymer flocculants to the treatment process. No sampling is required; the system certifies that dosing is within specified limits.

Table C3.T8. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement[1]		Trigger for more monitoring[2]	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes [3,4]
Pesticides/PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit[5]	Yes [4,6]

Notes:

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNCW, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 quarterly samples for groundwater systems, and at least 4 quarterly samples for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a sanitary survey of the PWS.
5. Detection limits noted in Table C3.T7., or as determined by the best available testing methods.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection: systems >3,300 reduce to a minimum of 2 quarterly samples in one year during each repeat compliance period, or systems <3,300 reduce to a minimum of 1 sample every 3 years.
7. Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements

Source Water Type	Population Served by System	Analyte & Frequency of Samples	Number of Samples
Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW)	10,000 or more	TTHM & HAA5 - Quarterly[1,2]	4[1,2,3]
SW or GWUDISW	Serving 500 to 9,999	TTHM & HAA5 - Quarterly[4]	1[5,6]
SW or GWUDISW	499 or less	TTHM & HAA5 - Yearly	1[7,8]
Ground Water (GW)	10,000 or more	TTHM & HAA5 - Quarterly[9]	1[10,11]
GW	9,999 or less	TTHM & HAA5 - Yearly[12]	1[13,14]
		Chlorite - Daily & Monthly[15,16,17,18]	
		Bromate - Monthly[19,20]	
		Chlorine[21,22]	
		Chloramines[23,24]	
		Chlorine Dioxide[25,26,27]	
		TOC[28]	

Notes:

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.
2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least one year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to one sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.
5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to one sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.
6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to one sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HHA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.
10. System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to one sample per three-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A three-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of one year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least one sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is less than 0.05 mg/L based upon monthly measurements for one year.
20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, three additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take three samples in the distribution system as close as possible to the first customer at intervals of not less than 6 hours
26. If any daily sample from the distribution system exceeds the MRDL and if one or more of the three samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any two consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following an exceedance of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce TOC and alkalinity to one paired sample per plant per quarter.

Table C3.T10. Radionuclide MCLs and Monitoring Requirements

Contaminant	MCL
Gross Alpha[1]	13.5 pCi/L
Combined Radium-226 and -228	5 pCi/L
Beta Particle and Photon Radioactivty[2]	4 mrem/yr
Uranium	30 ug/L

Notes:

1. Gross alpha activity includes radium-226, but excludes radon and uranium.
2. Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides.

Monitoring Requirements:

All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed if activity is <5 picoCuries per liter (pCi/L). Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the MCL, analysis of a single sample may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Table C3.T11. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 0.5°C or Lower*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	23	46	69	91	114	137	27	54	82	109	136	163	33	65	98	130	163	195	40	79	119	158	198	237
0.6	24	47	71	94	118	141	28	56	84	112	140	168	33	67	100	133	167	200	40	80	120	159	199	239
0.8	24	48	73	97	121	145	29	57	86	115	143	172	34	68	103	137	171	205	41	82	123	164	205	246
1	25	49	74	99	123	148	29	59	88	117	147	176	35	70	105	140	175	210	42	84	127	169	211	253
1.2	25	51	76	101	127	152	30	60	90	120	150	180	36	72	108	143	179	215	43	86	130	173	216	259
1.4	26	52	78	103	129	155	31	61	92	123	153	184	37	74	111	147	184	221	44	89	133	177	222	266
1.6	26	52	79	105	131	157	32	63	95	126	158	189	38	75	113	151	188	226	46	91	137	182	228	273
1.8	27	54	81	108	135	162	32	64	97	129	161	193	39	77	116	154	193	231	47	93	140	186	233	279
2	28	55	83	110	138	165	33	66	99	131	164	197	39	79	118	157	197	236	48	95	143	191	238	286
2.2	28	56	85	113	141	169	34	67	101	134	168	201	40	81	121	161	202	242	50	99	149	198	248	297
2.4	29	57	86	115	143	172	34	68	103	137	171	205	41	82	124	165	206	247	50	99	149	199	248	298
2.6	29	58	88	117	146	175	35	70	105	139	174	209	42	84	126	168	210	252	51	101	152	203	253	304
2.8	30	59	89	119	148	178	36	71	107	142	178	213	43	86	129	171	214	257	52	103	155	207	258	310
3	30	60	91	121	151	181	36	72	109	145	181	217	44	87	131	174	218	261	53	105	158	211	263	316

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	46	92	139	185	231	277	55	110	165	219	274	329	65	130	195	260	325	390
0.6	48	95	143	191	238	286	57	114	171	228	285	342	68	136	204	271	339	407
0.8	49	98	148	197	246	295	59	118	177	236	295	354	70	141	211	281	352	422
1	51	101	152	203	253	304	61	122	183	243	304	365	73	146	219	291	364	437
1.2	52	104	157	209	261	313	63	125	188	251	313	376	75	150	226	301	376	451
1.4	54	107	161	214	268	321	65	129	194	258	323	387	77	155	232	309	387	464
1.6	55	110	165	219	274	329	66	132	199	265	331	397	80	159	239	318	398	477
1.8	56	113	169	225	282	338	68	136	204	271	339	407	82	163	245	326	408	489
2	58	115	173	231	288	346	70	139	209	278	348	417	83	167	250	333	417	500
2.2	59	118	177	235	294	353	71	142	213	284	355	426	85	170	256	341	426	511
2.4	60	120	181	241	301	361	73	145	218	290	363	435	87	174	261	348	435	522
2.6	61	123	184	245	307	368	74	148	222	296	370	444	89	178	267	355	444	533
2.8	63	125	188	250	313	375	75	151	226	301	377	452	91	181	272	362	453	543
3	64	127	191	255	318	382	77	153	230	307	383	460	92	184	276	368	460	552

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T12. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 5.0°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139	28	55	83	111	138	166
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	114	143	171
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149	30	60	90	119	149	179
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152	31	61	92	122	153	183
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155	31	62	94	125	156	187
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158	32	64	96	128	160	192
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162	33	65	98	131	163	196
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165	33	67	100	133	167	200
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169	34	68	102	136	170	204
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172	35	70	105	139	174	209
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175	36	71	107	142	178	213
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178	36	72	109	145	181	217
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182	37	74	111	147	184	221

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	33	66	99	132	165	198	39	79	118	157	197	236	47	93	140	186	233	279
0.6	34	68	102	136	170	204	41	81	122	163	203	244	49	97	146	194	243	291
0.8	35	70	105	140	175	210	42	84	126	168	210	252	50	100	151	201	251	301
1	36	72	108	144	180	216	43	87	130	173	217	260	52	104	156	208	260	312
1.2	37	74	111	147	184	221	45	89	134	178	223	267	53	107	160	213	267	320
1.4	38	76	114	151	189	227	46	91	137	183	228	274	55	110	165	219	274	329
1.6	39	77	116	155	193	232	47	94	141	187	234	281	56	112	169	225	281	337
1.8	40	79	119	159	198	238	48	96	144	191	239	287	58	115	173	230	288	345
2	41	81	122	162	203	243	49	98	147	196	245	294	59	118	177	235	294	353
2.2	41	83	124	165	207	248	50	100	150	200	250	300	60	120	181	241	301	361
2.4	42	84	127	169	211	253	51	102	153	204	255	306	61	123	184	245	307	368
2.6	43	86	129	172	215	258	52	104	156	208	260	312	63	125	188	250	313	375
2.8	44	88	132	175	219	263	53	106	159	212	265	318	64	127	191	255	318	382
3	45	89	134	179	223	268	54	108	162	216	270	324	65	130	195	259	324	389

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T13. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 10°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104	21	42	63	83	104	125
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107	21	43	64	85	107	128
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112	22	45	67	89	112	134
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114	23	46	69	91	114	137
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116	23	47	70	93	117	140
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	96	120	144
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122	25	49	74	98	123	147
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124	25	50	75	100	125	150
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129	26	52	79	105	131	157
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131	27	53	80	107	133	160
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134	27	54	82	109	136	163
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137	28	55	83	111	138	166

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	35	70	105	139	174	209
0.6	26	51	77	102	128	153	31	61	92	122	153	183	36	73	109	145	182	218
0.8	26	53	79	105	132	158	32	63	95	126	158	189	38	75	113	151	188	226
1	27	54	81	108	135	162	33	65	98	130	163	195	39	78	117	156	195	234
1.2	28	55	83	111	138	166	33	67	100	133	167	200	40	80	120	160	200	240
1.4	28	57	85	113	142	170	34	69	103	137	172	206	41	82	124	165	206	247
1.6	29	58	87	116	145	174	35	70	106	141	176	211	42	84	127	169	211	253
1.8	30	60	90	119	149	179	36	72	108	143	179	215	43	86	130	173	216	259
2	30	61	91	121	152	182	37	74	111	147	184	221	44	88	133	177	221	265
2.2	31	62	93	124	155	186	38	75	113	150	188	225	45	90	136	181	226	271
2.4	32	63	95	127	158	190	38	77	115	153	192	230	46	92	138	184	230	276
2.6	32	65	97	129	162	194	39	78	117	156	195	234	47	94	141	187	234	281
2.8	33	66	99	131	164	197	40	80	120	159	199	239	48	96	144	191	239	287
3	34	67	101	134	168	201	41	81	122	162	203	243	49	97	146	195	243	292

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T14. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 15°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	16	25	33	41	49
0.6	8	17	25	33	42	50
0.8	9	17	26	35	43	52
1	9	18	27	35	44	53
1.2	9	18	27	36	45	54
1.4	9	18	28	37	46	55
1.6	9	19	28	37	47	56
1.8	10	19	29	38	48	57
2	10	19	29	39	48	58
2.2	10	20	30	39	49	59
2.4	10	20	30	40	50	60
2.6	10	20	31	41	51	61
2.8	10	21	31	41	52	62
3	11	21	32	42	53	63

Chlorine Concentration (mg/L)	pH = 6.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	10	20	30	39	49	59
0.6	10	20	30	40	50	60
0.8	10	20	31	41	51	61
1	11	21	32	42	53	63
1.2	11	21	32	43	53	64
1.4	11	22	33	43	54	65
1.6	11	22	33	44	55	66
1.8	11	23	34	45	57	68
2	12	23	35	46	58	69
2.2	12	23	35	47	58	70
2.4	12	24	36	48	60	72
2.6	12	24	37	49	61	73
2.8	12	25	37	49	62	74
3	13	25	38	51	63	76

Chlorine Concentration (mg/L)	pH = 7.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	23	35	47	58	70
0.6	12	24	36	48	60	72
0.8	12	24	37	49	61	73
1	13	25	38	50	63	75
1.2	13	25	38	51	63	76
1.4	13	26	39	52	65	78
1.6	13	26	40	53	66	79
1.8	14	27	41	54	68	81
2	14	28	42	55	69	83
2.2	14	28	43	57	71	85
2.4	14	29	43	57	72	86
2.6	15	29	44	59	73	88
2.8	15	30	45	59	74	89
3	15	30	46	61	76	91

Chlorine Concentration (mg/L)	pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	14	28	42	55	69	83
0.6	14	29	43	57	72	86
0.8	15	29	44	59	73	88
1	15	30	45	60	75	90
1.2	15	31	46	61	77	92
1.4	16	31	47	63	78	94
1.6	16	32	48	64	80	96
1.8	16	33	49	65	82	98
2	17	33	50	67	83	100
2.2	17	34	51	68	85	102
2.4	18	35	53	70	88	105
2.6	18	36	54	71	89	107
2.8	18	36	55	73	91	109
3	19	37	56	74	93	111

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	17	33	50	66	83	99
0.6	17	34	51	68	85	102
0.8	18	35	53	70	88	105
1	18	36	54	72	90	108
1.2	19	37	56	74	93	111
1.4	19	38	57	76	95	114
1.6	19	39	58	77	97	116
1.8	20	40	60	79	99	119
2	20	41	61	81	102	122
2.2	21	41	62	83	103	124
2.4	21	42	64	85	106	127
2.6	22	43	65	86	108	129
2.8	22	44	66	88	110	132
3	22	45	67	89	112	134

Chlorine Concentration (mg/L)	pH = 8.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	20	39	59	79	98	118
0.6	20	41	61	81	102	122
0.8	21	42	63	84	105	126
1	22	43	65	87	108	130
1.2	22	45	67	89	112	134
1.4	23	46	69	91	114	137
1.6	24	47	71	94	118	141
1.8	24	48	72	96	120	144
2	25	49	74	98	123	147
2.2	25	50	75	100	125	150
2.4	26	51	77	102	128	153
2.6	26	52	78	104	130	156
2.8	27	53	80	106	133	159
3	27	54	81	108	135	162

Chlorine Concentration (mg/L)	pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	23	47	70	93	117	140
0.6	24	49	73	97	122	146
0.8	25	50	76	101	126	151
1	26	52	78	104	130	156
1.2	27	53	80	107	133	160
1.4	28	55	83	110	138	165
1.6	28	56	85	113	141	169
1.8	29	58	87	115	144	173
2	30	59	89	118	148	177
2.2	30	60	91	121	151	181
2.4	31	61	92	123	153	184
2.6	31	63	94	125	157	188
2.8	32	64	96	127	159	191
3	33	65	98	130	163	195

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T15. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 20°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54	11	21	32	43	53	64
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57	12	23	35	46	58	69
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58	12	23	35	47	58	70
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59	12	24	36	48	60	72
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61	12	25	37	49	62	74
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62	13	25	38	50	63	75
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63	13	26	39	51	64	77
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66	13	27	40	53	67	80
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67	14	27	41	54	68	81
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68	14	28	42	55	69	83

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	18	35	53	70	88	105
0.6	13	26	39	51	64	77	15	31	46	61	77	92	18	36	55	73	91	109
0.8	13	26	40	53	66	79	16	32	48	63	79	95	19	38	57	75	94	113
1	14	27	41	54	68	81	16	33	49	65	82	98	20	39	59	78	98	117
1.2	14	28	42	55	69	83	17	33	50	67	83	100	20	40	60	80	100	120
1.4	14	28	43	57	71	85	17	34	52	69	86	103	21	41	62	82	103	123
1.6	15	29	44	58	73	87	18	35	53	70	88	105	21	42	63	84	105	126
1.8	15	30	45	59	74	89	18	36	54	72	90	108	22	43	65	86	108	129
2	15	30	46	61	76	91	18	37	55	73	92	110	22	44	66	88	110	132
2.2	16	31	47	62	78	93	19	38	57	75	94	113	23	45	68	90	113	135
2.4	16	32	48	63	79	95	19	38	58	77	96	115	23	46	69	92	115	138
2.6	16	32	49	65	81	97	20	39	59	78	98	117	24	47	71	94	118	141
2.8	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	95	119	143
3	17	34	51	67	84	101	20	41	61	81	102	122	24	49	73	97	122	146

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T16. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 25°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	28	35	42
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39	8	16	24	31	39	47
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40	8	16	24	32	40	48
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41	8	16	25	33	41	49
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41	8	17	25	33	42	50
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42	9	17	26	34	43	51
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43	9	17	26	35	43	52
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44	9	18	27	35	44	53
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45	9	18	27	36	45	54
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46	9	18	28	37	46	55

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	12	23	35	47	58	70
0.6	9	17	26	34	43	51	10	20	31	41	51	61	12	24	37	49	61	73
0.8	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75
1	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
1.2	9	18	28	37	46	55	11	22	34	45	56	67	13	27	40	53	67	80
1.4	10	19	29	38	48	57	12	23	35	46	58	69	14	27	41	55	68	82
1.6	10	19	29	39	48	58	12	23	35	47	58	70	14	28	42	56	70	84
1.8	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
2	10	20	31	41	51	61	12	25	37	49	62	74	15	29	44	59	73	88
2.2	10	21	31	41	52	62	13	25	38	50	63	75	15	30	45	60	75	90
2.4	11	21	32	42	53	63	13	26	39	51	64	77	15	31	46	61	77	92
2.6	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
2.8	11	22	33	44	55	66	13	27	40	53	67	80	16	32	48	64	80	96
3	11	22	34	45	56	67	14	27	41	54	68	81	16	32	49	65	81	97

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T17. CT Values for Inactivation of Viruses by Free Chlorine

	Log Inactivation		**Log Inactivation**		**Log Inactivation**	
	2.0 pH		**3.0 pH**		**3.0 pH**	
Temperature (C)	**6-9**	**10**	**6-9**	**10**	**6-9**	**10**
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table C3.T18. CT Values for Inactivation of *Giardia* Cysts by Chlorine Dioxide

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	10	4.3	4	3.2	2.5	2
1-log	21	8.7	7.7	6.3	5	3.7
1.5-log	32	13	12	10	7.5	5.5
2-log	42	17	15	13	10	7.3
2.5-log	52	22	19	16	13	9
3-log	63	26	23	19	15	11

Table C3.T19. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

	Temperature (C)					
Removal	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	8.4	5.6	4.2	2.8	2.1	1.4
3-log	25.6	17.1	12.8	8.6	6.4	4.3
4-log	50.1	33.4	25.1	16.7	12.5	8.4

Table C3.T20. CT Values for Inactivation of *Giardia* Cysts by Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	0.48	0.32	0.23	0.16	0.12	0.08
1-log	0.97	0.63	0.48	0.32	0.24	0.16
1.5-log	1.5	0.95	0.72	0.48	0.36	0.24
2-log	1.9	1.3	0.95	0.63	0.48	0.32
2.5-log	2.4	1.6	1.2	0.79	0.60	0.40
3-log	2.9	1.9	1.43	0.95	0.72	0.48

Table C3.T21. CT Values for Inactivation of Viruses by Free Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	0.9	0.6	0.5	0.3	0.25	0.15
3-log	1.4	0.9	0.8	0.5	0.4	0.25
4-log	1.8	1.2	1.0	0.6	0.5	0.3

Table C3.T22. CT Values for Inactivation of *Giardia* Cysts by Chloramine pH 6-9

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	635	365	310	250	185	125
1-log	1,270	735	615	500	370	250
1.5-log	1,900	1,100	930	750	550	375
2-log	2,535	1,470	1,230	1,000	735	500
2.5-log	3,170	1,830	1,540	1,250	915	625
3-log	3,800	2,200	1,850	1,500	1,100	750

Table C3.T23. CT Values for Inactivation of Viruses by Chloramine

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	1,243	857	643	428	321	214
3-log	2,063	1,423	1,067	712	534	356
4-log	2,883	1,988	1,491	994	746	497

Table C3.T24. CT Values for Inactivation of Viruses by UV

Log Inactivation	
2.0	**3.0**
21	36

Table C3.T25 Radionuclides

Radionuclide	Bq/l	Radionuclide	Bq/l	Radionuclide	Bq/l
Hydrogen 3	10000	Cobalt 58	100	Radium 224	1
Beryllium 7	10000	Cobalt 60	100	Radium 225	1
Carbon 14	100	Nickel 59	1000	Radium 226	1
Sodium 22	100	Nickel 63	1000	Radium 228	0.1
Phosphorus 32	100	Zinc 65	100	Molybdenum 93	100
Phosphorus 33	1000	Arsenic 73	1000	Molybdenum 99	100
Sulphur 35	100	Arsenic 74	100	Technetium 96	100
Chloride 36	100	Arsenic 76	100	Technetium 97	1000
Cadmium 45	100	Arsenic 77	1000	Technetium 99	100
Cadmium 47	100	Selenium 75	100	Ruthenium 97	1000
Scandium 46	100	Bromme 82	100	Ruthenium 103	100
Scandium 47	100	Rubidium 86	100	Ruthenium 106	10
Scandium 48	100	Strontium 85	100	Radium 105	1000
Vanadium 48	100	Strontium 89	100	Palladium 103	1000
Chromium 51	10000	Strontium 90	10	Silver 105	100
Manganese 52	100	Yttrium 90	100	Silver 110	100
Manganese 53	10000	Yttrium 91	100	Silver 111	100
Manganese 54	100	Zirconium 93	100	Cadmium 109	100
Iron 55	1000	Zirconium 95	100	Cadmium 110	100
Iron 59	100	Niobium 93	1000	Indrium 111	1000
Cobalt 56	100	Niobium 94	100	Indrium 114	100
Cobalt 57	100	Niobium 95	100	Osmium 191	100
Tin 113	100	Uranium 237	100	Osmium 193	100
Tin 125	100	21 Uranium 238	10	Iridium 190	100
Antimony 122	100	Lanthanum 140	100	Iridium 192	100
Antimony 124	100	Sirium 139	1000	Platinum 191	1000
Antimony 125	100	Sirium 141	100	Platinum 193	1000
Tellurium 123	100	Sirium 143	100	Gold 198	100
Tellurium 127	1000	Sirium 144	10	Gold 199	1000
Tellurium 129	1000	Niobium 147	100	Mercury 197	1000
Tellurium 131	1000	Promethium 147	1000	Mercury 203	100
Tellurium 132	100	Promethium 149	100	Thallium 200	1000
Iodine 125	10	Samarium 151	1000	Thallium 201	1000
Iodine 126	10	Samarium 153	100	Thallium 202	1000
Iodine 129	1000	Erbium 152	100	Thallium 204	100
Iodine 131	10	Erbium 154	100	Lead 203	1000
Strontium 129	1000	Erbium 155	1000	Bismuth 206	100
Strontium 131	1000	Gadolinium 153	1000	Bismuth 207	100

Table C3.T25 Radionuclides (continued)

Strontium 132	100	Terbium 160	100	Bismuth 210	100
Strontium 134	10	Erbium 169	1000	Lead 210	0.1
Strontium 135	100	Thulium 171	1000	Polonium 210	0.1
Strontium 136	100	Ytterbium 175	1000	Radium 223	1
Strontium 137	10	Tantabium 182	100	Chromium 242	10
Barium 131	1000	Tungsten 181	1000	Chromium 243	1
Barium 140	100	Tungsten 185	1000	Chromium 244	1
Uranium 235	1	Rhenium 186	100	Chromium 245	1
Uranium 236	1	Osmium 185	100	Chromium 246	1
Thorium 227	10	Uranium 234	10	Chromium 247	1
Thorium 228	1	Niobium 237	1	Chromium 248	0.1
Thorium 229	0.1	Niobium 239	100	Berkelium 249	100
Thorium 230	1	Plutonium 236	1	Californium 246	100
Thorium 231	1000	Plutonium 237	1000	Californium 247	10
Thorium 232	1	Plutonium 238	1	Californium 249	1
Thorium 234	100	Plutonium 239	1	Californium 250	1
Protactinium 230	100	Plutonium 240	1	Californium 251	1
Protactinium 231	0.1	Plutonium 241	10	Californium 252	1
Protactinium 233	100	Plutonium 242	1	Californium 253	100
Uranium 230	1	Plutonium 244	1	Californium 254	1
Uranium 231	1000	Americium 241	1	Einsteinium 253	10
Uranium 232	1	Americium 242	1000	Einsteinium 254	10
Uranium 233	1	Americium 243	1		

Table C3.T26. Chemical Components used in Treatment of Drinking Water and Related Components

Component	Maximum Level
Derivatives of purification substances	µg/l
Dichloromethane bromate	60
Bromoform	100
Chlorate	700
Chloroform	300
Cyanogen chloride	70
Dibromoacetonitrile	70
Dibromochloromethane	100
Dichloroacetate	50
Dichloroacetonitrile	20
Monochloroacetate	20
Trichloroacetate	200
4,2 – 6 Trichlorophenol	200
Contaminants from treatment chemicals	µg/l
Acrylamide	0.5
Epichlorohydrin	0.4
Contaminants from pipes and equipment	µg/l
Benzo [alpha] benzene	0.7
Copper	1000
Lead	10
Vinyl chloride	0.3

Table C3.T27. Residues of Insecticides used for Public Health Purposes

Residues of insecticides used for public health purposes	Maximum level (ug/L)
Chlorpirifos	30
DDT and substitutes	1
Permethrin	300
Pyriproxyfen	300

Table C3.T28. Toxic Substances

Toxic Substance	Maximum level (ug/L)
Micrositin LR	1

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C4. CHAPTER 4

WASTEWATER

C4.1. SCOPE

This Chapter contains criteria to control and regulate discharges of wastewater into surface waters. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges, and pollutants from indirect dischargers.

C4.2. DEFINITIONS

C4.2.1. 7-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of seven consecutive days.

C4.2.2. 30-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

C4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

C4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

C4.2.5. Ballast Water. The water found inside a tank on a shipthat is used for stabilization.

C4.2.6. Best Management Practices (BMP). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into waters of the State of Qatar.

C4.2.7. Biochemical Oxygen Demand (BOD_5). The five-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

C4.2.8. Carbonaceous BOD_5 ($CBOD_5$). The five-day measure of the pollutant parameter, $CBOD_5$. This test can substitute for the BOD_5 testing which suppresses the nitrification reaction/component in the BOD_5 test.

C4.2.9. Conventional Pollutants. BOD_5, total suspended solids (TSS), oil and grease, fecal coliforms, and pH.

C4.2.10. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

C4.2.11. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

C4.2.12. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to waters of the State of Qatar from any "point source."

C4.2.13. Domestic Wastewater Treatment System (DWTS). Any DoD or State of Qatar facility designed to treat wastewater before its discharge to waters of the State of Qatar and in which the majority of such wastewater is made up of domestic sewage.

C4.2.14. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into waters of the State of Qatar.

C4.2.15. Existing Source. A source in operation, or under construction, prior to 1 October 1994, unless it is subsequently substantially modified, that discharges pollutants.

C4.2.16. Hazardous Healthcare Waste Treatment Facility. A facility that treats wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C4.2.17. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

C4.2.18. Industrial Activities Associated with Storm Water. Activities that may contribute pollutants to storm water runoff or drainage during wet weather events. (See Table C4.T3., "Best Management Practices.")

C4.2.19. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to waters of the State of Qatar.

C4.2.20. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

C4.2.21. Maritime Environment. The State coasts, the sea, internal seas, the regional sea water, the neighboring area, the pure economical area and its depths, and all its components, live and inanimate creatures.

C4.2.22. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

C4.2.23. New Source. A source built or substantially modified on or after 1 October 1994 that directly or indirectly discharges pollutants to the wastewater system.

C4.2.24. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft, or any conveyance that merely collects natural surface flows of precipitation.

C4.2.25. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical waste; biological material; radioactive material; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

C4.2.26. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

C4.2.27. Public Sewer. A common sewer directly controlled by public authority.

C4.2.28. Regulated Facilities. Those facilities for which criteria are established under this Chapter, such as DWTS, IWTS, or industrial discharges.

C4.2.29. Storm Water. Run-off and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

C4.2.30. Substantial Modification. Any modification to a facility, the cost of which exceeds $1,000,000, regardless of funding source.

C4.2.31. Total Suspended Solids (TSS). The pollutant parameter total filterable suspended solids.

C4.2.32. Total Toxic Organics (TTO). The summation of all quantifiable values greater than 0.01 mg/L for the toxic organics in Table C4.T1., "Components of Total Toxic Organics."

C4.2.33. Waters of the State of Qatar. Surface water including the territorial seas recognized under customary international law, including:

C4.2.33.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce.

C4.2.33.2. Waters which are or could be used for recreation or other purposes.

C4.2.33.3. Waters from which fish or shellfish are or could be taken and sold.

C4.2.33.4. Waters which are used or could be used for industrial purposes by industries.

C4.2.33.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

C4.2.33.6. Tributaries of waters identified in subparagraphs C4.2.29.1. through C4.2.29.5. of this definition.

C4.2.33.7. Exclusions to waters of the State of Qatar. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this Chapter, are not waters of the State of Qatar. This exclusion applies only to manmade bodies of water that were neither originally waters of the State of Qatar nor resulted from impoundment of waters of the State of Qatar.

C4.3. CRITERIA

C4.3.1. Domestic Wastewater Treatment Systems.

C4.3.1.1. The DWTS must be equipped with flow measuring devices and equipment necessary for wastewater sample collection and analyses.

C4.3.1.2. Any industrial wastewater discharged to the public sewer shall not exceed applicable limitations set out in Table C4.T5.

C4.3.1.3. Any wastewater discharged to the DWTS shall not exceed applicable limitations set out in Table C4.T7.

C4.3.1.4. It is prohibited to discharge any kind of wastewater or materials that can impede the operation of a Domestic Wastewater Treatment System (DWTS) or impact the effluent quality.

C4.3.2. Effluent Limitations for Direct Dischargers of Conventional Pollutants.

C4.3.2.1. All new sources of pollutants directly discharged to waters of the State of Qatar will comply with the following effluent limitations:

C4.3.2.1.1. BOD_5

C4.3.2.1.1.1. The 30-day average will not exceed 30 mg/L.

C4.3.2.1.1.2. The 7-day average will not exceed 45 mg/L.

C4.3.2.1.1.3. $CBOD_5$ may be substituted for BOD_5. $CBOD_5$ limit, if substituted for the parameter BOD_5, should be at least 5 mg/L less than each numerical limit for the 30-day and 7-day average for the BOD_5 limit. The $CBOD_5$ test procedure suppresses the nitrification component in the BOD_5 test procedure, thereby reducing the value or effects and lowering the oxygen demand. When $CBOD_5$ is substituted for BOD_5, the following limits will apply:

C4.3.2.1.1.3.1. 30-day average will not exceed 25 mg/L.

C4.3.2.1.1.3.2. The 7-day average will not exceed 40 mg/L.

C4.3.2.1.2. TSS

C4.3.2.1.2.1. The 30-day average will not exceed 30 mg/L.

C4.3.2.1.2.2. The 7-day average will not exceed 45 mg/L.

C4.3.2.1.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.2.2. Existing sources of pollutants to waters of State of Qatar will comply with the following effluent limitations:

C4.3.2.2.1. BOD_5

C4.3.2.2.1.1. The 30-day average will not exceed 45 mg/L.

C4.3.2.2.1.2. The 7-day average will not exceed 50 mg/L.

C4.3.2.2.2. TSS

C4.3.2.2.2.1. The 30-day average will not exceed 45 mg/L.

C4.3.2.2.2.2. The 7-day average will not exceed 50 mg/L.

C4.3.2.2.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.2.3. Monitoring. Monitoring requirements apply to all regulated facilities. The monitoring frequency (including both sampling and analysis) given in Table C4.T2., "Monitoring Requirements," includes all three parameters which are regulated (BOD_5, TSS, and pH). Samples shall be collected at the point of discharge to the waters of the State of Qatar.

C4.3.2.4. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. Retain records for three years.

C4.3.2.4.1. The effluent, concentration, or other measurement specified for each regulated parameter.

C4.3.2.4.2. The daily volume of effluent discharge from each point source.

C4.3.2.4.3. Test procedures for the analysis of pollutants.

C4.3.2.4.4. The date, exact place, and time of sampling and/or measurements.

C4.3.2.4.5. The name of the person who performed the sampling and/or measurements.

C4.3.2.4.6. The date of analysis.

C4.3.2.5. Complaint System. A system for investigating water pollution complaints from individuals or State of Qatar water pollution control authorities will be established, involving the EEA, as appropriate.

C4.3.2.6. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 0.049 million gallons per day (MGD), monthly sample must comply with level for 30-day average.

C4.3.3. Effluent Limitations For Non-Categorical Industrial Indirect Dischargers

C4.3.3.1. Effluent Limits. The following effluent limits will apply to all discharges of pollutants to DWTSs and associated collection systems from process wastewater for which categorical standards have not been established (see subparagraphs C4.3.4.1.8. C4.3.4.1.9., and C4.3.4.1.10. for a list of categorical standards.

C4.3.3.1.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater treatment plant flow is prohibited.

C4.3.3.1.2. Ignitability and Explosivity

C4.3.3.1.2.1. The discharge of wastewater with a closed cup flashpoint of less than 60C (140F) is prohibited.

C4.3.3.1.2.2. The discharge of waste with any of the following characteristics is prohibited:

C4.3.3.1.2.2.1. A liquid solution that contains more than 24% alcohol by volume and has a flash point less than 60 C (140 F).

C4.3.3.1.2.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction.

C4.3.3.1.2.2.3. An ignitable compressed gas.

C4.3.3.1.2.2.4. An oxidizer, such as peroxide.

C4.3.3.1.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

C4.3.3.1.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

C4.3.3.1.3.2. Wastes that react violently with water;

C4.3.3.1.3.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water;

C4.3.3.1.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

C4.3.3.1.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

C4.3.3.1.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material"; and

C4.3.3.1.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

C4.3.3.1.4. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 is allowed, unless the DWTS is specifically designed to handle that type of wastewater.

C4.3.2.1.5. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin.

C4.3.3.1.6. Spills and Batch Discharges (slugs). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

C4.3.3.1.6.1. Description of discharge practices, including non-routine batch discharges;

C4.3.3.1.6.2. Description of stored chemicals;

C4.3.3.1.6.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this Chapter, including procedures for subsequent written notification within five days;

C4.3.3.1.6.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training;

C4.3.3.1.6.5. Proper procedures for building containment structures or equipment;

C4.3.3.1.6.6. Necessary measures to control toxic organic pollutants and solvents; and

C4.3.3.1.6.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

C4.3.3.1.7. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

C4.3.3.1.8. Heat. Heat in amounts that inhibit biological activity in the DWTS resulting in interference, but in no case in such quantities that the temperature of the process water at the DWTS exceeds 40°C (104°F).

C4.3.3.2. Complaint System. A system for investigating water pollution complaints from State of Qatar water pollution control authorities will be established, involving the EEA as appropriate.

C4.3.4. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect). Any installations which have activities that fall into any of the industrial categories listed below must comply with the following effluent limitations (i.e., either direct or indirect discharge limitations at the source of the discharge). For most categories, the effluent limitations are the same for new and existing activities. Where differences in limitations exist, activities constructed or substantially modified on or after 1 October 1994 will meet the limitations for new activities.

C4.3.4.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

C4.3.4.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

C4.3.4.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

C4.3.4.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

C4.3.4.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

C4.3.4.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

C4.3.4. 1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

C4.3.4.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

C4.3.4.1.8. The following discharge standards apply to new and existing facilities in the above electroplating subparts which directly or indirectly discharge less than 38,000 liters per day (10,000 gallons per day):

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, amenable	5.0	2.7
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Toxic Organics	4.57	---

C4.3.4.1.9. The following discharge standards apply to new and existing facilities in the above electroplating subparts that directly, or indirectly, discharge 38,000 liters per day (10,000 gallons per day) or more:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, total	1.9	1.0
Copper	4.5	2.7
Nickel	4.1	2.6
Chrome	7.0	4.0
Zinc	4.2	2.6
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Metals	10.5	6.8
Total Toxic Organics	2.13	---

C4.3.4.1.10. In addition to the above standards, new and existing facilities that electroplate precious metals and that directly or indirectly discharge 38,000 liters per day (10,000 gallons per day) or more must comply with the following standard:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Silver	1.2	0.7

C4.3.4.2. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters that are specified in the paragraph of this Chapter dealing with industrial dischargers. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan. (See Table C4.T2., "Monitoring Requirements.")

C4.3.5. Storm Water Management

C4.3.5.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table C4.T3., "Best Management Practices." Update the SWPPP annually using in-house resources.

C4.3.5.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events, should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

C4.3.6. Septic System. In the absence of a public sewer, all building drains shall be routed to a septic tank with the ability to connect to a public sewer in the future. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

C4.3.7. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate.

C4.4. ADDITIONAL REQUIREMENTS

C4.4.1. Marine Environment.

C4.4.1.1. It is prohibited to dispose of any materials, wastes or untreated wastewater to the coastal environment. The facility or project representative is responsible for any violation of this requirement.

C4.4.1.2. Any wastewater discharged to the maritime environment shall not exceed applicable limitations set out in Table C4.T4.

C4.4.1.3. Ballast water discharged to the maritime or land environment shall not exceed applicable limitations set out in Table C4.T6.

C4.4.2. Other requirements.

C4.4.2.1. The operator of a hazardous healthcare waste treatment facility should maintain an operating record that contains test results of the water discharged from the treatment process, and the methods and location of discharged water disposal.

C4.4.2.2. It is prohibited to use untreated sewage or wastewater for irrigation or any agricultural purposes.

Table C4.T1. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1,2-Dichloropropane
Methyl bromide (bromomethane)	1,3-Dichloropropylene (1,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1,2-Trichloroethane
1,1 -Dichloroethene	Benzene
1,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1,2-Dichloroethane	Bromoform (tribromomethane)
1,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1 -Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1,2-Diphenylhydrazine
1,3-Dichlorobenzene	N-nitrosodiphenylamine
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate
Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)

Table C4.T1. Components of Total Toxic Organics (continued)

Base/Neutral Extractable Organics (continued)	
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractables Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	
Pesticides/PCBs	
Alpha-Endosulfan	Endrin
Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor
Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)
Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and	PCB-1016 (Arochlor 1016)
Dieldrin	

Table C4.T2. Monitoring Requirements

Plant Capacity (MGD)	Monitoring Frequency
0.001 -	Monthly
1.0 -	Weekly
> 5.0	Daily

Table C4.T3. Best Management Practices

Activity	**Best Management Practice**
Aircraft Ground Support Equipment Maintenance	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids.
Aircraft/runway deicing	Perform anti-icing before the storm. Put critical aircraft in
Aircraft/vehicle fueling operations	Protect fueling areas from rain. Provide spill response equipment at fueling station.
Aircraft/vehicle maintenance & repair	Perform maintenance/repair activities inside. Use drip pans to capture drained
Aircraft/vehicle washing	Capture wash water and send to wastewater treatment plant Treat wash water with oil water separator before discharge.
Bulk fuel storage areas	Use dry camlock connectors to reduce fuel loss. Capture spills with drip pans when breaking connections. Curb fuel transfer areas; treat with oil
Construction activities	Construct sediment dams/silt fences around construction sites.
Corrosion control activities	Capture solvent/soaps used to prepare aircraft for painting. Perform corrosion control activities inside.
Hazardous material storage	Store hazardous materials inside or under cover. Reduce use of hazardous materials.
Outdoor material storage areas	Cover and curb salt, coal, urea piles. Store product drums inside or under cover. Reduce quantity of material
Outdoor painting/depainting operations	Capture sandblasting media for proper disposal. Capture paint clean up materials (thinners,
Pesticide operations	Capture rinse water when mixing chemicals. Store spray equipment inside.
Power production	Capture leaks and spills from power production equipment using drip pans, etc.
Vehicle storage yards	Check vehicles in storage for leaks and spills. Use drip pans to capture leaking

Table C4.T4.Criteria for Treated Wastewater of Point of Discharge into Maritime Environments

Parameter	Symbol	Standards	Unit
1- Physical Tests			
Total Dissolved Solids	TDS	1500	mg/l
Floating Particles		0	mg/l
Temperature		10*	C°
Turbidity		5-75	N.T.U
2- Inorganic Matters			
Ammonia	NH_4	1-3	mg/l
Chlorine Residual		0.05-1	mg/l
Cyanide	CN	0.05-0.1	mg/l
Dissolved Oxygen	DO	>2-4	mg/l
Fluoride	F	2-25	mg/l
Phosphate as P	PO_4^{-3}	2-25	mg/l
Sulfide	S^{-2}	0.1-0.5	mg/l
Total Kjeldahl Nitrogen as N		100-250	mg/l
Chemical Oxygen Demand	COD	100-250	mg/l
3- Trace Metals			
Aluminum	Al	3-25	mg/l
Arsenic	As	0.1	mg/l
Barium	Ba	2	mg/l
Cadmium	Cd	0.01-0.2	mg/l
Chromium, total	Cr	0.1-0.5	mg/l
Cobalt	Co	0.05-2	mg/l
Copper	Cu	0.2-1.5	mg/l
Iron	Fe	1.5-10	mg/l
Lead	Pb	0.08-0.5	mg/l
Manganese	Mn	0.2-1	mg/l
Mercury	Hg	0.001-0.005	mg/l
Nickel	Ni	0.1-2	mg/l
Zinc	Zn	0.1-2	mg/l
Silver	Ag	0.005-0.1	mg/l
Selenium	Se	0.02	mg/l
4- Organic Matters			
Oil & Grease		10-15	mg/l
Phenols (estimated as Phenols)		0.002-5	mg/l
Total Organic Carbon	TOC	75	mg/l
Halogenated Hydrocarbons & Pesticides		0.001-0.2	mg/l
5- Biological Tests			
Total Coliform		10-100	MPN/100ml
Egg Parasites		0	No/l
Worm Parasites		0	No/l
Fecal Coliform		1000	MPN/100 ml

Table C4.T5. Criteria for the Discharge of Industrial Effluents into Public Sewers

Parameter	Symbol	Standards	Unit
Synthetic detergents		10-30	mg/l
Cyanide Compounds	CN	0.1-1	mg/l
Sulfides	S	8-10	mg/l
Sulfates		80-100	mg/l
Tar & Tar Oils		0-5	mg/l
Floating oils & Grease		5-30	mg/l
Emulsified Oil & Grease		50-75	mg/l
Suspended Solids	SS	300-500	mg/l
Chemical Oxygen Demand	COD	700-1500	mg/l
Metal Salts (Total)			
Cadmium	Cd	0.5-5	mg/l
Chromium, total	Cr	0.1-2	mg/l
Copper	Cu	1-4	mg/l
Lead	Pb	2-4	mg/l
Nickel	Ni	1-4	mg/l
Silver	Ag	2-4	mg/l
Zinc	Zn	2-5	mg/l
Arsenic	AS	0.1-4	mg/l
Mercury	Hg	0.00-0.1	mg/l

Table C4.T6.Criteria for Ballast Water Discharge

Parameter	Symbol	Standards	Unit
Ammonia, as N	NH_3	2-3	mg/l
Biochemical Oxygen Demand	BOD_5	40-50	mg/l
pH	pH	6-9	pH
Chemical Oxygen Demand	COD	200-250	mg/l
Floatable Oil and Grease		0	mg/l
Suspended Solid	SS	40-50	mg/l
Total Oil (Hexane Extractable)	TO	10-15	mg/l
Total Organic Carbon	TOC	90-100	mg/l

Table C4.T7. Criteria for Drainage of Liquid Waste to the DWTS Treatment

Parameter	Symbol	Standards	Unit
pH	pH	5-10	mg/l
Color		Non-resistance	mg/l
BOD5	BOD	1000	mg/l
COD5	COD	3000	mg/l
Temperature	C	60	mg/l
Insolubles		2000	mg/l
Total Dissolved Solids	TDS	4000	mg/l
Grease and Oil		120	mg/l
Sulfide (as ions)	S`	10	mg/l
Sulfate (as ions)	S`	1000	mg/l
Phenols		150	mg/l
Cyanide	CN	1	mg/l
Detergents (capable of vigorous decomposition)		100	mg/l
Total Chlorinated Hydrocarbons	TCH	0.5	mg/l
Total Organic Carbon	TOC	1000	mg/l
Caustic Alkali (calcium carbonates)		3000	mg/l
Total toxic metals		10	mg/l
Aluminum	Al	30	mg/l
Arsenic	As	5	mg/l
Barium	Ba	10	mg/l
Cadmium	Cd	2	mg/l
Total Chromium		5	mg/l
Copper	Co	5	mg/l
Iron	Fe	25	mg/l
Lead	Pb	5	mg/l
Mercury	Hg	0.1	mg/l
Nickel	Ni	5	mg/l
Silver	Ag	5	mg/l
Zinc	Zn	10	mg/l

C5. CHAPTER 5

HAZARDOUS MATERIAL

C5.1. SCOPE

This Chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements, which are covered under other Chapters. This FGS does not cover munitions.

C5.2. DEFINITIONS

C5.2.1. Hazardous Chemicals. Gas, liquid or solid chemicals which are characterized by their own effectiveness, toxicity, explosiveness, causing corrosion, or any other characteristics that could endanger the human health and environment, whether alone or when coming into contact with other substances.

C5.2.2. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the following information:

C5.2.2.1. Identification/name of hazardous chemicals;

C5.2.2.2. Appropriate hazard warnings; and

C5.2.2.3. The name and address of the manufacturer, importer, or other responsible party; and that is prepared in accordance with DoDI 6050.05 (Reference (g)).

C5.2.3. Hazardous Material. Any material that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table C5.T1., "Typical Hazardous Materials Characteristics," or the material is listed in Table AP1.T4., "List of Hazardous Waste/Substances/Materials." Munitions are excluded.

C5.2.4. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with Reference (g).

C5.2.5. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle, either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

C5.2.6. Material Safety Data Sheet (MSDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

C5.3. CRITERIA

C5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and Marine Corps Order (MCO) 4450.1 2A (Reference (h)) provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Interservice Manual 24-204(I), Army Technical Order (TO) 3 8-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, DCMAD1, Ch3.4 (HM24), (Reference (i)). Hazardous chemicals shall be stored so that there is a minimum separation from the public. Table C5.T2 provides minimum separation distances of hazardous chemicals from the public. Hazardous chemicals shall also be separated by minimum distances from other hazardous chemicals according to UN Class/Division. Table C5.T3 provides the minimum separation distances.

C5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

C5.3.3. Installations will ensure that for each hazardous material shipment:

C5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material and include an MSDS;

C5.3.3.2. All drivers are trained on the hazardous material included in the shipment, including health risks of exposure and the physical hazards of the material, including potential for fire, explosion, and reactivity;

C5.3.3.3. Drivers will be trained on spill control and emergency notification procedures;

C5.3.3.4. For any hazardous material categorized on the basis of section AP1.1. of this FGS, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes;

C5.3.3.5. The transport vehicles are subjected to a walk-around inspection by the driver before and after the hazardous material is loaded; and

C5.3.3.6. Packages are labeled in accordance with paragraph C5.3.7.

C5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material as well as an inventory of all hazardous materials contained therein. (See paragraph C1 8.3.2.)

C5.3.5. Each MSDS shall be in English or the predominant language in the work place, and shall contain at least the following information:

C5.3.5.1. The identity used on the label.

C5.3.5.1.1. If the hazardous chemical is a single substance, its chemical and common name.

C5.3.5.1.2. If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or

C5.3.5.1.3. If the hazardous chemical is a mixture that has not been tested as a whole:

C5.3.5.1.3.1. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

C5.3.5.1.3.2. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations that would exceed an established Occupational Safety and Health Administration (OSHA)-permissible exposure limit, or could present a health hazard to employees; and

C5.3.5.1.3.3. The chemical and common name(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

C5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

C5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

C5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical;

C5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

C5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available;

C5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen;

C5.3.5.8. Any generally applicable precautions for safe handling and use that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

C5.3.5.9. Any generally applicable control measures that are known to the chemical manufacturer, importer, or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment;

C5.3.5.10. Emergency and first aid procedures;

C5.3.5.11. The date of preparation of the MSDS or the last change to it; and

C5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

C5.3.6. Each work center will maintain a file of MSDSs for each hazardous material procured, stored, or used at the work center. MSDSs that are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site.

C5.3.7. All hazardous materials on DoD installations will have a Hazardous Chemical Warning Label in accordance with Reference (g) (or State of Qatar equivalent) and have MSDS information either available or in the HMIRS in accordance with Reference (g) and other DoD Component instructions. These requirements apply throughout the life-cycle of these materials.

C5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

C5.3.9. All excess hazardous material will be processed through the Defense Reutilization and Marketing Service (DRMS) in accordance with the procedures in DoD 4160.21-M (Reference (j)). The DRMS will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local pharmacy or exchange program.

C5.3.10. All personnel who use, handle, or store hazardous materials will be trained in accordance with Reference (g) and other DoD Component instructions.

C5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

C5.4. ADDITIONAL REQUIREMENTS

C5.4.1. Packaging

C5.4.1.1 Hazardous chemicals are to be placed inside good quality containers that are capable of being sealed and able to withstand all conditions of transport, storage, trading, vibration effects, and temperature changes, as well as being well sealed.

C5.4.1.2. Containers shall be compatible with the chemical substances placed inside them. The inside of the containers must be coated with anti-rust, anti-corrosion, and anti-interaction substance to maintain integrity of the container. Chemicals may not be packed in containers that are breakable or damaged. For dried hazardous chemicals, containers shall be compatible with the contents and able to withstand transport conditions.

C5.4.1.3. The United Nations packaging specifications and/or the national specifications shall be used.

C5.4.2. Transportation By Land

C5.4.2.1. Hazardous chemicals shall be safely transported within speed limits and using roads that allow hazardous chemical transport.

C5.4.2.2. Tankers used to transport chemicals shall be made of material suitable for the transported chemical. The tanks' containers shall be designed according to internationally approved rules, with a wide aperture for inspection. This aperture shall contain an appropriate device for pressure relief.

C5.4.2.3. Metal nameplates shall be affixed to the outer surface of all sides of the transport units to describe tank contents and the risk involved. The tanks shall be painted with a reflective painting that is able to withstand the weather conditions.

Table C5.T1. Typical Hazardous Materials Characteristics

1.	The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials that damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gases, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-
2.	The item and/or its disposal is regulated by the State of Qatar because of its hazardous nature.
3.	The item has a flashpoint below 93℃ (200℉) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control.
4.	The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of greater than 1.0 volt or less than -1.0 volt.
5.	In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics.
6.	The item has special characteristics that, in the opinion of the manufacturer or the DoD Components, could cause harm to personnel if used or stored improperly.

Table C5.T2. Minimum Separation of Hazardous Chemicals from the Public

UN Class/Division[a]	Minimum separation in meters
1	50
2.1	5
2.2	5
2.3	15
3.1	10
4.1, 4.2	5
5.1, 5.2	5
6.1, 6.2	5
8	5

Table C5.T3. Minimum Separation of Hazardous Chemicals from Other Chemicals

UN Class/ Division	1.1	2.1	2.2	2.3	3.1	4.1	4.2	4.3	5.1	5.2	6.1	8
1.1		C	C	C	C	C	C	C	C	C	C	C
2.1	C			C	B	B	C	B	C	C	B	B
2.2	C			C	A	A	B	A	A	B	A	A
2.3	C	C	C		C	C	C	C	C	C	C	C
3.1	C	B	A	C		B	B	B	C	C	B	A
4.1	C	B	A	C	B		B	B	C	C	B	A
4.2	C	C	B	C	B	B		B	C	C	B	A
4.3	C	B	A	C	B	B	B		C	C	B	B
5.1	C	C	A	C	C	C	C	C		B	B	B
5.2	C	C	B	C	C	C	C	C	B		C	B
6.1	C	B	A	C	B	B	B	B	B	C		A
8	C	B	A	C	A	A	A	B	B	B	A	

Legend:

A- Separation shall be on a distance of at least 3 m.
B- Separation shall be on a distance of at least 5 m.
C- They shall not be stored in the same chamber and the minimum separation distance between storage areas is 10 m.

Substances (including mixtures and solutions) are assigned to one of nine classes according to the hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. These classes and divisions are:

Class 1: Explosives
- Division 1.1: Substances and articles which have a mass explosion hazard
- Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard
- Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard
- Division 1.4: Substances and articles which present no significant hazard
- Division 1.5: Very insensitive substances which have a mass explosion hazard
- Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard

Class 2: Gases
- Division 2.1: Flammable gases
- Division 2.2: Non-flammable, non-toxic gases
- Division 2.3: Toxic gases

Class 3: Flammable liquids

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases
- Division 4.1: Flammable solids, self-reactive substances and solid desensitized explosives
- Division 4.2: Substances liable to spontaneous combustion
- Division 4.3: Substances which in contact with water emit flammable gases

Class 5: Oxidizing substances and organic peroxides
- Division 5.1: Oxidizing substances
- Division 5.2: Organic peroxides

Class 6: Toxic and infectious substances
- Division 6.1: Toxic substances
- Division 6.2: Infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles, including environmentally hazardous substances

Source: UN Model Regulations 2009, UN Recommendations on the Transport of Dangerous Goods - Model Regulations Sixteenth Revised Edition, Annex: Model Regulations on the Transport of Dangerous Goods, Part 2: Classification, http://www.unece.org/trans/danger/publi/unrec/rev16/16files_e.html

C6. CHAPTER 6

HAZARDOUS WASTE

C6.1. SCOPE

This Chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed, and recycled in an environmentally sound manner.

C6.2. DEFINITIONS

C6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4., "List of Hazardous Waste/Substances/Material." with a U.S. Environmental Protection Agency (USEPA) waste number with the "P" designator, or those hazardous wastes in Table AP1.T4. with Hazard Code "H".

C.6.2.3. Dangerous Wastes. The wastes of the different functions or operations, or their ashes, which composed of dangerous materials characteristics that has no subsequent original or alternative uses like clinical wastes from the medical functions and wastes resulting from manufacturing of pharmaceutical compounds, drugs, organic solubles, inks, paints, or jelly's and creams.

C6.2.4. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into or on any land or water that would allow the waste or constituent to enter the environment. Proper disposal effectively mitigates hazards to human health and the environment.

C6.2.5. DoD Hazardous Waste Generator. The Department of Defense considers a generator to be the installation, or activity on an installation, that produces a hazardous waste.

C6.2.6. Elementary Neutralization. A process of neutralizing a HW, that is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

C6.2.7. Facility (or Waste Management Facility). This refers to any facility (including the soil and its changes) used to store, treat or dispose of hazardous wastes.

C6.2.18. Generator. This refers to any person who produces wastes or is the main reason of its production.

C6.2.8. Hazardous Constituent. A chemical compound listed by name in Table AP1.T4., "List of Hazardous Waste/Substances/Material," or that possesses the characteristics described in section AP1.1.

C6.2.9. Hazardous Waste. A discarded material that may be solid, semi-solid, liquid, or contained gas, and either exhibits a characteristic of a hazardous waste as defined in section AP1.1. or is listed as a hazardous waste in Tables AP1.T1. through AP1.T4. Excluded from this definition are domestic sewage sludge, household wastes, and medical wastes.

C6.2.10. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area (HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

C6.2.11. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending, or other treatment is also hazardous waste fuel.

C6.2.12. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this FGS.

C6.2.13. Hazardous Waste Log. A listing of HW deposited and removed from an HWSA. Information such as the waste type, volume, location, and storage removal dates should be recorded.

C6.2.14. Hazardous Waste Profile Sheet (HWPS). A document that identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

C6.2.15. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. An HWSA may store more than 55 gallons of a HW stream, and more than one quart of an acute HW stream.

C6.2.16. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

C6.2.17. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

C6.2.19. Transporter. This is the person who ships wastes through land, air or sea.

C6.2.20. Transportation. This refers to the process of shipping wastes outside the site whether through land, air or sea.

C6.2.21. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste that would render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

C6.2.22. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The number could be the Unit Identification Code (UIC) or the DoD Activity Address Code (DoDAAC).

C6.2.23. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment. "Used oil," means any oil or other waste petroleum, oil, or lubricant (POL) product that has been refined from crude oil, or is synthetic oil, has been used and as a result of such use, is contaminated by physical or chemical impurities, or is off-specification and cannot be used as intended. Although used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, it is still considered used oil, unless it has been mixed with hazardous waste. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

C6.3. CRITERIA

C6.3.1. DoD Hazardous Waste Generators

C6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using their knowledge of the materials and processes that generated the waste, or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name), and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics should be measurable by standardized, and available testing protocols.

C6.3.1.2. An HWPS will be used to identify each hazardous waste stream. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams or process modifications that change the character of the hazardous waste being handled at the storage area.

C6.3.1.3. Each generator will use a unique identification number for all recordkeeping, reports, and manifests for hazardous waste.

C6.3.1.4. Pre-Transport Requirements

C6.3.1.4.1. Transportation

C6.3.1.4.1.1. When transporting HW via commercial transportation on State of Qatar public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable State of Qatar transportation regulations. Requirements may include placarding, marking, containerization, and labeling. Hazardous waste designated for international transport will be prepared in accordance with applicable international regulations. In the absence of State of Qatar regulations, international standards will be used.

C6.3.1.4.1.2. When transporting HW via military vehicle on State of Qatar public roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, if required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), State of Qatar transportation regulations.

C6.3.1.4.2. Manifesting. All HW leaving the installation will be accompanied by a manifest to ensure a complete audit trail from point of origin to ultimate disposal. The manifest will include the information listed below. State of Qatar forms will be used when applicable; otherwise, DD Form 1348-1A, "Issue Release/Receipt Document," or DD Form 1348-2, "Issue Release/Receipt Document with Address Label," may be used. This manifest should include:

C6.3.1.4.2.1. Generator's name, address, and telephone number;

C6.3.1.4.2.2. Generator's unique identification number;

C6.3.1.4.2.3. Transporter's name, address, and telephone number;

C6.3.1.4.2.4. Destination name, address, and telephone number;

C6.3.1.4.2.5. Description of waste;

C6.3.1.4.2.6. Total quantity of waste;

C6.3.1.4.2.7. Date of shipment; and

C6.3.1.4.2.8. Date of receipt.

C6.3.1.4.3. Generators will maintain an audit trail of HW from the point of generation to disposal. Generators using DRMS disposal services will obtain a signed copy of the manifest from the initial DRMS recipient of the waste, at which time the DRMS will assume responsibility. A generator, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different unique identification number (see definition C6.2.14.) will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer, and disposal of the waste. Activities desiring to dispose of their HW outside the DRMS system will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal.

C6.3.2. Hazardous Waste Accumulation Point (HWAP)

C6.3.2.1. An HWAP is defined in paragraph C6.2.6. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those that are chemically incompatible. Each HWAP will have warning signs (National Fire Protection Association or appropriate international sign) appropriate for the waste being accumulated at that site.

C6.3.2.2. An HWAP will comply with the storage limits in paragraph C6.2.6. When these limits have been reached, the generator will make arrangements within five working days to move the HW to an HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348- 1A) to appropriate authorities responsible for removing the HW (e.g., DRMO). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-Quart) volume accumulation limits, but must be transported off-site to a final destination facility within one year.

C6.3.2.3. All criteria of paragraph C6.3.4., "Use and Management of Containers," apply to HWAPs with the exception of subparagraph C6.3.4.1.5., "Weekly Inspections."

C6.3.2.4. The following provisions of paragraph C6.3.5., "Recordkeeping Requirements," apply to HWAPs: C6.3.5.1. ("Turn-in Documents"), C6.3.5.5. ("Manifests"), and C6. 3.5.6. ("Waste Analysis/Characterization Records").

C6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate HW training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph C6.3.9.

C6.3.3. Hazardous Waste Storage Area (HWSA)

C6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

C6.3.3.2. Design and Operation of HWSAs. HWSAs must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned release of HW or HW constituents to air, soil, groundwater or surface water that could threaten human health or the environment. Hazardous waste should not be stored longer than one year in an HWSA.

C6.3.3.3. Waste Analysis and Verification

C6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served, will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

C6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, an HWPS for each waste stream that is stored at each HWSA.

C6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

C6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided.

C6.3.3.3.3.2. Ensure that no waste is accepted for storage unless an HWPS is provided, or is available and properly referenced.

C6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

C6.3.3.3.4. Analyze waste shipments in accordance with the waste analysis plan to determine whether it matches the waste description on the accompanying manifest and documents; and

C6.3.3.3.4.1. Reject shipments that do not match the accompanying waste descriptions unless the generator provides an accurate description.

C6.3.3.4. Security

C6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the HWSA grounds.

C6.3.3.4.2. Security System Design. An acceptable security system for a HWSA consists of either:

C6.3.3.4.2.1. A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the HWSA; or

C6.3.3.4.2.2. An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff) that completely surrounds the HWSA, combined with a means to control entrance at all times (e.g., an attendant, television monitors, locked gate, or controlled roadway access).

C6.3.3.4.3. Required Signs. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the HWSA, and at other locations, in sufficient numbers to be seen from any approach to the HWSA. The legend must be written in English and in any other language predominant in the area surrounding the installation, and must be legible from a distance of at least 25 feet. Existing signs with a legend other than "Danger Unauthorized Personnel Keep Out," may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the HWSA, and that entry can be dangerous.

C6.3.3.5. Required Aisle Space. Aisle space must allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation during an emergency. Containers must not obstruct an exit.

C6.3.3.6. Access to Communications or Alarm System

C6.3.3.6.1. General. Whenever HW is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

C6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

C6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

C6.3.3.7.1. An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel.

C6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams.

C6.3.3.7.3. Portable fire extinguishers, fire control equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment.

C6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems.

C6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, and eyewash and shower facilities.

C6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA communications alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its proper operation in time of emergency.

C6.3.3.8. General Inspection Requirements

C6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of HW constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

C6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of HW, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

C6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems (e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, or eroding dike).

C6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in subparagraph C6. 3.4.1.5. Minimum frequencies for inspecting tank systems are found in subparagraph C6.3.7.5.2. For equipment not covered by those paragraphs, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

C6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

C6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep the records for at least three years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

C6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate HW training program in accordance with the training requirements in paragraph C6.3.9.

C6.3.3.10. Storage Practices

C6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion, and generation of toxic gases.

C6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat- producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No Smoking" signs, or the appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "No Smoking" legend must be written in English and Arabic. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

C6.3.3.11. Closure and Closure Plans

C6.3.3.11.1. Closure. At closure of an HWSA, HW and HW waste residues must be removed from the containment system, including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of HW and according to the Closure Plan.

C6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA will also develop a Closure Plan. The Closure Plan will be implemented concurrent with the decision to close the HWSA. The Closure Plan will include: estimates of the storage capacity of the HW, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

C6.3.4. Use and Management of Containers

C6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following guidelines will apply when handling and storing HW containers.

C6.3.4.1.1. Containers holding HW will be in good condition, free from severe rusting, bulging, or structural defects.

C6.3.4.1.2. Containers used to store HW, including overpack containers, must be compatible with the materials stored.

C6.3.4.1.3. Management of Containers

C6.3.4.1.3.1. A container holding HW must always be closed during storage, except when it is necessary to add or remove waste.

C6.3.4.1.3.2. A container holding HW must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

C6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

C6.3.4.1.4. Containers holding HW will be marked with a HW marking, and a label indicating the hazard class of the waste contained (flammable, corrosive, etc.).

C6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking and deteriorating containers as well as deterioration of the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

C6.3.4.2. Containment. Container storage areas must have a secondary containment system meeting the following:

C6.3.4.2.1. Must be sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

C6.3.4.2.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

C6.3.4.2.3. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in subparagraph C6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

C6.3.4.2.4. Rainwater captured in secondary containment areas should be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the HW in the containers. Contaminated water shall be treated as HW until determined otherwise.

C6.3.4.3. Special Requirements for Ignitable or Reactive Waste. Areas that store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

C6.3.4.4. Special Requirements for Incompatible Wastes

C6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

C6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

C6.3.4.4.3. A storage container holding HW that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments, must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

C6.3.4.4.4. A transporter shall not mix wastes of different shipment characteristics by putting them in a single container.

C6.3.5. Recordkeeping Requirements

C6.3.5.1. Turn-in Documents. Turn-in documents, e.g., DD 1348-1A or manifests, must be maintained for 3 years.

C6.3.5.2. Hazardous Waste Log. A written HW log will be maintained at the HWSA to record all HW handled and should consist of the following:

C6.3.5.2.1. Name/address of generator;

C6.3.5.2.2. Description and hazard class of the hazardous waste;

C6.3.5.2.3. Number and types of containers;

C6.3.5.2.4. Quantity of hazardous waste;

C6.3.5.2.5. Date stored;

C6.3.5.2.6. Storage location; and

C6.3.5.2.7. Disposition data, to include: dates received, sealed, and transported, and transporter used.

C6.3.5.3. The HW log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

C6.3.5.4. Inspection Logs. Records of inspections should be maintained for a period of 3 years.

C6.3.5.5. Manifests. Manifests of incoming and outgoing hazardous wastes will be retained for a period of 3 years.

C6.3.5.5.1. The generator (base) shall keep a copy of every transportation document until a signed copy of the facility specified in the document, to which wastes are shipped, is received. Also, the signed copy shall be kept for at least five years starting from the date wastes are received by the transporter.

C6.3.5.5.2. Hazardous waste transporter shall keep a copy of the transportation document signed, by the generator (base) of wastes, and by the recipient of wastes for five years upon reception of wastes.

C6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until 5 years after closure of the HWSA. The generator (base) shall keep copies of all letters, reports, any results of waste test or analysis, or any other results for at least five years after the last date of waste treatment in the site.

C6.3.5.6.1. Those who generates, manages, or transports dangerous, gas, liquid, or solid materials, shall take all precautions to prevent any damages to the environment.

C6.3.5.7. The installation will maintain records, identified in subparagraphs C6.3.5.1., C6.3.5.5., and C6.3.5.6. for all HWAPs on the installation.

C6.3.6. Contingency Plan

C6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of HW in accordance with the provisions of Chapter 18, "Spill Prevention and Response Planning."

C6.3.6.2. A current copy of the installation contingency plan must be:

C6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan that are pertinent to their facilities and operation); and

C6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and upon which the plan relies to provide emergency services. Contingency Plans should be available in both English and Arabic.

C6.3.7. Tank Systems. The following criteria apply to all storage tanks containing HW. See Chapter 19, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POLs and hazardous substances.

C6.3.7.1. Application. The requirements of this subparagraph apply to HWSAs that use tank systems for storing or treating HW. Tank systems that are used to store or treat HW that contain no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in subparagraph C6.3.7.4., Containment and Detection of Releases. Tank systems, including sumps that serve as part of a secondary containment system to collect or contain releases of HW, are exempted from the requirements in subparagraph C6.3.7.4.

C6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of subparagraph C6.3.7.4., installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

C6.3.7.3. Design and Installation of New Tank Systems or System Components. Managers of HWSAs installing new tank systems or system components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating HW. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

C6.3.7.4. Containment and Detection of Releases. To prevent the release of HW or hazardous constituents to the environment, secondary containment that meets the requirements of this subparagraph must be:

C6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

C6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

C6.3.7.4.3. Provided for tank systems that store or treat HW by 1 January 1999;

C6.3.7.4.4. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

C6.3.7.4.5. Constructed to include one or more of the following: a liner external to the tank, a vault, or double-walled tank.

C6. 3.7.5. General Operating Requirements

C6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

C6.3.7.5.2. The installation must inspect and log at least once each operating day:

C6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

C6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

C6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of HW (e.g., wet spots, dead vegetation).

C6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA.

C6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or that is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

C6.3.7.6.1. Cessation of use; prevention of flow or addition of wastes. The installation must immediately stop the flow of HW into the tank system or secondary containment system and inspect the system to determine the cause of the release.

C6.3.7.6.2. Containment of visible releases to the environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

C6.3.7.6.2.1. Prevent further migration of the leak or spill to soil or surface water;

C6.3.7.6.2.2. Remove and properly dispose of any contaminated soil or surface water;

C6.3.7.6.2.3. Remove free product to the maximum extent possible; and

C6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

C6.3.7.6.3. Make required notifications and reports.

C6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable, and structures and equipment.

C6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

C6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

C6.3.8.1.1. Industrial furnaces.

C6.3.8.1.2. Boilers that are identified as follows:

C6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

C6.3.8.1.2.2. Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids;

C6.3.8.1.2.3. Used oil-fired space heaters provided that:

C6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

C6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.5 million BTU per hour; and

C6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

C6.3.8.2. Prohibitions on Dust Suppression or Road Treatment. Used oil, HW, or used oil contaminated with any HW will not be used for dust suppression or road treatment.

C6.3.8.3. Lead-acid batteries that are to be recycled will be managed as hazardous material. Lead-acid batteries that are not recycled will be managed as HW.

C6.3.9. Hazardous Waste Training

C6.3.9.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty after the effective date of this FGS must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05 (Reference (g)).

C6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

C6.3.9.3. Training Contents and Requirements. The training program must:

C6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

C6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience.

C6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

C6.3.9.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

C6.3.9.3.4.1. Emergency procedures (response to fire/explosion/spills; use of communications/alarm systems; body and equipment clean up);

C6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures;

C6.3.9.3.4.3. Employee Protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

C6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

C6.3.9.4. Documentation of Training. Installations must document all HW training for each individual assigned duties involving actual or potential exposure to HW. Updated training records on personnel assigned duties involving actual or potential exposure to HW must be kept by the HWSA manager or the responsible installation office and retained for at least three years after termination of duty of these personnel.

C6.3.10. Hazardous Waste Disposal

C6.3.10.1. All DoD HW should normally be disposed of through the DRMS. A decision not to use the DRMS for HW disposal may be made in accordance with DoDD 4001.1 (Reference (k)) to best accomplish the installation mission, but should be concurred with by the component chain of command to ensure that installation contracts and disposal criteria are at least as protective as criteria used by the DRMS.

C6.3.10.2. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or State of Qatar law are not disposed of in the State of Qatar unless the disposal is conducted in accordance with FGS and the following:

C6.3.10.2.1. When HW cannot be disposed of in accordance with FGS within the State of Qatar, it will either be retrograded to the United States or, if permissible under international agreements, transferred to another country outside the United States where it can be disposed of in an environmentally sound manner and in compliance with FGS applicable to the country of disposal, if any exist. Transshipment of HW to a country other than the United States for disposal must be approved by, at a minimum, the DUSD (I&E).

C6.3.10.2.2. The determination of whether particular DoD-generated HW may be disposed of in a State of Qatar will be made by the EEA, in coordination with the unified combatant commander, the Director of Defense Logistics Agency, other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

C6.3.10.3. Disposal Procedures

C6.3.10.3.1. The determination of whether HW may be disposed of in the State of Qatar must include consideration of whether the means of treatment and/or containment technologies employed in the State of Qatar program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the State of Qatar program includes:

C6.3.10.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

C6.3.10.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

C6.3.10.3.1.3. Appropriate standards and limitations on the methods that may be used to treat and dispose of HW.

C6.3.10.3.1.4. Standards designed to minimize the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface, or groundwater.

C6.3.10.3.2. The EEA must also be satisfied, either through reliance on the State of Qatar regulatory system and/or provisions in the disposal contracts, that:

C6.3.10.3.2.1. Persons and facilities in the waste management process have demonstrated the appropriate level of training and reliability; and

C6.3.10.3.2.2. Effective inspections, monitoring, and recordkeeping will take place.

C6.3.10.4. State of Qatar facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the State of Qatar as being in compliance with their regulatory requirements. This evaluation and approval may consist of having a valid permit or State of Qatar equivalent for the HW that will be handled.

C6.3.10.5. Hazardous waste will be recycled or reused to the maximum extent practical. Safe and environmentally acceptable methods will be used to identify, store, prevent leakage, and dispose of HW, to minimize risks to health and the environment.

C6.3.10.6. Land Disposal Requirements. Hazardous wastes will only be land-disposed when there is a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal site for as long as the wastes remain hazardous. Hazardous waste may be land-disposed only in facilities meeting the following criteria:

C6.3.10.6.1. The land disposal facility has a liner and a leachate collection system. The liner will be of natural or man-made materials and restrict the downward or lateral escape of HW, hazardous constituents, or leachate. The permeability of such liners will be no greater than 10^{-7} cm/sec;

C6.3.10.6.2. The land disposal facility has a groundwater monitoring program capable of determining the facility's impact on the quality of water in the aquifers underlying the facility; and

C6.3.10.6.3. The requirements of subparagraphs C6.3.10.6.1. or C6.3.10.6.2., above, may be waived for a particular land disposal facility by the EEA if a written determination is made by a qualified geologist or geotechnical engineer that there is a low potential for migration of HW, hazardous constituents, or leachate from the facility to water supply wells, irrigation wells, or surface water. This determination will be based on an analysis of local precipitation, geologic conditions, physical properties, depth to groundwater, and proximity of water supply wells or surface water, as well as use of alternative design and operating practices. Methods for preventing migration will be at least as effective as liners and leachate collection systems required in subparagraph C6. 3.10.6.1.

C6.3.10.6.4. Landfills have to be designed, established, operated and kept in a way that ensures that no leakage of wastes to soil layers, ground water, or surface water, and that no dispersal due to winds would take place. Landfills must be approved by CENTCOM/CCJ4E.

C6.3.10.7. Incinerator Standards. This subparagraph applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

C6.3.10.7.1. Incinerators used to dispose of HW must be licensed or permitted by a component State of Qatar authority or approved by the EEA. This license, permit, or approval must comply with the criteria listed in subparagraph C6.3.10.7.2.

C6.3.10.7.2. A license, permit, or EEA approval for incineration of HW must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme that would require an incinerator to achieve the standards set forth in either subparagraphs C6. 3.10.7.2.1. or C6.3.10.7.2.2. is acceptable.

C6.3.10.7.2.1. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission of particulate matter, and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

C6.3.10.7.2.2. The incinerator has demonstrated, as a condition for obtaining a license, permit, or EEA approval, the ability to effectively destroy the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the competent HN authority or the EEA to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

C6.3.10.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes categorized as hazardous on the basis of section AP1.1. and which, after treatment as described herein, no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix 1 will continue to be managed as HW under the criteria of this FGS, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of HN disposal alternatives. These technologies should not be implemented without consultation with the EEA, or the Combatant Commander, if there is no EEA.

C6.3.10.8.1. Organics

C6.3.10.8.1.1. Incineration in accordance with the requirements of subparagraph C6.3.10.7.1.

C6.3.10.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

C6.3.10.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentrations of a representative compound or indicator parameter (e.g., total organic carbon) has been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the HW being biodegraded.

C6.3.10.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction; liquid extraction; precipitation/crystallization, or phase separation techniques, such as decantation, filtration, and centrifugation when used in conjunction with one of the above techniques.

C6.3.10.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions.

C6.3.10.8.2. Heavy Metals

C6.3.10.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

C6.3.10.8.2.2. Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals.

C6.3.10.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits the characteristic for reactivity defined in Appendix 1.

C6.3.10.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3., will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

C6.3.10.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with subparagraphs C6.3.10.8.2.1. or C6.3.10.8.2.2. to stabilize, fix or recover heavy metals, as appropriate, and in accordance with subparagraph C6.3.10.8.4. to neutralize any corrosives before disposal.

C6.3.10.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accord with subparagraphs C6.3.10.7. and C6.3.10.8.

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C7. CHAPTER 7

SOLID WASTE

C7.1. SCOPE

This Chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated, and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4 (Reference (e)) and service solid waste management manuals. The criteria in this Chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are located in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste Management," Chapter 11, "Pesticides," and Chapter 14, "Polychlorinated Biphenyls."

C7.2. DEFINITIONS

C7.2.1. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

C7.2.2. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

C7.2.3. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

C7.2.4. Collection Frequency. The number of times collection is provided in a given period of time.

C7.2.5. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

C7.2.6. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

C7.2.7. Construction and Demolition Waste. The waste building materials, packaging, and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures.

C7.2.8. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

C7.2.9. Curb Collection. Collection of solid waste placed adjacent to a street.

C7.2.10. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

C7.2.11. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

C7.2.12. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

C7.2.13. Generation. The act or process of producing solid waste.

C7.2.14. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

C7.2.15. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

C7.2.16. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities.

C7.2.17. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

C7.2.18. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

C7.2.19. Municipal Solid Waste (MSW). Normally, residential and commercial solid waste generated within a community, not including yard waste. (See also definition in Chapter 2, "Air Emissions.")

C7.2.20. Municipal Solid Waste Landfill (MSWLF) Unit. A discrete area of land or an excavation, on or off an installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. An MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

C7.2.21. Open Burning. Burning of solid wastes in the open, such as in an open dump.

C7.2.22. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

C7.2.23. Residential Solid Waste. The wastes generated by normal household activities, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

C7.2.24. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

C7.2.25. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

C7.2.26. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

C7.2.27. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

C7.2.28. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 9 1-8, Army TM 5-634 (Reference (l)), or their successor documents.

C7.2.29. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.30. Solid Wastes. Garbage, refuse, sludge, and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.31. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

C7.2.32. Stationary Compactor. A powered machine that is designed to compact solid waste or recyclable materials and that remains stationary when in operation.

C7.2.33. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

C7.2.34. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

C7.2.35. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

C7.2.36. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

C7.2.37. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

C7.3. CRITERIA

C7.3.1. DoD solid wastes will be treated, stored, and disposed of in facilities that have been evaluated against paragraphs C7.3.12., C7.3.14., and C7.3.15. These evaluated facilities will be used to the maximum extent practical.

C7.3.2. Installations will cooperate with State of Qatar officials, to the extent possible, in the solid waste management planning process.

C7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting, and waste minimization efforts.

C7.3.4. All solid wastes or materials that have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled to avoid spillage.

C7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2, "Air Emissions," or hazardous constituents as defined in Chapter 6, "Hazardous Waste." Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 14, and 15 of this FGS.

C7.3.6. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of this FGS, there will be provisions for storage in accordance with these guidelines that will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

C7.3.7. Storage containers should be leakproof, waterproof, and vermin-proof, including sides, seams and bottoms, and be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking, or deforming in a manner that would impair serviceability. Storage containers should have functional lids.

C7.3.8. Containers should be stored on a firm, level, well-drained surface that is large enough to accommodate all of the containers and that is maintained in a clean, spillage-free condition.

C7.3.9. Recycling programs will be instituted on DoD installations in accordance with the policies in Reference (e).

C7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located, and only after justification that unique circumstances mandate a new unit.

C7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

C7.3.11.1. Location restrictions with regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, and unstable areas;

C7.3.11.2. Procedures for excluding hazardous waste;

C7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions, and record keeping requirements; and

C7.3.11.4. Inspection program.

C7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

C7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with the EEA, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

C7.3.12. Installations operating MSWLF units will:

C7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day.

C7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

C7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, PCBs, and wastes determined unsuitable for the specific MSWLF unit.

C7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling.

C7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

C7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

C7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation.

C7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

C7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

C7.3.12.10. Operate in an aesthetically acceptable manner.

C7.3.12.11. Operate in a manner to protect aquifers.

C7.3.12.12. Control public access to landfill facilities.

C7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

C7.3.12.14. Maintain records on the preceding criteria.

C7.3.12.15. During closure and post-closure operations, installations will:

C7.3.12.15.1. Install a final cover system that is designed to minimize infiltration and erosion.

C7.3.12.15.2. Ensure that the infiltration layer is composed of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or a combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present, or a permeability no greater than 0.00005 cm/sec, whichever is less.

C7.3.12.15.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earthen material that is capable of sustaining native plant growth.

C7.3.12.15.4. If possible, revegetate the final cap with native plants that are compatible with the landfill design, including the liner.

C7.3.12.15.5. Prepare a written Closure Plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, groundwater monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. The post-closure period will be a minimum of 5 years.

C7.3.13. Open burning will not be the regular method of solid waste disposal. Where burning is the method, incinerators meeting air quality requirements of Chapter 2, "Air Emissions," will be used.

C7.3.14. It is prohibited to dump, place, abandon, pour, or discharge onto fields, roads, streets, passageways, alleys, sidewalks, sea shores, open land areas, building surfaces, walls, balconies, perimeter walls of houses, and any other such places, regardless of whether public or private, any of the following items:

C7.3.14.1. Garbage and waste of all kinds, such as fecal matter, dung, waste, peelings, sweepings, rubbish, discarded papers, household wastewater, bath water, laundry water, sewage water, water from sump pits, drainage water, and any other such substances.

C7.3.14.2. Anything that obstructs use of roads, denigrates the land, or impacts public health.

C7.3.15. It is prohibited to drain or dispose any materials, or wastes, or untreated liquids that cause pollution in the coasts or the neighboring waters, either caused intentionally or unintentionally, directly, or indirectly.

C7.3.16. During transport, all collected garbage, waste, and materials, must be covered or controlled so that none of the contents leaves the transport vehicle.

C7.3.17. A composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") will comply with the following criteria:

C7.3.17.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge, and other materials, such as nutrient or bulking agents being composted, including the source and volume or weight of the material.

C7.3.17.1.1. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

C7.3.17.1.2. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically.

C7.3.17.1.3. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system.

C7.3.17.1.4. The temperature and retention time for the material being composted must be monitored and recorded.

C7.3.17.1.5. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate, nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCBs.

C7.3.17.1.6. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

C7.3.17.1.6.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing to maintain aerobic conditions during the composting process; and

C7.3.17.1.6.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55°C. A stabilization period of at least 7 days must follow the decomposition period.

C7.3.18. Classification and Use of Compost from DoD Composting Facilities. Compost produced at a composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

C7.3.18.1. Class A compost must be stored until the compost is matured, i.e., 60 percent decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated below. The compost must be stabilized and contain no greater amounts of inert material than indicated. Allowable average contaminant concentrations in milligrams per kilogram on a dry weight basis are:

PCB	1
Cadmium	10
Chromium	1,000
Copper	500
Lead	500
Mercury	5
Nickel	100
Zinc	1,000

C7.3.18.2. Class B compost consists of any compost generated that fails to meet Class A standards.

C7.3.18.3. Compost distribution and end use:

C7.3.18.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

C7.3.18.3.2. Class B compost may not be distributed for agricultural applications.

C7.4 ADDITIONAL REQUIREMENTS

C7.4.1. Solid Waste

C7.4.1.1. Any wastes transported off installation must be taken to a waste management facility authorized to operate by the local or national authority.

C7.4.1.2. Waste transporter shall be responsible for identification of types of wastes transported except when moving wastes within site by waste producers or owners of operators of the facility.

C7.4.2. Wastewater sludge.

C7.4.2.1. The use of sludge for agricultural purposes in exposed rock layer areas that are part of the water table is prohibited, as is disposal of the sludge in the ocean or surface water bodies.

C7.4.2.2. Use of sludge in agricultural lands. Liquid, wet, dry or composted sludge can be used in different fields, provided that the concentration of pollutants in the sludge shall not be used in reclamation of non-agricultural lands, such as parks, green playgrounds, graveyards, highways and airport aprons, provided that the concentration of pollutants in the sludge shall not exceed the limits shown in table C7.T5.

C7.4.2.3. Use of non-dry sludge in Forestry. Non-dry sludge must be placed in a minimum 50cm trench. The trench must be covered with a minimum of 30 cm of soil. Mixing of the sludge cannot occur until 3 months after initial disposal.

C7.4.2.4. Use of dry sludge in forestry, horticulture and productive cultivation, except cultivation of vegetables that have fruits in the soil and that are eaten fresh, such as carrots, radish, and green onion. Must have a minimum soil or combination of soil/gravel cover of 20 cm over the dry sludge.

C7.4.2.5. Provisions for collecting and drying of sludge produced from a DWTS. The following requirements apply to collection and drying of sludge produced from a DWTS:

C7.4.2.5.1. Collecting the sludge in a proper site with the following:

C7.4.2.5.1.1. Specify a site away fro residential areas, with a proper protection wall.

C7.4.2.5.1.2. Provide the site with required health utilities and facilities.

C7.4.2.5.1.3. Provide the site with required services (electricity, water, roads)

C7.4.2.5.1.4. Provide the site with required spreading and mixing machines.

C7.4.2.5.1.5. Provide technical staff, as well as integrated supervision staff for receiving and distribution.

C7.4.2.5.2. Cover the sludge with a 50 cm layer as a maximum.

C7.4.2.5.3. Provide automatic mixing of the sludge periodically for a minimum of 6 months, in order to ensure drying is complete and bacteria are eliminated.

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C8. CHAPTER 8

MEDICAL WASTE MANAGEMENT

C8.1. SCOPE

This Chapter contains criteria for the management of medical waste at medical, dental, research and development, and veterinary facilities generated in the diagnosis, treatment, or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This waste also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

C8.2. DEFINITIONS

C8.2.1. Chemical Waste. Chemical waste is considered hazardous if it has any of the following properties:

C8.2.1.1. Toxic, Flammable, Corrosive, Reactive or explosive.

C8.2.1.2. It can cause physical defects in fetuses (teratogenic) or causing genetic mutations (mutagenic), or cause cancer (carcinogenic), or stop the growth of cells (cytostatic).

C8.2.2. Consignment Note. It is the form that contains all the completed information and signed by the generator, the transporter, the disposal facility, which normally consists of several copies that accompany the healthcare waste load being transported from the waste generating facility to the treatment unit.

C8.2.3. Facility. Any hospital, clinic, medical or veterinary center, pharmaceutical company, medical or pharmaceutical research institution, laboratory, public or private wellness centers.

C8.2.4. Generator. Any person, natural or legal, whose activities generate healthcare wastes such as healthcare facilities.

C8.2.5. Genotoxic and Cytotoxic waste: It consists of waste that can affect genes and cells, causing health problems such as physical defects in fetuses or that can cause cancer or prevent cellular growth. These substances are used in nuclear medicine and in tumor treatment units, and for diagnostic purposes using radioactive substances. This includes tap water and wastewater from bathrooms used by patients treated with these substances.

C8.2.6. Healthcare Waste. It is the waste generated by facilities offering various types of healthcare, laboratories, facilities for the manufacture of drugs, pharmaceuticals and vaccines, veterinary institutions, research institutions, and from home treatment and patient care. It consists of two types:

C8.2.6.1. Hazardous Healthcare Waste. It consists of wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C8.2.6.2. Non-hazardous Healthcare Waste. It consists of all the wastes that are found in municipal wastes, and it is generated by administrative institutions and by the general cleaning activities in healthcare institutions. This constitutes the major part of healthcare wastes, and it is treated in the same way as municipal waste.

C8.2.7. Infectious Agent. Any organism (such as a virus or bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

C8.2.8. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitology laboratory.

C8.2.9. Infectious Medical Waste. Solid waste produced by medical and dental treatment facilities that is specially managed because it has the potential for causing disease in humans and may pose a risk to both individuals or community health if not managed properly, and that includes the following classes:

C8.2.9.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration, are known to cause disease in humans.

C8.2.9.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Animal carcasses, body parts, blood, and bedding from contaminated animals are also included.

C8.2.9.3. Human blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products, that are capable of releasing these materials during handling.

C8.2.9.4. Potentially infectious materials, including human body fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

C8.2.9.5. Sharps, including hypodermic needles, syringes, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste.

C8.2.9.6. Infectious waste from isolation rooms, but only including those items that were contaminated or likely to have been contaminated with infectious agents or pathogens, including excretion exudates and discarded materials contaminated with blood.

C8.2.10. Infectious Waste. Consists of waste that contains disease-causing agents (bacteria, viruses, parasites, fungi) in quantities or concentrations sufficient for posing a health risk to individuals exposed to contamination. It includes: leftovers from microbial cultures, isolation and surgery wastes, wastes resulting from infected patients undergoing hemodialysis.

C8.2.11. Noninfectious Medical Waste. Solid waste created that does not require special management because it has been determined to be incapable of causing disease in humans or which has been treated to render it noninfectious.

C8.2.12. Pathological Waste. It consists of tissues, organs, body parts, fetal and placental tissues, blood and blood components, other body fluids and animal carcasses.

C8.2.13. Pharmaceutical Waste (drugs). It consists of wastes resulting from the manufacture and preparation of drugs and pharmaceutical substances, damaged, expired or contaminated pharmaceutical products, serums, vaccines, including the containers and equipment used in their manufacture, packaging and distribution.

C8.2.14. Pressurized Gas Containers. They include empty or damaged pressurized containers used for packaging inert or potentially harmful gases. These containers may explode if punctured or exposed to high temperatures.

C8.2.15. Radioactive Waste. It includes all solid and liquid substances that has radioactivity, and which are used in medical examination, diagnosis and treatment, and all materials that have been contaminated by them (whether these materials are solid or liquid).

C8.2.16. Sharps Waste. It consists of objects that can cause cut or puncture wounds, or that can penetrate the skin such as injection needles, scalpels, blades, broken glass and other sharp objects.

C8.2.17. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

C8.2.18. Storage. It is the temporary storage of hazardous healthcare waste in a specific collection area.

C8.2.19. Transporter. It is the natural or legal person (a company, a public or private institution) who works in the field of transporting hazardous healthcare wastes to the treatment and disposal unit.

C8.2.20. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed.

C8.2.21. Waste Incineration. It is the process by which combustible solid, liquid and gaseous wastes are disposed of in high temperatures, such that the gases, substances or compounds that are produced as a result do not affect the environment, and the burnt materials do not contain hazardous substances.

C8.2.22. Waste Segregation. It is the segregation of the hazardous healthcare waste (by the generator) starting from the point of generation and through the stages of collection, packaging, storage, and transport within the facility.

C8.3. CRITERIA

C8.3.1. Generators of hazardous healthcare waste will continually look at their processes for opportunities to minimize the rate of generation of these wastes both in terms of size and type of wastes generated. Infectious medical waste will be separated, if practical, from other solid waste at the point of origin.

C8.3.1.1. Hazardous healthcare wastes shall be segregated as follows.

C8.3.1.1.1. Infectious waste:

C8.3.1.1.2. Pathological waste:

C8.3.1.1.3. Sharps waste.

C8.3.1.1.4. Pharmaceutical waste (drugs).

C8.3.1.1.5. Genotoxic and Cytotoxic waste:

C8.3.1.1.6. Chemical waste:

C8.3.1.1.7. Radioactive waste.

C8.3.1.1.8. Pressurized gas containers.

C8.3.2. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M (Reference (j)) and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. Defense Reutilization and Marketing Offices (DRMOs) have no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

C8.3.3. Solid waste that is classified as a hazardous waste in accordance with Appendix 1 will be managed in accordance with the criteria in Chapter 6, "Hazardous Waste."

C8.3.4. Mixtures of other solid waste and infectious medical waste will be handled as infectious medical waste.

C8.3.5. Radioactive medical waste will be managed in accordance with Service Directives.

C8.3.6. Infectious medical waste will be segregated, transported, and stored in bags or receptacles a minimum of 3 mils thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use.

C8.3.7. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and the State of Qatar language, and will include markings that identifies the generator, date of generation, and the contents, department or wing, weight and amount of waste stored inside the container or bag, the time and date of collection, and time and date of transport.

C8.3.8. Sharps will only be discarded into rigid receptacles. Needles will not be clipped, cut, bent, or recapped before disposal.

C8.3.9. Infectious medical waste will be transported and stored to minimize human exposure, and will not be placed in chutes or dumbwaiters. Highly infectious and hazardous wastes - resulting from microbial cultures – shall be collected in plastic bags suitable for preliminary treatment using autoclaves generating these wastes. After preliminary treatment, these plastic bags shall be put in a second plastic bag with the words "Hazardous Medical Waste" printed on them, as well as the Infectious Substances Symbol.

C8.3.10. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph C8.3.17. Containers holding sharps will not be compacted.

C8.3.11. Genotoxic and Cytotoxic waste: Genotoxic and cytotoxic wastes will be collected in leak-proof medical containers with the words "Cytotoxic Residues" printed on them. They should be returned to where they originally came from, or incinerated at very high temperatures (1200° Celsius or above). They should not be buried or discharged into the domestic (municipal or city) sewage system, and they shall not be mixed with other pharmaceutical substances.

C8.3.12. Chemical waste: Liquid chemical wastes should be collected in containers that are tamper-proof (difficult to break or open) and leak-proof, and clearly labeled with the words "Chemical Waste". Solid chemical waste should be collected in plastic bags with the words "Chemical Waste - Drugs" and the Infectious Substances Symbol.

C8.3.13. Pathological waste: Pharmaceutical waste (drugs): Drug residues or potentially contaminated pharmaceutical substances will be disposed of by placing them in impermeable containers, and then placed in plastic bags labeled "Drugs – Pharmaceuticals" and the Infectious Substances Symbol.

C8.3.14. All anatomical pathology waste (i.e., large body parts) must be placed in containers lined with plastic bags that comply with paragraph C8.3.6., and may only be disposed of in a landfill or by burial in a designated area after being treated for disposal by incineration or cremation.

C8.3.15. Blood, blood products, and other liquid infectious wastes will be handled as follows:

C8.3.15.1. Bulk blood and blood products may be decanted into a sewer system connection (sinks, drains, etc.), unless pre-treatment is required. If pre-treatment is required, the methods contained in Table C8.T1., "Treatment and Disposal Methods for Infectious Medical Waste," will be employed prior to discharge to the sewer system. The emptied containers will continue to be managed as infectious medical waste.

C8.3.15.2. Suction canister waste from operating rooms will either be decanted into a clinical sink or will be sealed into leak-proof containers and incinerated.

C8.3.16. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

C8.3.16.1. Requirements for collection and transportation inside the healthcare facility. The collection and transportation of hazardous healthcare waste containers and bags require the use of carts or trolleys dedicated solely for that purpose, and handled by trained personnel in order to guarantee the highest levels of safety during the collection and transportation process inside the healthcare facilities, so that the contents of the containers or bags do not spill or leak.

C8.3.16.1.1 . Before the collecting and transporting hazardous healthcare waste containers and bags, the containers or bags will be tightly closed, have the Infectious Substances Symbol printed on the bag or container, and have the consignment note describing the type of waste they contain attached to the container or bag.

C8.3.16.1.2. The bags will not be more than three-quarters full. They should not be pressed, squeezed, held close to the body, or held by the bottom during transportation. Instead, they will be held from the top during transportation.

C8.3.16.1.3. Hazardous healthcare waste will be transported by means of lidded carts or trolleys inside the healthcare facility and dedicated solely for that purpose. The design will ensure functionality during loading and unloading, they will be rigid and impermeable, in addition to being easily cleaned and disinfected.

C8.3.16.1.4. Hazardous healthcare waste from departments and rooms of infectious diseases and isolation departments will be collected under direct supervision of the person in charge of the waste management department at the facility.

C8.3.16.1.5. Human body parts, tissues, fetal and placental tissues shall be collected separately and stored in the refrigerated mortuary, or in a special refrigerator until they are disposed of according to established DoD procedures.

C8.3.16.1.6. Animal carcasses and tissues shall be collected and stored separately in a refrigerator until they are treated and disposed.

C8.3.16.1.7. The dedicated carts or trolleys shall be cleaned and washed for the collection and transportation of hazardous healthcare wastes, and shall be disinfected daily by trained personnel and under the supervision of the person in charge of healthcare waste in the healthcare facility. This shall be carried out in a dedicated area, and the wastes from the cleaning process are treated before discharge or disposal.

C8.3.16.1.8. Non-hazardous healthcare waste will be collected in black plastic bags, and they are treated as municipal solid waste.

C8.3.17. If infectious medical waste cannot be treated on-site, it will be managed during storage as follows:

C8.3.17.1. Infectious medical waste will be maintained in a nonputrescent state, using refrigeration as necessary.

C8.3.17.2. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

C8.3.18. Storage sites must be:

C8.3.18.1. Specifically designated;

C8.3.18.2. Constructed to prevent entry of insects, rodents, and other pests and:

C8.3.18.2.1. The storage area will be suitable such that it does not cause pollution, or pose a health risk or a risk to the environment.

C8.3.18.2.2. The storage area will have a solid resistant floor that can be washed and disinfected, and equipped with a working drainage system.

C8.3.18.2.3. The storage area will be fitted with safety equipment and fire protection systems.

C8.3.18.2.4. The storage area will be equipped with appropriate air conditioning to keep the room between 15 and 18 degrees Celsius. It will be well-lit and well-ventilated.

C8.3.18.2.5. The area will be equipped with appropriate cleaning equipment, disinfectants and sterilization materials for use in the routine cleaning of the location, in emergencies and waste spills.

C8.3.18.3. Prevent access by unauthorized personnel; and

C8.3.18.4. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and Arabic.

C8.3.18.5. The storage area will be located the farthest distance possible from food storage areas and kitchens and places where food is prepared. It shall be as far as possible from patient care areas.

C8.3.19. There shall be easy access to the storage area for storage, transportation and cleaning purposes

C8.3.20. The period of storage for hazardous healthcare waste will not exceed 24 hrs.

C8.3.21. Bags and receptacles containing infectious medical waste must be placed into rigid or semi-rigid, leak-proof containers before being transported off-site.

C8.3.22. Infectious medical waste must be treated in accordance with Table C8.T1., "Treatment and Disposal Methods for Infectious Medical Waste," and the following before disposal:

C8.3.22.1. Sterilizers must maintain the temperature at 121°C (250°F) for at least 30 minutes at 15 psi.

C8.3.22.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips or an equivalent biological performance test.

C8.3.22.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens, and must meet applicable criteria in Chapter 2, "Air Emissions.".

C8.3.22.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6, "Hazardous Waste." Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

C8.3.22.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

C8.3.23. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

C8.3.24. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

C8.3.24.1. Response personnel must comply with paragraph C8.3.13.

C8.3.24.2. Blood, body fluid, and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste.

C8.3.24.3. Surfaces contacted by infectious medical waste must be washed with soap and water and chemically decontaminated in accordance with subparagraph C 8.3.17.5.

C8.3.25. Installations will keep records of the following information concerning infectious medical waste for at least three years after the date of disposal:

C8.3.25.1. Type of waste;

C8.3.25.2. Amount of waste (volume or weight);

C8.3.25.3. Treatment, if any, including date of treatment; and

C8.3.25.4. Disposition, including date of disposition, and if the waste was transferred to State of Qatar facilities, and receipts acknowledging subparagraphs C8.3.20.1. - C8.3.20.3. for each transfer.

C8.3.26. The following procedures shall be followed by the hazardous healthcare waste generator before transporting the waste outside the facility:

C8.3.26.1. Packaging the hazardous healthcare waste and putting adhesives on it appropriately as per paragraphs C8.3.7 above.

C8.3.26.2. Hazardous healthcare waste loads will only be delivered to a person or institution licensed by the relevant authorities for the transportation of hazardous healthcare wastes.

C8.3.26.3. Hazardous healthcare waste loads will not be delivered for transport to an off-site location without a consignment note accompanying the load.

C8.3.26.4. Hazardous healthcare waste loads will not be delivered to a treatment unit that does not have a permit from the relevant authorities.

C8.3.27. Transportation to an off-site location. Hazardous healthcare waste transporters will observe the following rules:

C8.3.27.1. Never transport any chemical waste that is not accompanied by a Material Safety Data Sheet.

C8.3.27.2. Never transport any waste that is not accompanied by the consignment note with all the information completed by the generator.

C8.3.27.3. Never mix wastes that have different packaging specifications by putting them in a single container.

C8.3.27.5. Never accept any container or bag that does not have an adhesive indicating the information in paragraph C8.3.7.

C8.3.27.6. Provide maintenance of the transportation vehicles and equipment in order to reduce the impact on human health and the environment.

C8.3.27.7. Never drive through residential areas or commercial roads while transporting hazardous healthcare wastes during peak hours.

C8.3.27.8. Put signs on the vehicle indicating the type of substances being transported. The transporter shall be completely aware of the level of its hazardousness, and the necessary steps that should be taken in the event of an emergency during the transportation process.

C8.3.27.9. To keep all the records and documents relating to the transportation of the waste.

C8.3.28. Any person or facility that wishes to build and operate a unit for the treatment of hazardous healthcare wastes should observe the following procedures:

C8.3.28.1. Implement the standards for environment preservation, air, water and wastes, using Table C8.T2. as a guideline.

C8.3.6.2. Treatment of any fluid that may result from the waste treatment process.

C8.3.28.3. The performance of the technology and the destruction rate should not be less than 99.99%.

C8.3.28.4. Prepare and implement a training program for the personnel working at the facility in the field of hazardous healthcare waste management.

C8.3.28.5. Never accept any hazardous healthcare waste that is not accompanied by a properly completed consignment note from the generator and the transporter.

C8.3.28.6. Never accept any hazardous healthcare waste from a transporter that does not have a permit from the relevant State of Qatar authorities.

C8.3.29. Never accept any waste that is not accompanied by the information mentioned in the requirements for labeling per paragraph C8.3.7.1.

C8.3.30. Ensure that every load of waste received at the facility matches the specifications mentioned in the consignment note accompanying the load.

C8.3.32. Operating records. The operator of a hazardous healthcare waste treatment facility will maintain an operating record that contains the following:

C8.3.32.1. A description of the type and quantity of each load received the name of the generator as written in the consignment note, the date of receipt and the date of treatment.

C8.3.32.2. The type and the results of the laboratory tests conducted on the residues resulting from the treatment process.

C8.3.32.3. The type and results of performance tests of the treatment equipment.

C8.3.32.4. Copies of transportation documents.

C8.3.32.5. Copies of all safety forms for each waste.

C8.3.32.6. The quantity of residues resulting from the treatment process, and the methods and location of its disposal.

Table C8.T1. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	**Method of Treatment**	**Method of Disposal**
Microbiological	[1] Steam sterilization	[2] Municipal solid waste landfill (MSWLF)
	Chemical disinfection	MSWLF
	Incineration	MSWLF
Pathological	[3] Incineration	MSWLF
	[3] Cremation	Burial
	[4] Chemical Sterilization	[5] Domestic wastewater treatment plant (DWTP)
	[4] Steam sterilization	DWTP
	[6] Steam sterilization Chemical disinfection	DWTP
	[6] Incineration	MSWLF
	Steam sterilization	MSWLF
	Incineration	MSWLF

Notes:

1. Preferred method for cultures and stocks because they can be treated at point of generation
2. See Chapter 7, "Solid Waste," for criteria for solid waste landfills.
3. Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.
4. This only applies to placentas, small organs and small body parts that may be steam sterilized or chemically sterilized, ground, and discharged to a domestic wastewater treatment plant.
5. See Chapter 4, "Wastewater," for criteria for domestic wastewater treatment plants.
6. Bulk blood or suction canister waste known to be infectious must be treated by incineration or steam sterilization before disposal.

Table C8.T2. Guidelines Regulating the Standards of Emissions Resulting from the Incineration of Hazardous Healthcare Wastes

Pollutants	Measurements
Total suspended particles	34 mg/m^3 (1) (modified to 7% Oxygen)
dimness	10 % except for 6 minutes during any hour
Carbon monoxide	50 mg/m^3
Brimstone dioxide	150 mg/m^3
Hydrogen chloride	100 mg/m^3 or removal of at least 97 %
Nitrogen oxides	400 mg/m^3
Organic compounds	8 parts out of million or removal of at least 99.99 %
Hydrogen fluoride	5mg/m^3
Dioxin and furan	125 ng/m^3
cadmium	0.16 mg/m^3
Lead	1.2 mg/m^3
arsenic	1.2 mg/m^3
mercury	0.55 mg/m^3

Notes:
(1) dry cubic meter

The smokestack should be 2.5 higher than any neighboring building.

The calculated performance of the incineration should be ensured before beginning the incineration of the waste, taking into account the heat capacity and the natural and chemical properties of the wastes to be incinerated.

These measurements are applicable for healthcare incinerators whose capacity is 500 Kg per hour or more.

C9. CHAPTER 9

PETROLEUM, OIL, AND LUBRICANTS

C9.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 18, "Spill Prevention and Response Planning."

C9.2. DEFINITIONS

C9.2.1. Above ground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

C9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs, that are exempt from all criteria in Chapter 19, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 19 are counted toward the aggregate thresholds in subparagraph C9.2.7.2. below.

C9.2.3. Dangerous Materials. The solid, or liquid, or gas materials with dangerous characteristics that injure the man, animal, or plant health, or air, or perform a harmful impact on environment like poisonous, fragile, flammable, or of ionic radiations materials.

C9.2.4. Dangerous Wastes. The wastes of the different functions or operations, or their ashes, which composed of dangerous materials characteristics that has no subsequent original or alternative uses like clinical wastes from the medical functions and wastes resulting from manufacturing of pharmaceutical compounds, drugs, organic solubles, inks, paints, or jelly's and creams.

C9.2.5. Drainage. Any leakage, or flow, discharge, unloading of any of the pollutant materials, getting rid of them in the regional sea water, the neighboring area, or the pure economical area, with consideration to the levels determined in this document.

C9.2.6. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

C9.2.7. Loading/ Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

C9.2.8. Maritime Environment. The State Coasts, the sea, internal seas, the regional sea water, the neighboring area, the pure economical area and its depths, and all its components, live and inanimate creatures..

C9.2.9. Oil. all kinds of crude oil and its products, this include any type of liquid hydro-carbonate, lubes, fuels, refined oils, steamer oils, asphalt, any other petroleum extracts and wastes.

C9.2.10. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

C9.2.11. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

C9.2.12. POL Facility. An installation with either:

C9.2.12.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

C9.2.12.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

C9.2.12.3. A pipeline facility as identified in paragraph C9.2.5.

C9.2.13. POL Storage Container. POL containers with capacities GREATER than 55 gallons (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 19 are EXCLUDED from the definition of POL storage containers.

C9.2.14. Pure Economical Area. The area that extends to a distance of 200 nautical miles begins from the basic lines, from which starts the breadth of the regional sea.

C9.2.15. Watery Environment. The maritime environment and the inland waters including the groundwater, spring waters, and valleys, where there are natural resources, plants, fish, and other live creatures, and where there is air above and built in, installations, or fixed or mobile projects.

C9.3. CRITERIA

C9.3.1. Applicability. The below criteria apply only at POL Facilities as defined in paragraph C9.2.12.

C9.3.2. General POL Storage Container Criteria

C9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

C9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criteria for below ground storage containers.

C9.3.2.3. Permeability. Permeability for containment areas will be a maximum of 10^{-7} cm/sec.

C9.3.2.4. Containment Area Drainage. Drainage of stormwater from containment areas will be controlled by a valve that is locked closed when not in active use. Stormwater will be inspected for petroleum sheen before being drained from containment areas. If a petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, "Hazardous Waste."

C9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

C9.3.3. Additional POL Storage Container Criteria

C9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

C9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

C9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

C9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

C9.3.4.1. POL container cleaning wastes (sludge and washwaters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

C9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

C9.3.5. General Transport and Distribution Criteria

C9.3.5.1. Loading/Unloading Racks and Areas

C9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

C9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

C9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

C9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and / or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL, which reasonably could be expected to cause a sheen on waters of the State of Qatar defined in Chapter 4, "Wastewater."

C9.3.5.2. POL Pipeline Facilities

C9.3.5.2.1. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

C9.3.5.2.1.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies.

C9.3.5.2.1.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

C9.3.5.2.1.3. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

C9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; and the applicable contents of the facility Spill Plan.

C9.4. ADDITIONAL REQUIREMENTS

C9.4.1. It is restricted for all ships and carriers to drain or dispose of oil, or oily mixture in the regional sea or the pure economical area of the State of Qatar.

C9.4.4. It is restricted for ships and carriers in the regional sea or the pure economical area of the state, to conduct any of the following:

C9.4.4.1. Throwing or draining any wastes, pollutant, injurious liquid materials, or perished animals, intentionally, or unintentionally, directly, or indirectly, that cause damage in the watery environment, or general health, or any other legal usages in the sea.

C9.4.4.2. Disposing of dangerous wastes and materials in the watery environment.

C9.4.5. It is prohibited for ships and sea platforms to discharge contaminated sanitary drainage water into the sea, or the pure economical area of the State of Qatar.

C9.4.6. The owner and captain of the ship, that is registered inside or outside the State of Qatar, must keep a record of oil contained in the ship, including the following operations:

C9.4.6.1. Record of oil loading and delivery operations and type of oil transported.

C9.4.6.2. Record of oil or oil mixtures drained from the ship.

C9.4.6.3. Records of oil or oil mixture leaks due to accidents, with documentation of amount of oil leaked.

C9.4.6.4. Records of the drainage of ballast waters or water resulting from tank cleaning or from ship water contaminated with oil from machinery rooms or other ship compartments.

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C10. CHAPTER 10

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C11. CHAPTER 11

PESTICIDES

C11.1. SCOPE

This Chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

C11.2. DEFINITIONS

C11.2.1. Active Substance. A vital part in the installation of effective pesticides.

C11.2.2. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides and have been formally certified in accordance with DoD 4150.7-M (Reference (m)) (which accepts State of Qatar certification in appropriate circumstances).

C11.2.3. Container. Contains a quantity of a pesticide in its various forms; solid, liquid or gaseous.

C11.2.4. Handling. Selling, offering for sale, storing, or possessing, regardless of whether permanently or temporarily, or transporting by any means.

C11.2.5. Importation. Entering pesticides into the country on behalf of a public or private organization, regardless of whether through mail packages, independent shipping, or shipping through importers.

C11.2.6. Integrated Pest Management (IPM). A planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods, including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control and, where necessary, the judicious use of least-hazardous pesticides.

C11.2.7. Labeling. All information written, printed and painted or attached to a pesticide package explaining its composition, characteristics, uses and the precautions to be taken to ensure safe use of each pesticide, or any other information requested.

C11.2.8. Package. A defined amount of a pesticide filled in a container with a protective cover that is used to provide pesticides to their users through the channels of wholesale or retail distribution.

C11.2.9. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the well being of humans or animals; attack real property, supplies, equipment, or vegetation; or are otherwise undesirable.

C11.2.10. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities who provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

C11.2.11. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

C11.2.12. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

C11.2.12.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or State of Qatar authority;

C11.2.12.2. Any pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

C11.2.12.3. Any material used to clean up a pesticide spill; or

C11.2.12.4. Any containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are NOT considered hazardous waste, and can be disposed of as normal solid waste.

C11.2.13. Registered Pesticide. A pesticide registered and approved for sale or use within the United States or the State of Qatar.

C11.3. CRITERIA

C11.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1, "Pest Management Maintenance Report," or a computer-generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910-M (Reference (f)).

C11.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

C11.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

C11.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

C11.3.3.2. Arthropod skin and clothing repellents; and

C11.3.3.3. Pesticides applied as part of an installation's self help program.

C11.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

C11.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed.

C11.3.6. Installations will only use registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan:

C11.3.7. Pesticides will be included in the installation spill contingency plan. (See Chapter 18, "Spill Prevention and Response Planning.")

C11.3.8. Pest management facilities, including mixing and storage areas, will comply with Military Handbook 1028/8A (Reference (n)).

C11.3.9. All pesticide applications will be in accordance with guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If foreign nationals will be using the pesticides, the precautionary messages and use instructions will be in English and in the prevalent local languages.

C11.3.10. MSDSs and labels for all pesticides will be available at the storage and holding facility.

C11.3.11. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

C11.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below:

C11.3.12.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6 of this FGS.

C11.3.12.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of this FGS.

C11.3.12.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through DRMO, as a solid waste. The details on pesticides labels shall include warnings in Arabic and English against re-use of the package. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

C11.3.13. Transporting Pesticides. Pesticides shall be transported inside the country using transport means in accordance with the pesticide label and warnings.

C11.3.14. Conditions that must be met for pesticides storage.

C11.3.14.1. Pesticide storage areas shall be secured against pedestrian access except through gates that are assigned for general access.

C11.3.14.2. A warning sign shall be mounted to indicate that the pesticide storage area contains dangerous materials. A tag shall be mounted at the external door or the storage entrance.

C11.3.14.3. Floor drains shall be secured against pesticide leakage.

C11.3.14.4. Drinking water sources and networks should be protected from pesticide leakage.

C11.3.14.5. Pesticides storage shall have proper spill cleanup equipment to manage any leakage of pesticide concentrates in the storage areas.

C11.3.14.6. Opened or damaged pesticide cans or containers should be closed or refilled to prevent any release of odor or fumes.

C11.3.14.7. The floor of the pesticide storage shall be paved with a material that does not absorb spilled or leaked pesticides.

C11.3.14.8. Safety measures (fire extinguishers, water sources and hoses, and emergency exit doors), and emergency phone numbers for hospitals and fire services shall be readily available at an easily accessible location.

C11.3.14.9. Any persons responsible for storing pesticides shall be trained in initial spill response including use of safety and fire control equipment, and as allowed, spill clean-up.

C11.3.14.10. Based on the type of pesticides stored and per pesticide label, proper personal protective equipment shall be available for workers managing the storage of pesticides.

C11.3.14.11. Pesticides shall be stored and kept in their containers or cans in their original package; any pesticides transferred to other non-original containers must be labeled.

C11.3.15. Spraying or using of insecticides, any other chemical components for agricultural, or general health purposes, is restricted, which includes preventing exposure of humans, animals, plants, water streams, or any other environmental components from the injurious effects of these insecticides or chemical components.

C11.3.16. Chemical pesticides must meet the following specifications:

C11.3.16.1. Must be of a stable consistency and not prone to separating into their constituent components if the pesticide material is in the form of a concentrated liquid. They must be easily soluble with water if they can be emulsified, and easy to mix with kerosene or diesel fuel if they are to be used as a mist or by spraying in extremely minute quantities.

C11.3.16.2. Must dissolve quickly in water and become suspended for a long period of time without precipitating quickly.

C11.3.16.3. Must be of a homogenous mixture if the pesticide substance is in the form of a powder ready-made for dissolving. Their density must be very light, such that at least 90% of the substance passes through a sprayer nozzle with 300 holes per square inch.

C11.3.17. Pesticide containers must meet the following specifications:

C11.3.17.1. Containers must be compatible with the chemical composition, and resistant to corrosion from the pesticide constituents. Containers must not permit the pesticide substance to escape in the event the substance is in the form of a powder. The containers must be sturdy, able to be closed firmly, and be made of a rustproof material in the event the pesticide substance is in the form of a concentrated liquid.

C11.3.17.2. The pesticide shall be contained in a durable, tightly closed, leak proof and non-transparent device resistant to sunlight, and capable of enduring transfer and storage.

C11.3.17.3. The container shall be made from a substance that does not react with its contents in a way that might change its nature or properties.

C11.3.18. Pesticide Label Specifications

C11.3.18.1. The instruction label shall be well fixed in order not to be replaceable or changeable. The explanatory data labeled on the packaging shall not be deliberately changed, mutilated, or destroyed.

C11.3.18.2. Any modification or alteration of the pesticide label may not be done whether it is after importation or before exportation. part of the explanatory data labeled on the packaging.

C11.3.18.3. A label containing the following information in Arabic and English must be affixed to the container; or, the necessary information must be written on the container directly:

C11.3.18.3.1. The commercial name of the pesticide and its commercial logo

C11.3.18.3.2. The name of the active ingredients and the common name of the pesticide

C11.3.18.3.3. The concentration of the active ingredient as well as the other substances by weight and volume

C11.3.18.3.4. The uses for the pesticide and the methods and recommendations for use

C11.3.18.3.5. Methods for first aid and the counter-agents for the pesticide

C11.3.18.3.6. The level of toxicity for the pesticide and a suitable warning label, according to the classification of the World Health Organization and the instructions from the United Nations Food and Agriculture Organization

C11.3.18.3.7. The date of manufacture and expiration date for the pesticide

C11.3.18.3.8. The name of the manufacturing company and country, and the registration number of the pesticide in that country

C11.3.18.3.9. The conditions for storing the pesticide and the effect of temperature on it during storage, as well as the appropriate storage temperatures

C11.3.18.3.10. The tendency of the pesticide to mix with other substances

C11.3.18.3.11. The gross weight or volume of the container in units

C11.3.19. The following are prohibited:

C11.3.19.1. Handling any pesticide which is expired or fraudulently adulterated.

C11.3.19.2. Changing, destroying, or distorting the data recorded on the container, or a part thereof, before allowing it to be handled.

C11.3.19.3. Import, manufacture or handle a pesticide that is corrupted, adulterated or expired.

C11.3.20. Pesticide storage facilities must meet the following conditions:

C11.3.20.1. They must be placed away from human-populated areas, commercial neighborhoods, livestock barns, poultry farms, beekeeping areas, and factories and storage depots for food products, as well as soft drink factories, animal fodder factories.

C11.3.20.2. They must be well ventilated and outfitted with air ventilators.

C11.3.20.3. A small pharmacy cabinet must be installed at pesticide storage facilities, which contain first-aid materials and antidotes against poisoning.

C11.3.20.4. They must be equipped with a source of water and fire fighting equipment.

C11.3.20.5. A technical supervisor must be on the premises, and have sufficient experience with all types of pesticides and how to handle them.

C11.3.20.6. The pesticide storage facility must be separate from other agricultural and food products, in order to prevent them from being contaminated and affected by the pesticides.

C12. CHAPTER 12

HISTORIC AND CULTURAL RESOURCES

C12.1. SCOPE

This Chapter contains criteria for required plans and programs needed to ensure proper protection and management of historic and cultural resources, such as properties on the World Heritage List or the State of Qatar list equivalent to the U.S. National Register of Historic Places.

C12.2. DEFINITIONS

C12.2.1. Adverse Effect. Changes that diminish the quality or significant value of historic or cultural resources.

C12.2.2. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal remains, or any portion of any of the foregoing items.

C12.2.3. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

C12.2.3.1. Limiting the magnitude of the action;

C12.2.3.2. Relocating the action in whole or in part;

C12.2.3.3. Repairing, rehabilitating, or restoring the affected resources, affected property; and

C12.2.3.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered.

C12.2.4. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

C12.2.5. Historic or Cultural Resources. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national, or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object, and also includes natural resources (plants, animals, landscape features, etc.) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or the State of Qatar equivalent of the National Register of Historic Places. State of Qatar lists of properties should be evaluated to determine if they are equivalent with the National Register of Historic Places prior to application.

C12.2.6. Inventory. To determine the location of historic and cultural resources that may have world, national, or local significance.

C12.2.7. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

C12.2.7.1. Surface or subsurface structures;

C12.2.7.2. Surface or subsurface artifact concentrations or scatters;

C12.2.7.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments;

C12.2.7.4. By-products, waste products, or debris resulting from manufacture or use;

C12.2.7.5. Organic waste;

C12.2.7.6. Human remains;

C12.2.7.7. Rock carvings, rock paintings, and intaglios;

C12.2.7.8. Rock shelters and caves;

C12.2.7.9. All portions of shipwrecks; or

C12.2.7.10. Any portion or piece of any of the foregoing.

C12.2.8. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

C12.2.9. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack, or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

C12.2.10. Relic. Archaeological relics are to be divided into two types: immobile relics and mobile relics. Immobile relics mean ancient relics that have been erected on the ground and which are connected to it, such as the remains of cities and buildings, archaeological hills, caves, grottoes, fortresses, walls, fortifications, religious edifices, schools, and other such items, regardless of whether they are within the ground, or submerged in domestic or regional waters. Mobile relics are those relics which have been manufactured by nature to not be connected to the ground, and which can be relocated without being damaged or destroyed.

C12.3. CRITERIA

C12.3.1. Installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on the applicable country's equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

C12.3.2. Installations shall have access to the World Heritage List and the State of Qatar equivalent of the National Register of Historic Places.

C12.3.3. Installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resources management.

C12.3.4. Installations shall, after coordination with the State of Qatar installation commander or similar appropriate State of Qatar authorities, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

C12.3.5. Installations shall, after coordination with the State of Qatar installation commander or similar appropriate State of Qatar authorities, and if financially and otherwise practical:

C12.3.5.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

C12.3.5.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

C12.3.5.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

C12.3.6. Installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the State of Qatar.

C12.3.7. Installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

C12.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the State of Qatar installation commander or similar appropriate State of Qatar authorities.

C12.4. ADDITIONAL REQUIREMENTS

C12.4.1. It is prohibited to destroy mobile or immobile archaeological relics, or to deface, damage, disfigure, or change their features. Putting signs and announcements on archaeological areas as well as on registered historical buildings is forbidden. It is not permissible to join a new building to the archaeological real estate object, to set up access points or ports, or to arrange for any other connective rights to the archaeological buildings and fortifications. It is also not permissible to take soil or any other substances, wreckage, or waste products from archaeological relic areas.

C12.4.2. It is not permissible to use immobile registered archaeological relics for purposes other than those specified by the State of Qatar. It is also not permitted to tear down or transport all or part of the relic, renovate, or renew it, except within the parameters specified and approved on by the State of Qatar. It is prohibited to use the locations of registered archaeological relics to store debris or wreckage, or as burial places. It is also prohibited to set up irrigation equipment there, or to dig up, plant, or cut down a tree there, or conduct any other activities which would result in a change in the appearance of these locations.

C12.4.3. Anyone who discovers an immobile archaeological relic or learns of its discovery, must notify the local chain of command within 48 hours of discovery.

C12.4.4. During planning for bases, or their expansion, it is necessary to preserve archaeologically important areas and their features within the bases.

C12.4.5. Exporting archaeological relics are prohibited.

C13. CHAPTER 13

NATURAL RESOURCES AND ENDANGERED SPECIES

C13.1. SCOPE

This Chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the U.S. or State of Qatar governments.

C13.2. DEFINITIONS

C13.2.1. Administrative Authority. Any State of Qatar Ministry or other governmental body.

C13.2.2. Adverse Effect. Changes that diminish the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance, and fitness.

C13.2.3. Competent Authority. Those assigned to the State of Qatar Wildlife Conservation and Development.

C13.2.4. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

C13.2.5. Council. The Environment and Natural Protected Area High Council

C13.2.6. Endangered. Related to a particular migratory species, means that the migratory species is in danger of extinction throughout all or a significant portion of its range.

C13.2.7. Environment. The biosphere that includes the live creatures (humans and animals), plants, and their surroundings of air, water, and soil.

C13.2.8. Environment Protection. The conservation of environmental components and their development, the prevention of environmental deterioration or pollution, or the reduction of pollution frequency. These components consist of air, seas, and inland waters that include the groundwater, the terrain, the natural reserves, and the other natural resources.

C13.2.9. Fishing. The use of booby traps, or trained animals like dogs and hawks to kill or capture the animals.

C13.2.10. Flora Environment. Those land areas covered by a group of plants, regardless of whether they are naturally occurring, planted, or transplanted. They may consist of trees, shrubs, grasses, herbs, and various living organisms which are not set aside for agricultural purposes. The trees shall be the predominant element therein. They shall be owned by the State of Qatar, and no one shall have the right to exploit them.

C13.2.11. Fungal Organisms. Living organisms such as molds, mildew, yeasts, and mushroom. These organisms are of the Fungi family and usually act as parasites or organisms that feed off of decomposing organic material.

C13.2.12. Grasses and Herbs. Shrub plants whose stems do not contain sufficient woody tissues to qualify them as trees or shrubs, and whose component parts remain permanently green.

C13.2.13. Habitat. An environment where species normally live. For example, fish live in a marine environment.

C13.2.14. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

C13.2.15. Maritime Environment. The State of Qatar coasts, the sea, internal seas, the regional sea water, the neighboring area, the pure economical area and its depths, and all its components, live and inanimate creatures, where built in, installations or fixed and mobile projects.

C13.2.16. Migratory Species. The entire population or any geographically separate part of the population of any species or lower taxonomy of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.

C13.2.17. Ministry. The Ministry of Municipal and Agricultural Affairs.

C13.2.18. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

C13.2.19. Natural Resources Management. Actions taken that combine science, economics, and policy, to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

C13.2.20. Protected Area. The region is determined by the State of Qatar for the purpose of protecting wildlife and development in the State of Qatar.

C13.2.21. Protected Species. Any species of flora or fauna listed or designated by the State of Qatar, because continued existence of the species is, or is likely to be, threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

C13.2.22. Significant Land or Water Area. Land or water area that is normally 500 or more acres outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

C13.2.23. Shrub. Any long-lasting plant occurring naturally, planted, or transplanted, whose height ranges from 1/2 m to 5 m, and which has one or more stems.

C13.2.24. Threatened and Endangered Species. Any species of fauna or flora, listed in Table C13.T1., "Threatened and Endangered Fauna" and Table C13.T2., "Threatened and Endangered Flora," respectively. This also includes any species of fauna or flora listed on an equivalent State of Qatar protected species list.

C13.2.25. <u>Tree.</u> Any durable plant with a single wooden trunk, and which rises above the surface of the earth more than 5 m regardless of whether it is growing naturally, transplanted, or planted.

C13.2.26. <u>Wildlife.</u> Any species of live animal organisms, birds, plants, bacteria, and fungi within or outside their natural habitats.

C13.3. <u>CRITERIA</u>

C13.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and State of Qatar-protected species and their habitat.

C13.3.2. Installations shall maintain, or have access to, Table C13.T1., "Threatened and Endangered Fauna" and Table C13.T2., "Threatened and Endangered Flora," as well as a current list of State of Qatar-protected species.

C13.3.3. Installations with significant land or water areas shall, after coordination with the State of Qatar installation commander or similar appropriate State of Qatar authorities, develop natural resources management plans.

C13.3.4. Installations with natural resources management plans shall, after coordination with the State of Qatar installation commander or similar appropriate State of Qatar authorities, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

C13.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or State of Qatar-protected species, or support State of Qatar surveys.

C13.3.4.2. Implement natural resources management plans.

C13.3.5. The State of Qatar installation commander or, if there is no State of Qatar installation commander, the U.S. Ambassador will be notified of the discovery of any endangered or threatened species and State of Qatar-protected species not previously known to be present on the installation.

C13.3.6. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent State of Qatar facilities where practical.

C13.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, State of Qatar-protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

C13.3.8. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna.

C13.3.9. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

C13.3.10. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

C13.4. ADDITIONAL REQUIREMENTS

C13.4.1. For protected areas within the State of Qatar, measures need to be taken to ensure that the environment is not impacted. This includes:

C13.4.1.1. Fishing in all its forms.

C13.4.1.2. Grazing or agricultural activities.

C13.4.1.3. Harvesting or collection of plant material.

C13.4.1.4. Firewood collection or destruction of living trees.

C13.4.1.5. Collection of fungal organisms or their products.

C13.4.1.6. Establishment of recreational camps.

C13.4.1.7. Access by all types of vehicles.

C13.4.1.8. Prohibition of the introduction of any type of exotic animals (domesticated or wild) to the protected area.

C13.4.1.9. Any other activities that have a negative impact on the biology of the protected area.

C13.4.2. The following are prohibited in the flora environment:

C13.4.2.1. Igniting fire, or using fire for any purpose. Exceptions to this are fires used for cooking and heating, under the provision that all precautions and prerequisite arrangements are made to prevent the fire from spreading.

C13.4.2.2. Burning agricultural harvest waste biomass, grasses, or herbs, whether within the flora environment areas or in areas nearby.

C13.4.2.3 Dumping industrial or agricultural wastes, sewage, demolition debris, or leveling the land, or any similar activities.

C13.4.2.4. Tampering with or damaging fences and facilities for protected flora environment areas.

C13.4.2.5. Driving cars, equipment, or vehicles off road; they may only be driven on established roads.

C13.4.2.6. Cutting down trees and shrubs without coordination with the State of Qatar.

C13.4.2.7. Exploitation of natural renewable resources and their land areas.

C13.4.2.8. Cutting or uprooting trees, shrubs, grasses, and herbs, or burning them for removal, transporting them, defoliating, peeling, or damaging them.

C13.4.2.9. Setting up fixed installations.

C13.4.3. It is prohibited to hunt wild animals, birds, and reptiles in nature preserves, on the islands of Qatar, within the borders of cities and villages, at a distance of less than 500 m from public roads, and within private property without the consent of its owner and those who have rights regarding it.

C13.4.4. In those areas where hunting is allowed, it may only be conducted during designated hunting seasons, and hunting may only be conducted after sunrise and before sunset.

C13.4.5. The following activities are prohibited:

C13.4.5.1. Hunting sea turtles or their eggs.

C13.4.5.2. Hunting bird eggs or disturbing their nests.

C13.4.5.3. Damaging gardens and wild plants.

C13.4.6. It is prohibited to drain or throw any materials, or wastes, or untreated liquids that cause pollution in the coasts or the neighboring waters.

C13.4.7. No building or construction may occur within 200 meters of the coast line.

C13.4.8. No actions may be taken that affect the natural contours of the coastline.

C13.4.9. It shall be prohibited to engage in any action, conduct, activities, or measures which may damage, destroy, deplete, or degrade the natural environment, or decrease the beauty of natural protected areas. In particular, the following activities are prohibited:

C13.4.9.1. Hunting, transporting, or killing land or aquatic wildlife, or any act which may eliminate or harm such wildlife.

C13.4.9.2. Taking, transporting, or harming any organisms or biological matter, such as natural and industrial shellfish and corals, for any purpose whatsoever.

C13.4.9.3. Destroying, transporting, or damaging plants located in natural preserve or protected areas.

C13.4.9.4. Destroying or moving away any geological or geographic structures, or areas which are considered a habitat for certain kinds of animals or plants, or for their reproduction.

C13.4.9.5. Introducing any alien species into natural protected areas.

C13.4.9.6. Polluting the soil, water, or air of natural protected areas in any way.

C13.4.9.7. Establishing buildings or facilities, cutting new roads, driving vehicles, or practicing any agricultural, industrial, commercial, hunting, or any other such activities in a natural protected area.

C13.4.9.8. Cutting down plant species or parts thereof, or collecting their seeds, unless done for authorized scientific purposes.

C13.4.9.9. Holding or killing natural wildlife species.

Table C13.T1. Threatened and Endangered (T&E) Species

Common Name	Scientific Name	T&E Fauna Listed Overseas
Mammals		
Ass, Asian wild	Equus hemionus	Southwestern and Central Asia
Bear, Baluchistan	Ursus thibetanus gedrosianus	Iran, Pakistan
Chimpanzee	Pan troglodytes	Wherever found in the wild
Deer, Persian fallow	Dama mesopotamica (=dama m.)	Iraq, Iran
Gazelle, Arabian	Gazella gazella	Arabian Peninsula, Palestine, Sinai
Gazelle, sand	Gazella subgutturosa marica	Jordan, Arabian Peninsula
Gazelle, Saudi Arabian	Gazella dorcas saudiya	Israel, Iraq, Jordan, Syria, Arabian Peninsula
Leopard, snow	Uncia (=Panthera) uncia	Central Asia
Oryx, Arabian	Oryx leucoryx	Arabian Peninsula
Tahr, Arabian	Hemitragus jayakari	Oman
Whale, blue	Balaenoptera musculus	Oceanic
Whale, bowhead	Balaena mysticetus	Oceanic (north latitudes only)
Whale, finback	Balaenoptera physalus	Oceanic
Whale, humpback	Megaptera novaeangliae	Oceanic
Whale, right	Balaena glacialis (incl. australis)	Oceanic
Whale, Sei	Balaenoptera borealis	Oceanic
Whale, sperm	Physeter catodon (=macrocephalus)	Oceanic
Birds		
Common Name	**Scientific Name**	**T&E Fauna Listed Overseas**
Crane, Siberian white	Grus leucogeranus	C.I.S. (Siberia) to India, including Iran and China
Falcon, Eurasian peregrine	Falco peregrinus peregrinus	Europe, Eurasia south to Africa and Mideast
Ibis, northern bald	Geronticus eremita	Southern Europe, southwestern Asia, northern Africa
Ostrich, Arabian	Struthio camelus syriacus	Jordan, Saudi Arabia
Tern, roseate	Sterna dougallii dougallii	Tropical and temperate coasts of Atlantic Basin and East Africa
Reptiles		
Common Name	**Scientific Name**	**T&E Fauna Listed Overseas**
Crocodile, Nile	Crocodylus niloticus	Africa, Middle East
Monitor, Indian (=Bengal)	Varanus bengalensis	Iran, Iraq, India, Sri Lanka, Malaysia, Afghanistan, Burma, Vietnam, Thailand
Sea turtle, green	Chelonia mydas	Circumglobal in tropical and temperate seas and oceans
Sea turtle, hawksbill	Eretmochelys imbricata	Tropical seas

Table C13.T1. Threatened and Endangered (T&E) Species (continued)

Common Name	Scientific Name	T&E Fauna Listed Overseas
Sea turtle, leatherback	Dermochelys coriacea	Tropical, temperate, and subpolar seas
Sea turtle, loggerhead	Caretta caretta	Circumglobal in tropical and temperate seas and oceans
Sea turtle, olive ridley	Lepidochelys olivacea	Circumglobal in tropical and temperate seas
Skink, Round Island	Leiolopisma telfairi	Indian Ocean_Mauritius
Snake, Lake Erie water	Nerodia sipedon insularum	U.S.A., Canada (Ont.)

C14. CHAPTER 14

POLYCHLORINATED BIPHENYLS

C14.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage, and disposal of polychlorinated biphenyls (PCB). These criteria include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers, and cables.

C14.2. DEFINITIONS

C14.2.1. Capacitor. A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

C14.2.2. Chemical Waste Landfill. A landfill at which a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.

C14.2.3. In or Near Commercial Buildings. Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters of a non-industrial, non-substation building.

C14.2.4. Incinerator. An engineered device using controlled-flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.

C14.2.5. Leak or Leaking. Any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

C14.2.6. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to this FGS.

C14.2.7. Marked. PCB items and PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

C14.2.8. Non-PCB Transformers. Any transformer that contains less than 50 ppm PCB.

C14.2.9. PCB Article. Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

C14.2.10. PCB Article Container. Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.

C14.2.11. PCB Container. Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.

C14.2.12. PCB-Contaminated Electrical Equipment. Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain 50 ppm or greater PCB, but less than 500 ppm PCB.

C14.2.13. PCB Equipment. Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

C14.2.14. PCB Item. Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of 50 ppm or greater.

C14.2.15. PCB Large High Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at 2,000 volts (alternating current (ac) or direct current (dc)) or above.

C14.2.16. PCB Large Low Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates below 2,000 volts (ac or dc).

C14.2.17. PCB Transformer. Any transformer that contains 500 ppm PCB or greater.

C14.2.18. Restricted Access Area. Areas where access by unauthorized personnel is controlled by fences, other man-made structures, or naturally occurring barriers such as mountains, cliffs, or rough terrain.

C14.2.19. Substantial Contact Area. An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

C14.3. CRITERIA

C14.3.1. General

C14.3.1.1. The installation spill contingency plan will address PCB items, including temporary storage items. Chapter 18, "Spill Prevention and Response Planning," provides criteria on how to prepare these plans.

C14.3.1.2. Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up in accordance with the following:

C14.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms (μg) per 100 square centimeters (cm^2).

C14.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 μg per 100 cm^2.

C14.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing less than 1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling, and a reference to any reports documenting the site conditions.

C14.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing less than 1 ppm PCBs.

C14.3.1.3. All PCB transformers, PCB large high voltage capacitors, PCB containers, and certain PCB items containing PCBs at concentrations 50 ppm or greater (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and the State of Qatar language. The marking must identify the item as containing PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criteria also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB large low voltage capacitors and equipment containing a PCB transformer or PCB large high voltage capacitor.

C14.3.1.4. Each installation having PCB items will maintain a written inventory that includes a current list by type of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of for that year. Inventory records should be maintained for a period of time at least 3 years after disposal of the last item on the list.

C14.3.1.5. Disposal of PCB items will only be through the servicing DRMO in accordance with DoD 4160.21-M (Reference (j)) or paragraph C14.3.5. of this FGS.

C14.3.1.6. All periodic inspections as required in this Chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for three years after disposal of the transformer.

C14.3.2. <u>PCB transformers (500 ppm PCB or greater)</u>

C14.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

C14.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

C14.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

C14.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed one year.

C14.3.2.5. PCB transformers will be serviced as follows:

C14.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C14.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

C14.3.2.5.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of in accordance with paragraph C14.3.5.;

C14.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

C14.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing less than 500 ppm PCBs that are mixed with fluids containing 500 ppm or greater PCBs will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be greater than 500 ppm PCBs; and

C14.3.2.5.6. Dielectric fluids containing 500 ppm PCBs or greater will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

C14.3.2.6. All in-service PCB transformers (greater than 500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100 percent of dielectric fluid or PCB transformers tested and found to contain less than 60,000 ppm PCBs will be inspected at least every 12 months.

C14.3.2.7. If any PCB transformer is involved in a fire and was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and treated if required.

C14.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

C14.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

C14.3.3. <u>Other PCB Items</u>

C14.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

C14.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C14.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of 500 ppm or greater that requires the removal and rework of the internal components is prohibited;

C14.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

C14.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of 500 ppm or greater will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

C14.3.3.1.5. Dielectric fluids containing 500 ppm or greater will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

C14.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

C14.3.3.2.1. Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors that pose an exposure risk to food or feed is prohibited;

C14.3.3.2.2. Use of PCB large high-voltage and PCB large low-voltage capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have an adequate roof, walls, and floor to contain any release of PCBs; and

C14.3.3.3. Any PCB item removed from service will be marked with the date it is removed from service.

C14.3.4. Storage

C14.3.4.1. PCBs and PCB items at concentrations 50 ppm or greater that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

C14.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

C14.3.4.1.2. A containment berm, at least 6 inches high, sufficient to contain twice the internal volume of the largest PCB article, or 25 percent of the total internal volume of all PCB articles or containers stored, whichever is greater;

C14.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines, or other openings constructed to prevent any release from the bermed area;

C14.3.4.1.4. Continuous, smooth, and impervious flooring material; and

C14.3.4.1.5. To the maximum extent possible, a new PCB storage area will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where there is a high possibility of such risks, the installation spill prevention and control plan will address the risk.

C14.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

C14.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

C14.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

C14.3.4.2.3. PCB containers in which non-liquid PCBs have been placed; and

C14.3.4.2.4. PCB containers in which PCBs at a concentration between 50-499 ppm have been placed, and whose containers are marked to indicate there is less than 500 ppm PCB.

C14.3.4.3. Non-leaking and structurally undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting the criteria of paragraph C14.3.4. if they are inspected weekly.

C14.3.4.4. All other PCB storage areas will be inspected at least monthly.

C14.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing DRMO.

C14.3.5. Disposal

C14.3.5.1. Installations that generate PCB waste of 50 ppm or greater PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, "Hazardous Waste." Installations will coordinate and obtain concurrence with the State of Qatar for in-country PCB disposal as for HW disposal.

C14.3.5.2. PCB-contaminated dielectric fluid with concentrations greater than 500 ppm will only be disposed in an incinerator with 99.9 percent combustion efficiency.

C14.3.5.3. PCB-contaminated dielectric fluid with concentrations 50 ppm or greater, but less than 500 ppm, will only be disposed as follows:

C14.3.5.3.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.3.2. In a high-efficiency boiler that is rated at a minimum of 50 MBtu/hr and is fueled by natural gas, oil, or coal.

C14.3.5.4. Rags, soil, and other debris with PCBs at concentrations of 50 ppm or greater will be disposed of:

C14.3.5.4.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.4.2. In a chemical waste landfill.

C14.3.5.5. PCB transformers will be disposed of:

C14.3.5.5.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.5.2. In a chemical waste landfill, provided the transformers, and all their inner workings, are first drained of all free-flowing liquids.

C14.3.5.6. PCB capacitors will be disposed of as follows:

C14.3.5.6.1. PCB capacitors will be disposed of in an incinerator with 99.9 percent combustion efficiency, except,

C14.3.5.6.2. Intact non-leaking small PCB capacitors may be disposed of in a solid waste landfill unless large quantities (more than 100 pounds) are identified at the same time.

C14.3.5.7. PCB hydraulic machines containing PCBs may be disposed of as municipal solid waste if:

C14.3.5.7.1. The machines containing PCBs at concentrations of 50 ppm or greater are drained of all free-flowing liquid.

C14.3.5.7.2. The machines containing PCB liquid of 1,000 ppm or greater are flushed prior to disposal with a solvent containing less than 50 ppm PCB.

C14.3.5.8. PCB-contaminated electrical equipment, except capacitors, will be disposed of as municipal solid waste only after draining all free-flowing liquid.

C14.3.5.9. PCB articles, other than those already described, will be disposed of:

C14.3.5.9.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.9.2. In a chemical waste landfill, provided the articles are first drained of all free-flowing liquids.

C14.3.5.10. PCB containers with concentrations of 500 ppm or greater may be disposed of:

C14.3.5.10.1. In an incinerator with 99.9 percent combustion efficiency; or

C14.3.5.10.2. In a chemical waste landfill, provided the containers are first drained of all free-flowing liquids.

C14.3.5.11. Where PCB fluids, items, or articles are disposed of in a high-temperature boiler, the following procedures will be followed:

C14.3.5.11.1. The boiler must be rated at a minimum of 50 million BTU hours;

C14.3.5.11.2. If the boiler uses natural gas or oil as the primary fuel, the carbon monoxide concentration in the stack must be 50 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C14.3.5.11.3. If the boiler uses coal as the primary fuel, the carbon monoxide concentration in the stack is 100 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C14.3.5.11.4. The mineral oil dielectric fluid does not comprise more than 10 percent, by volume, of the total fuel feed rate;

C14.3.5.11.5. The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start up or shut down operations;

C14.3.5.11.6. The performance of the boiler is continuously monitored for carbon monoxide and excess oxygen percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning less than 112,500 liters (30,000 gallons) of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes;

C14.3.5.11.7. The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes; and

C14.3.5.11.8. The flow of mineral oil dielectric fluid is stopped if the criteria respecting carbon monoxide or excess oxygen are exceeded.

C14.3.5.12. Where PCB fluids, items or articles are disposed of in an incinerator, the following procedures will be followed:

C14.3.5.12.1. Combustion criteria shall maintain the introduced liquids for a 2-second dwell time at 1,200℃, plus or minus 100℃ (2,200℉ +/- 212℉), and 3-percent excess oxygen in the stack gas or maintenance of the introduced liquids for a 1-1/2 second dwell time at 1,600℃, plus or minus 100℃ (3,050℉ +/- 212℉) and 2-percent excess oxygen in the stack gas;

C14.3.5.12.2. Combustion efficiency, measured by the ratio of the concentration of carbon dioxide to the total concentration of both carbon dioxide and carbon monoxide, will be maintained at least 99.9 percent;

C14.3.5.12.3. The rate and quantity of PCBs that are fed to the combustion system shall be measured and recorded at regular intervals not greater than 15 minutes;

C14.3.5.12.4. The temperatures of the incineration process shall be continuously measured and recorded;

C14.3.5.12.5. The flow of PCBs to the incinerator shall stop automatically if temperature criteria are not met;

C14.3.5.12.6. Monitoring is conducted sufficient to determine that an incinerator to be used for disposal the first time will operate within the criteria above; and

C14.3.5.12.7. Continuous monitoring is conducted during incineration of PCBs for oxygen and carbon monoxide and periodic monitoring for carbon dioxide.

C14.3.5.13. PCB containers used to contain only PCBs at a concentration less than 500 ppm may be disposed of as municipal solid waste only after draining all free-flowing liquid.

C14.3.5.14. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the United States will be returned to the United States for delivery to a permitted disposal facility if host country or third country disposal is not possible, is prohibited, or would not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with criteria in subparagraph C 14.3.1.3.

C14.3.6. Elimination of PCB Products

C14.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

C14.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

C14.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs (less than 2 ppm) at the time of shipment.

C14.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

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C15. CHAPTER 15

ASBESTOS

C15.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1 (Reference (o)) and DoDI 6055.5 (Reference (p)) and concomitant service instructions.

C15.2. DEFINITIONS

C15.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions coming from ACM are observed, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

C15.2.2. Asbestos. Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated and/or altered.

C15.2.3. Asbestos-Containing Material (ACM). Any material containing more than one percent asbestos by weight.

C15.2.4. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos.

C15.2.5. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing more than one percent asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.6. Friable Asbestos. Any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

C15.2.7. Regulated ACM. Means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

C15.3. CRITERIA

C15.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

C15.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

C15.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

C15.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

C15.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

C15.3.2.4. Work control/permit systems to control activities that might disturb ACM;

C15.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM;

C15.3.2.6. Record keeping to document O&M activities related to asbestos identification management and abatement;

C15.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

C15.3.2.8. Procedures to assess and prioritize identified hazards for abatement; and

C15.3.2.9. Procedures to prevent the use of ACM in new construction.

C15.3.3. Prior to demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

C15.3.4. Prior to demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

C15.3.5. Installations will remove friable ACM when the ACM poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

C15.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all regulated ACM.

C15.3.7. When disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leak-proof container, and properly dispose of it in an MSWLF as defined in Chapter 7, "Solid Waste." Containers will be labeled in English and the State of Qatar language: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD." Permanent records documenting the disposal action and site will be maintained.

C15.3.8. DoD schools will comply with applicable requirements of 15 U.S.C. 2643(l) (Reference (q)) and implementing regulations in 40 CFR Part 763, Subpart E (Reference (r)).

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C16. CHAPTER 16

RESERVED

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C17. CHAPTER 17

LEAD-BASED PAINT

C17.1. SCOPE

This Chapter contains criteria to establish and implement a lead hazard management program to identify, control, or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from lead exposure, refer to DoDI 6055.1 (Reference (o)), DoDI 6055.5 (Reference (p)), and concomitant service instructions.

C17.2. DEFINITIONS

C17.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead-contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

C17.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

C17.2.3. Bare Soil. Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

C17.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least two different days within any week, provided that each days' visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.

C17.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exist in a facility frequented by children under the age of 6.

C17.2.6. Deteriorated Paint. Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking, or is otherwise damaged or separated from the substrate.

C17.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 ,g/dl (micrograms of lead per deciliter) for a single test, or 15-19 ,g/dl in two tests taken at least 3 months apart.

C17.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

C17.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

C17.2.10. Evaluation. A visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, lead-based paint, or a lead-based paint hazard.

C17.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

C17.2.12. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through various methods, including interim controls or abatement or a combination of the two.

C17.2.13. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

C17.2.14. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.

C17.2.15. Lead-Based Paint. Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per cm^2, or 0.5 percent by weight or 5,000 ppm by weight.

C17.2.16. Lead-Based Paint Hazard. Includes paint-lead-hazard, dust-lead hazard or soil-lead hazard as identified below:

C17.2.16.1. Paint-Lead Hazard. A paint-lead hazard is any of the following:

C17.2.16.1.1. Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill, or floor) are equal to or greater than the dust-lead hazard levels identified in subparagraph C17.2.16.2.

C17.2.16.1.2. Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe).

C17.2.16.1.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

C17.2.16.1.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

C17.2.16.2. Dust-lead hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

C17.2.16.3. Soil-lead hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm ($\mu g/g$) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

C17.2.17. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint, and the provision of a report explaining the results of the investigation.

C17.2.18. Permanent. An expected design life of at least 20 years.

C17.2.19. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

C17.2.20. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

C17.2.21. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

C17.2.22. Risk Assessment Screen. A sampling protocol that is used in dwellings that are in relatively good condition and where the probability of finding lead-based hazards are low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.

C17.3. CRITERIA

C17.3.1. Installations will:

C17.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

C17.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement.

C17.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

C17.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 g/ft^2 for floors, >125 g/ft^2 for interior window sills, a lead-based paint risk assessment should be performed.

C17.3.1.3.2. Lead-based paint risk assessments.

C17.3.1.3.3. Routine facility inspection for fire and safety.

C17.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

C17.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

C17.3.1.3.6. Lead-based paint reevaluations.

C17.3.1.3.7. Review of construction, painting, and maintenance histories.

C17.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

C17.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-base paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

C17.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

C17.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, "Hazardous Waste," paragraph C6.2.5.

C18. CHAPTER 18

SPILL PREVENTION AND RESPONSE PLANNING

C18.1. SCOPE

This Chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8 (Reference (s)).

C18.2. DEFINITIONS

C18.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

C18.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

C18.2.3. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

C18.2.4. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

C18.2.5. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in Appendix 1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

C18.2.5.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

C18.2.5.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C18.2.6. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

C18.2.7. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

C18.2.8. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

C18.2.8.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

C18.2.8.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 416 liters (110 gallons);

C18.2.8.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

C18.2.8.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

C18.2.8.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

C18.2.9. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

C18.3. CRITERIA

C18.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT.

C18.3.1.1. The plan will be updated at least every 5 years or:

C18.3.1.1.1. Within 6 months of any significant changes to operations.

C18.3.1.1.2. When there have been two significant spills to navigable waters in any 12-month period;

C18.3.1.1.3. When there has been a spill of 1,000 gallons or greater.

C18.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification.

C18.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

C18.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate.

C18.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in subparagraph C18.3.2.3, critical water resources, land uses, and possible migration pathways.

C18.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure.

C18.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in subparagraph C 18.3.2.3.

C18.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of non-destructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

C18.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," subparagraph C9.3.2.5.

C18.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

C18.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

C18.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground storage tanks, pesticides, and PCBs provide specific criteria for containment structure requirements.

C18.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

C18.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

C18.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

C18.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

C18.3.2.14. Written procedures for:

C18.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

C18.3.2.14.2. Inspections; and

C18.3.2.14.3. Record keeping requirements.

C18.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

C18.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and to provide assistance to other agencies when requested. At a minimum, this section of the plan will contain:

C18.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills.

C18.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered.

C18.3.3.3. The responsibilities, composition, and training requirements of the FRT.

C18.3.3.4. The command structure that will be established to manage a worst case discharge. Include an organization chart and the responsibilities and composition of the organization.

C18.3.3.5. Procedures for FRT alert and response to include provisions for:

C18.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill.

C18.3.3.5.2. Public affairs involvement.

C18.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours.

C18.3.3.7. The plan will provide for notification of the FIC, installation commander, and local authorities in the event of hazard to human health or environment.

C18.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers.

C18.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills.

C18.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill.

C18.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation.

C18.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation.

C18.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations.

C18.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions.

C18.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

C18.3.4. Reporting Section. The reporting section of the spill plan will address the following:

C18.3.4.1. Recordkeeping when emergency procedures are invoked.

C18.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill.

C18.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency and the EEA and submit a follow-up written report when:

C18.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

C18.3.4.3.2. The spill exceeds 416 liters (110 gallons) of POLs;

C18.3.4.3.3. A water resource has been polluted; or

C18.3.4.3.4. The FIC has determined that the spill is significant.

C18.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local State of Qatar drinking water resource, the appropriate in-theater component commander and/or Defense Agency, EEA, and State of Qatar authorities will be notified immediately.

C18.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in subparagraph C18.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

C18.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment.

C18.3.6. After completion of the initial response, any remaining free product and/or obviously contaminated soil will be appropriately removed and managed. Further action will be governed by Reference (s).

C19. CHAPTER 19

UNDERGROUND STORAGE TANKS

C19.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing hazardous wastes are covered in Chapter 6, "Hazardous Waste." Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, "Petroleum, Oil, and Lubricants."

C19.2. DEFINITIONS

C19.2.1. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

C19.2.1.1. A hydrant fuel distribution system; or

C19.2.1.2. A field-constructed tank.

C19.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, "Hazardous Material." The term does not include:

C19.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

C19.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C19.2.3. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

C19.2.4. POL. Refined petroleum, oils, and lubricants.

C19.2.5. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

C19.2.6. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, larger than 416 liters (110 gallons), that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10 percent or more beneath the surface of the ground, but does not include:

C19.2.6.1. Tanks containing heating oil used for consumption on the premises where it is stored;

C19.2.6.2. Septic tanks;

C19.2.6.3. Stormwater or wastewater collection systems;

C19.2.6.4. Flow through process tanks;

C19.2.6.5. Surface impoundments, pits, ponds, or lagoons;

C19.2.6.6. Field constructed tanks;

C19.2.6.7. Hydrant fueling systems;

C19.2.6.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

C19.2.6.9. UST containing *de minimis* concentrations of regulated substances, except where subparagraph C 19.3.2.7. is applicable; and

C19.2.6.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

C19.3. CRITERIA

C19.3.1. All installations will maintain a UST inventory.

C19.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

C19.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

C19.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fillpipe. Overfill prevention will be provided by one of the following methods:

C19.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity).

C19.3.2.2.2. High level alarm (set at 90% of tank capacity).

C19.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or one percent of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

C19.3.2.3.1. USTs will use at least one of the following leak detection methods:

C19.3.2.3.1.1. Automatic tank gauging;

C19.3.2.3.1.2. Vapor monitoring;

C19.3.2.3.1.3. Groundwater monitoring; or

C19.3.2.3.1.4. Interstitial monitoring.

C19.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

C19.3.2.3.3. Suction piping will either have a line tightness test conducted every three years or use monthly monitoring.

C19.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

C19.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

C19.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.8 (Reference (s)). Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

C19.3.2.7. When a UST has not been used for one year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.3.

C19.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

C19.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

C19.3.2.9.1. Vent lines must be left open and functioning; and

C19.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

C19.3.3. UST Recordkeeping. Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

C19.3.4. Hazardous material USTs

C19.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults.

C19.3.4.2. Leak Detection. The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

C19.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in subparagraph C19.3.4.1. shall be immediately removed from service and upgraded or replaced as necessary.

C19.3.5. Deferred USTs. Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

AP1. APPENDIX 1

CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

AP1.1. CHARACTERISTICS OF HAZARDOUS WASTE

AP1.1.1. General

AP1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

AP1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

AP1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

AP1.1.2. Characteristic of Ignitability

AP1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

AP1.1.2.1.1. It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

AP1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

AP1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

AP1.1.2.1.4. It is an oxidizer.

AP1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

AP1.1.3. Characteristic of Corrosivity

AP1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

AP1.1.3.1.1. It is aqueous and has a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter.

AP1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

AP1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

AP1.1.4. Characteristic of Reactivity

AP1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

AP1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

AP1.1.4.1.2. It reacts violently with water.

AP1.1.4.1.3. It forms potentially explosive mixtures with water.

AP1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

AP1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

AP1.1.4.1.8. It is a forbidden explosive.

AP1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

AP1.1.5. Toxicity Characteristic

AP1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste contains any of the contaminants listed in Table AP1.T1., "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section AP1.1. at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself is considered to be the extract for the purpose of this section.

AP1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table AP1.T1 or section AP1.2., which corresponds to the toxic contaminant causing it to be hazardous.

AP1.2. LISTS OF HAZARDOUS WASTES

AP1.2.1. General

AP1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

AP1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

AP1.2.1.3. Each hazardous waste listed in section AP1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

AP1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table AP1.T3., "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

AP1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table AP1.T4., annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

AP1.2.4. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.

AP1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel.

AP1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

AP1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA ITW#, such waste will be listed in paragraph AP1.2.2. above or will be identified as a hazardous waste by the characteristics set forth in section AP1.1. of this Appendix.]

AP1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4., annotated "P" as the first character in the USEPA ITW# are hereby identified as acute hazardous waste (IT). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA ITW#s are listed in Table AP1.T4., annotated "P" as the first character in the USEPA ITW#.

AP1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table AP1.T4., subparagraphs AP1.2.4.1.1.1. through AP1.2.4.1.1.4. of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

Table AP1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

USEPA HW No.[1]	Contaminant	CAS No. [2]	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-2	1.0
D007	Chromium	7440-47-3	5.0
D016	2,4-D	94-75-7	10.0
D012	Endrin	72-20-8	0.02
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D010	Selenium	7782-49-2	1.0
D01 1	Silver	7440-22-4	5.0
D015	Toxaphene	8001-35-2	0.5
D017	2,4,5-TP (Silvex)	93-72-1	1.0

Table AP1.T2. Maximum Concentration of Contaminants for Non-Wastewater

USEPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/kg)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23 -5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D03 1	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
DO33	Hexachlorobutadiene	87-68-3	0.5
DO34	Hexachloroethane	67-72-1	3.0
DO35	Methyl Ethyl Ketone	78-93-3	200.0
DO36	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl Chloride	75-01-4	0.2

Notes:

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	**Hazardous Waste**	**Hazard Code**
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1 -trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1 -trichloroethane, chlorobenzene, 1,1,2-trichloro- 1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10% or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)[2]
F004	The following spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent	(T)
F005	The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Spent cyanide plating bath solutions from electroplating operations.	(R,T)
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F01 1	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	(T)
F0 19	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process.	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (this listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (this listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (this listing does not include wastewater, wastewater treatment sludges, spent catalysts, and wastes listed separately in this table or wastes listed in Table AP1.T4 and having a USEPA HW# beginning with "K").	(T)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (this listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027.	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F032	Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F035	Wastewater (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F037	Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling water segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K05 1 wastes are not included in this listing.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater and oily cooling wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in dissolved air flotation (DAF) units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste listed in Tables AP1.T3 or AP1.T4. (leachate resulting from the disposal of one or more of the following USEPA hazardous wastes and no other hazardous wastes retains its USEPA HW#(s): F020, F021, F022, F026, F027, and/or F028).	(T)

Notes:

1. USEPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Acenaphthene	83329			100
Acenaphthylene	208968			5,000
Acetaldehyde (I)	75070		U001	1,000
Acetaldehyde, chloro-	107200		P023	1,000
Acetaldehyde, trichloro-	75876		U034	5,000
Acetamide	60355			100
Acetamide, N-(aminothioxomethyl)-	591082		P002	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442		U1 87	100
Acetamide, 2-fluoro-	640197		P057	100
Acetamide, N-9H-fluoren-2-yl-	53963		U005	1
Acetic acid	64197			5,000
Acetic acid (2,4-dichlorophenoxy)-salts and esters	94757		U240	100
Acetic acid, lead(2+) salt	301042		U144	10
Acetic acid, thallium(1+) salt	563688		U214	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765		U232	1,000
Acetic acid, ethyl ester (I)	141786		U1 12	5,000
Acetic acid, fluoro-, sodium salt	62748		P058	10
Acetic anhydride	108247			5,000
Acetone (I)	67641		U002	5,000
Acetone cyanohydrin	75865	1,000	P069	10
Acetone thiosemicarbazide	1752303	1,000/10,000		1
Acetonitrile (I,T)	75058		U003	5,000
Acetophenone	98862		U004	5,000
2-Acetylaminofluorene	53963		U005	1
Acetyl bromide	506967			5,000
Acetyl chloride (C,R,T)	75365		U006	5,000
1-Acetyl-2-thiourea	591082		P002	1
Acrolein	107028	500	P003	1
Acrylamide	79061	1,000/10,000	U007	5,000
Acrylic acid (I)	79107		U008	5,000
Acrylonitrile	107131	10,000	U009	100
Acrylyl chloride	814686	100		1
Adipic acid	124049			5,000
Adiponitrile	111693	1,000		1
Aldicarb	116063	100/10,000	P070	1
Aldrin	309002	500/10,000	P004	1
Allyl alcohol	107186	1,000	P005	100
Allylamine	107119	500		1
Allyl chloride	107051			1,000
Aluminum phosphide (R,T)	20859738	500	P006	100
Aluminum sulfate	10043013			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
4-Aminobiphenyl	92671			1
5-(Aminomethyl)-3-isoxazolol	2763964		P007	1,000
Aminopterin	54626	500/10,000		1
4-Aminopyridine	504245		P008	1,000
Amiton	78535	500		1
Amiton oxalate	3734972	100/10,000		1
Amitrole	61825		U011	10
Ammonia	7664417	500		100
Ammonium acetate	631618			5,000
Ammonium benzoate	1863634			5,000
Ammonium bicarbonate	1066337			5,000
Ammonium bichromate	7789095			10
Ammonium bifluoride	1341497			100
Ammonium bisulfite	10192300			5,000
Ammonium carbamate	1111780			5,000
Ammonium carbonate	506876			5,000
Ammonium chloride	12125029			5,000
Ammonium chromate	7788989			10
Ammonium citrate, dibasic	3012655			5,000
Ammonium fluoborate	13826830			5,000
Ammonium fluoride	12125018			100
Ammonium hydroxide	1336216			1,000
Ammonium oxalate	600970 7 5972736 1425849			5,000
Ammonium picrate (R)	131748		P009	10
Ammonium silicofluoride	16919190			1,000
Ammonium sulfamate	7773060			5,000
Ammonium sulfide	12135761			100
Ammonium sulfite	10196040			5,000
Ammonium tartrate	14307438 3164292			5,000
Ammonium thiocyanate	1762954			5,000
Ammonium vanadate	7803556		P119	1,000
Amphetamlne	300629	1,000		1
Amyl acetate	628637			5,000
Iso-Amyl acetate	123922			
Sec-Amyl acetate	626380			
Tert-Amyl acetate	625161			
Aniline (I,T)	62533	1,000	U012	5,000
Aniline, 2,4,6- trimethyl	88051	500		1
o-Anisidine	90040			100
Anthracene	120127			5,000
Antimony++	7440360			5,000
Antimony pentachloride	7647189			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Antimony pentafluoride	7783702	500		1
Antimony potassium tartrate	28300745			100
Antimony tribromide	7789619			1,000
Antimony trichloride	10025919			1,000
Antimony trifluoride	7783564			1,000
Antimony trioxide	1309644			1,000
Antimycin A	1397940	1,000/10,000		1
ANTU (Thiourea 1-Naphthalenyl)	86884	500/10,000		100
Argentate(1-), bis(cyano-C)-, potassium	506616		P099	1
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
Aroclors	1336363			1
Arsenic++	7440382			1
Arsenic acid H_3AsO_4	1327522 7778394		P010	1
Arsenic disulfide	1303328			1
Arsenic oxide As_2O_3	1327533		P012	1
Arsenic oxide As_2O_5	1303282		P011	1
Arsenic pentoxide	1303282	100/10,000	P011	1
Arsenic trichloride	7784341			1
Arsenic trioxide	1327533		P012	1
Arsenic trisulfide	1303339			1
Arsenous oxide	1327533	100/10,000	P012	1
Arsenous trichloride	7784341	500		5,000
Arsine	7784421	100		1
Arsine, diethyl-	692422		P038	1
Arsinic acid, dimethyl-	75605		U136	1
Arsorous dichloride, phenyl-	696286		P036	1
Asbestos+++	1332214			1
Auramine	492808		U014	100
Azaserine	115026		U015	1
Aziridine	151564		P054	1
Azindine, 2-methyl-	75558		P067	1
Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1,1 a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1 aS-(1 a-alpha, 8-beta, 8a-alpha, 8b-alpha)]-	50077		U010	10
Azinphos-ethyl	2642719	100/10,000		100
Azinphos-methyl	86500	10/10,000		1
Barium cyanide	542621		P013	10
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495		U1 57	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Benz[c]acridine	225514		U016	100
Benzal chloride	98873	500	U017	5,000
Benzamide, 3,5-dichloro-N-(1, 1 -dimethyl-2- propynyl)-	23950585		U1 92	5,000
Benz[a]anthracene	56553		U018	10
1,2-Benzanthracene	56553		U01 8	10
Benz[a]anthracene, 7,12-dimethyl-	57976		U094	1
Benzenamine (I,T)	62533		U012	5,000
Benzenamine, 3-(Trifluoromethyl)	98168	500		1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808		U014	100
Benzenamine, 4-chloro-	106478		P024	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933		U049	100
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117		U093	10
Benzenamine, 2-methyl-	95534		U328	100
Benzenamine, 4-methyl-	106490		U353	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		U1 58	10
Benzenamine, 2-methyl-, hydrochloride	636215		U222	100
Benzenamine, 2-methyl-5-nitro-	99558		U181	100
Benzenamine, 4-nitro-	100016		P077	5,000
Benzene (I,T)	71432		U109	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	500/10,000		1
Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156		U038	10
Benzene, 1-bromo-4-phenoxy-	101553		U030	100
Benzenearsonic Acid	98055	10/10,000		1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033		U035	10
Benzene, chloro-	108907		U037	100
Benzene, chloromethyl-	100447		P028	100
Benzenediamin, ar-methyl-	2537645 8 95807 49672		U221	10
1,2-Benzenedicarboxylic acid, dioctyl ester	117840		U107	5,000
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817		U028	100
1,2-Benzenedicarboxylic acid, dibutyl ester	84742		U069	10
1,2-Benzenedicarboxylic acid, diethyl ester	84662		U088	1,000
1,2-Benzenedicarboxylic acid, dimethyl ester	131113		U1 02	5,000
Benzene, 1,2-dichloro-	95501		U070	100
Benzene, 1,3-dichloro-	541731		U071	100
Benzene, 1,4-dichloro-	106467		U072	100
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548		U060	1
Benzene, dichloromethyl-	98873		U017	5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Benzene, 1,3-diisocyanotomethyl- (R,T)	584849 91087 264716254		U223	100
Benzene, dimethyl (I,T)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
1,3-Benzenediol	108463		U201	5,000
1,2-Benzenediol, 4-[1 -hydroxy-2- (methylamino)ethyl]- (R) -	51434		P042	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098		P046	5,000
Benzene, hexachloro-	118741		U127	10
Benzene, hexahydro- (I)	110827		U056	1,000
Benzene, hydroxy-	108952		U188	1,000
Benzene, methyl-	108883		U220	1,000
Benzene, 2-methyl-1,3-dinitro-	606202		U106	100
Benzene, 1-methyl-2,4-dinitro-	121142		U105	10
Benzene, 1-methylethyl- (I)	98828		U055	5,000
Benzene, nitro-	98953		U169	1,000
Benzene, pentachloro-	608935		U1 83	10
Benzene, pentachloronitro-	82688		U1 85	100
Benzenesulfonic acid chloride (C,R)	98099		U020	100
Benzenesulfonyl chloride	98099		U020	100
Benzene, 1,2,4,5-tetrachloro-	95943		U207	5,000
Benzenethiol	108985		P014	100
Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro-	50293		U061	1
Benzene, 1,1 '-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435		U247	1
Benzene, (trichloromethyl)-	98077		U023	10
Benzene, 1,3,5-trinitro-	99354		U234	10
Benzidine	92875		U021	1
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	500/1 0,000		1
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072		U202	100
Benzo[a]anthracene	56553		U018	10
Benzo[b]fluoranthene	205992			1
Benzo[k]fluoranthene	207089			5,000
Benzo[j,k]fluorene	206440		U120	100
1,3-Benzodioxole, 5-(1-propenyl)-	120581		U141	100
1,3-Benzodioxole, 5-(2-propenyl)-	94597		U203	100
1,3-Benzodioxole, 5-propyl-	94586		U090	10
Benzoic acid	65850			5,000
Benzonitrile	100470			5,000
Benzo[rst]pentaphene	189559		U064	10
Benzo[ghi]perylene	191242			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812		P001	100
Benzo[a]pyrene	50328		U022	1
3,4-Benzopyrene	50328		U022	1
p-Benzoquinone	106514		U197	10
Benzotrichloride (C,R,T)	98077	500	U023	10
Benzoyl chloride	98884			1,000
1,2-Benzphenanthrene	218019		U050	100
Benzyl chloride	100447	500	P028	100
Benzyl cyanide	140294	500		1
Beryllium++	7440417		P015	10
Beryllium chloride	7787475			1
Beryllium fluoride	7787497			1
Beryllium nitrate	13597994 7787555			1
alpha-BHC	319846			10
beta-BHC	319857			1
delta-BHC	319868			1
gamma-BHC	58899		U129	1
Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1 s-(1-alpha, 2-beta, 4-alpha, 5- alpha, 6E))-	15271417	500/10,000		1
2,2'-Bioxirane	1464535		U085	10
Biphenyl	92524			100
(1,1 '-Biphenyl)-4,4'diamine	92875		U021	1
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941		U073	1
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904		U091	10
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937		U095	10
Bis(chloromethyl) ketone	534076	10/10,000		1
Bis(2-chloroethyl)ether	111444		U025	10
Bis(2-chloroethoxy)methane	111911		U024	1,000
Bis(2-ethylhexyl)phthalate	117817		U028	100
Bitoscanate	4044659	500/10,000		1
Boron trichloride	10294345	500		1
Boron trifluoride	7637072	500		1
Boron trifluoride compound with methyl ether (1:1)	353424	1,000		1
Bromoacetone	598312		P017	1,000
Bromadiolone	28772567	100/10,000		1
Bromine	7726956	500		1
Bromoform	75252		U225	100
4-Bromophenyl phenyl ether	101553		U030	100
Brucine	357573		P018	100
1,3-Butadiene	106990			10
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683		U128	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
1-Butanamine, N-butyl-N-nitroso-	924163		U172	10
1-Butanol	71363		U031	5,000
2-Butanone	78933		U159	5,000
2-Butanone peroxide (R,T)	1338234		U160	10
2-Butanone, 3,3-dimethyl-1 -(methylthio)-, O[(methylamno)carbonyl] oxime	39196184		P045	100
2-Butenal	123739 4170303		U053	100
2-Butene, 1,4-dichloro- (I,T)	764410		U074	1
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1 -oxobutoxy] methyl] -2,3,5,7a-tetrahydro-1H-pyrrolizin-1 -yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]-	303344		U143	10
Butyl acetate	123864			5,000
iso-Butyl acetate	110190			
sec-Butyl acetate	105464			
tert-Butyl acetate	540885			
n-Butyl alcohol (I)	71363		U031	5,000
Butylamine	109739			1,000
iso-Butylamine	78819			
sec-Butylamine	513495			
tert-Butylamine	13952846 75649			
Butyl benzyl phthalate	85687			100
n-Butyl phthalate	84742		U069	10
Butyric acid	107926			5,000
iso-Butyric acid	79312			
Cacodylic acid	75605		U136	1
Cadmium++ (2+)	7440439			10
Cadmium acetate	543908			10
Cadmium bromide	7789426			10
Cadmium chloride	10108642			10
Cadmium oxide	1306190	100/10,000		1
Cadmium stearate	2223930	1,000/10,000		1
Calcium arsenate	7778441	500/10,000		1
Calcium arsenite	52740166			1
Calcium carbide	75207			10
Calcium chromate	13765190		U032	10
Calcium cyanamide	156627			1,000
Calcium cyanide Ca(CN)2	592018		P021	10
Calcium dodecylbenzenesulfonate	26264062			1,000
Calcium hypochlorite	7778543			10
Camphechlor	8001352	500/10,000		1
Camphene, octachloro-	8001352		P123	1
Cantharidin	56257	100/10,000		1
Carbachol chloride	51832	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Captan	133062			10
Carbamic acid, ethyl ester	51796		U238	100
Carbamic acid, methylnitroso-, ethyl ester	615532		U178	1
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-l, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	100/10,000		1
Carbamic chloride, dimethyl-	79447		U097	1
Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546		U1 14	5,000
Carbamothioic acid, bis(1 -methylethyl)- , S-(2,3-dichloro-2-propenyl) ester	2303164		U062	100
Carbaryl	63252			100
Carbofuran	1563662	10/10,000		10
Carbon disulfide	75150	10,000	P022	100
Carbon oxyfluoride (R,T)	353504		U033	1,000
Carbon tetrachloride	56235		U21 1	10
Carbonic acid, dithallium(1+) salt	6533739		U21 5	100
Carbonic dichloride	75445		P095	10
Carbonic difluoride	353504		U033	1,000
Carbonochloridic acid, methyl ester	79221		U1 56	1,000
Carbonyl Sulfide	463581			100
Carbophenothion	786196	500		1
Catechol	120809			100
Chloral	75876		U034	5,000
Chlorambem	133904			100
Chlorambucil	305033		U035	10
Chlordane	57749	1,000	U036	1
Chlordane, alpha & gamma isomers	57749		U036	1
Chlordane, technical	57749		U036	1
Chlorfenvinfos	470906	500		1
Chlorinated champhene (Campheclor)	8001352			1
Chlorine	7782505	100		10
Chlormephos	24934916	500		1
Chlormequat chloride	999815	100/10,000		1
Chlornaphazine	494031		U026	100
Choroacetaldehyde	107200		P023	1,000
Chloroacetophenone	532274			100
Chloroacetic acid	79118	100/10,000		100
p-Chloroaniline	106478		P024	1,000
Chlorobenzene	108907		U037	100
Chlorobenzilate	510156		U038	10
p-Chloro-m-cresol (4)	59507		U039	5,000
1-Chloro-2,3-epoxypropane	106898		U041	100
Chlorodibromomethane	124481			100
Chloroethane	75003			100
Chloroethanol	107073	500		1
Chloroethyl chlorofomate	627112	1,000		1
2-Chloroethyl vinyl ether	110758		U042	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Chloroform	67663	10,000	U044	10
Chloromethane	74873		U045	100
Chloromethyl ether	542881	100	P016	1
Chloromethyl methyl ether	107302	100	U046	10
beta-Chloronaphthalene	91587		U047	5,000
2-Chloronaphthalene	91587		U047	5,000
Chlorophacinone	3691358	100/10,000		1
o-Chlorophenol (2)	95578		U048	100
4-Chlorophenyl phenyl ether	7005723			5,000
1 -(o-Chlorophenyl)thiourea	5344821		P026	100
Chloroprene	126998			100
3-Chloropropionitrile	542767		P027	1,000
Chlorosulfonic acid	7790945			1,000
4-Chloro-o-toluidine, hydrochloride	3165933		U049	100
Chlorpyrifos	2921882			1
Chloroxuron	1982474	500/10,000		1
Chlorthiophos	21923239	500		1
Chromic acetate	1066304			1,000
Chromic acid	11115745 7738945			10
Chromic acid H_2CrO_4, calcium salt	13765190		U032	10
Chromic chloride (Chromium chloride)	10025737	1/10,000		1
Chromic sulfate	10101538			1,000
Chromium++	7440473			5,000
Chromous chloride	10049055			1,000
Chrysene	218019		U050	100
Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)- N,N',O,O')-,	62207765	100/10,000		1
Cobaltous bromide	7789437			1,000
Cobalt carbonyl	10210681	10/10,000		1
Cobaltous formate	544183			1,000
Cobaltous sulfamate	14017415			1,000
Coke Oven Emissions	NA			1
Colchicine	64868	10/10,000		1
Copper++	7440508			5,000
Copper cyanide	544923		P029	10
Coumaphos	56724	100/10,000		10
Coumatetralyl	5836293	500/10,000		1
Creosote	8001589		U051	1
Cresol(s) (Phenol, Methyl)	1319773		U052	100
m-Cresol	108394	1,000/10,000		100
o-Cresol	95487			100
p-Cresol	106445			100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Cresylic acid	1319773		U052	100
m-Cresylic acid	108394			100
o-Cresylic acid	95487			100
p-Cresylic acid	106445			100
Crimidine	535897	100/10,000		1
Crotonaldehyde	123739 4170303	1,000 1,000	U053	100 100
Cumene (I)	98828		U055	5,000
Cupric acetate	142712			100
Cupric acetoarsenite	12002038			1
Cupric chloride	7447394			10
Cupric nitrate	3251238			100
Cupric oxalate	5893663			100
Cupric sulfate	7758987			10
Cupric sulfate, ammoniated	10380297			100
Cupric tartrate	815827			100
Cyanides (soluble salts and complexes) not otherwise specified	57125		P030	10
Cyanogen	460195		P031	100
Cyanogen bromide	506683	500/10,000	U246	1,000
Cyanogen chloride	506774		P033	10
Cyanogen iodide (Iodine cyanide)	506785	1,000/10,000		1
Cyanophos	2636262	1,000		1
Cyanuric fluoride	675149	100		1
2,5-Cyclohexadiene-1,4-dione	106514		U197	10
Cyclohexane (I)	110827		U056	1,000
Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6- beta)-	58899		U129	1
Cyclohexanone (I)	108941		U057	5,000
2-Cyclohexanone	131895		P034	100
Cycloheximide	66819	100/10,000		1
Cyclohexylamine	108918	10,000		1
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474		U1 30	10
Cyclophosphamide	50180		U058	10
2,4-D Acid	94757		U240	100
2,4-D Ester	94111 94791 94804 1320189 1928387 1928616 1929733 2971382 25168267 53467111			100
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757		U240	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Daunomycin	20830813		U059	10
Decarborane(14)	17702419	500/10,000		1
Demeton	8065483	500		1
Demeton-S-Methyl	919868	500		1
DDD, 4,4'DDD	72548		U060	1
DDE, 4,4'DDE	72559			1
DDT, 4,4'DDT	50293		U061	1
DEHP (Diethylhexyl phthalate)	117817		U028	100
Diallate	2303164		U062	100
Dialifor	10311849	100/10,000		1
Diazinon	333415			1
Diazomethane	334883			100
Dibenz[a,h]anthracene	53703		U063	1
1,2:5,6-Dibenzanthracene	53703		U063	1
Dibenzo[a,h]anthracene	53703		U063	1
Dibenzofuran	132649			100
Dibenz[a,i]pyrene	189559		U064	10
1,2-Dibromo-3-chloropropane	96128		U066	1
Dibromoethane	106934		U067	1
Diborane	19287457	100		1
Dibutyl phthalate	84742		U069	10
Di-n-butyl phthalate	84742		U069	10
Dicamba	1918009			1,000
Dichlobenil	1194656			100
Dichlone	117806			1
Dichlorobenzene	25321226			100
m-Dichlorobenzene (1,3)	541731		U071	100
o-Dichlorobenzene (1,2)	95501		U070	100
p-Dichlorobenzene (1,4)	106467		U072	100
3,3'-Dichlorobenzidine	91941		U073	1
Dichlorobromomethane	75274			5,000
1,4-Dichloro-2-butene (I,T)	764410		U074	1
Dichlorodifluoromethane	75718		U075	5,000
1,1 -Dichloroethane	75343		U076	1,000
1,2-Dichloroethane	107062		U077	100
1,1 -Dichloroethylene	75354		U078	100
1,2-Dichloroethylene	156605		U079	1,000
Dichloroethyl ether	11444	10,000	U025	10
Dichloroisopropyl ether	108601		U027	1,000
Dichloromethoxy ethane	111911		U024	1,000
Dichloromethyl ether	542881		P016	10
Dichloromethylphenylsilane	149746	1,000		1
2,4-Dichlorophenol	120832		U081	100
2,6-Dichlorophenol	87650		U082	100
Dichlorophenylarsine	696286		P036	1
Dichloropropane	26638197			1,000
1,1 -Dichloropropane	78999			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
1,3-Dichloropropane	142289			
1,2-Dichloropropane	78875		U083	1,000
Dichloropropane--Dichloropropene (mixture)	8003198			100
Dichloropropene	26952238			100
2,3-Dichloropropene	78886			
1,3-Dichloropropene	542756		U084	100
2,2-Dichloropropionic acid	75990			5,000
Dichlorvos	62737	1,000		10
Dicofol	115322			10
Dicrotophos	141662	100		1
Dieldrin	60571		P037	1
1,2:3,4-Diepoxybutane (I,T)	1464535	500	U085	10
Diethanolamine	111422			100
Diethyl chlorophosphate	814493	500		1
Diethylamine	109897			1,000
Diethylarsine	692422		P038	1
Diethylcarbmazine citrate	1642542	100/10,000		1
1,4-Diethylenedioxide	123911		U1 08	100
Diethylhexyl phthalate	117817		U028	100
N,N-Diethylaniline	91667			1,000
N,N'-Diethylhydrazine	1615801		U086	10
O,O-Diethyl S-methyl dithiophosphate	3288582		U087	5,000
Diethyl-p-nitrophenyl phosphate	311455		P041	100
Diethyl phthalate	84662		U088	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972		P040	100
Diethylstilbestrol	56531		U089	1
Diethyl sulfate	64675			10
Digitoxin	71636	100/10,000		1
Diglycidyl ether	2238075	1,000		1
Digoxin	20830755	10/10,000		1
Dihydrosafrole	94586		U090	10
Diisopropyfluorophosphate	55914		P043	100
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a- beta)-	309002		P004	1
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)-	465736		P060	1
2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1 a,2,2a,3,6,6a,7,7a-octahydro-,(1 a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)-	60571		P037	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro- 1 a,2,2a,3,6,6a,7,7aocta-hydro-, (1a-alpha, 2-beta, 2a-beta, 3- alpha, 6-alpha, 6a-beta,	72208		P051	1
Dimethoate	60515		P044	10
3,3'-Dimethoxybenzidine	119904		U091	10
Dimefox	115264	500		1
Dimethoate	60515	500/10,000		10
Dimethyl Phosphorochloridothioate	2524030	500		1
Dimethyl sulfate	77781	500		100
Dimethylamine (I)	124403		U092	1,000
p-Dimethylaminoazobenzene	60117		U093	10
7, 12-Dimethylbenz[a]anthracene	57976		U094	1
3,3'-Dimethylbenzidine	119937		U095	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159		U096	10
Dimethylcarbamoyl chloride	79447		U097	1
Dimethylformamide	68122			100
Dimethyldichlorosilane	75785	500		1
1,1 -Dimethylhydrazine	57147	1,000	U098	10
1,2-Dimethylhydrazine	540738		U099	1
alpha, alpha-Dimethylphenethylamine	122098		P046	5,000
Dimethyl-p-phenylenediamine	99989	10/10,000		1
2,4-Dimethylphenol	105679		U101	100
Dimethyl phthalate	131113		U102	5,000
Dimethyl sulfate	77781		U103	100
Dimetilan	644644	500/10,000		1
Dinitrobenzene (mixed)	25154545			100
m-Dinitrobenzene	99650			
o-Dinitrobenzene	528290			
p-Dinitrobenzene	100254			
4,6-Dinitro-o-cresol and salts	534521	10/10,000	P047	10
Dinitrophenol	25550587			10
2,5-Dinitrophenol	329715			
2,6-Dinitrophenol	573568			
2,4-Dinitrophenol	51285		P048	10
Dinitrotoluene	25321146			10
3,4-Dinitrotoluene	610399			
2,4-Dinitrotoluene	121142		U105	10
2,6-Dinitrotoluene	606202		U106	100
Dinoseb	88857	100/10,000	P020	1,000
Dinoterb	1420071	500/10,000		1
Di-n-octyl phthalate	117840		U107	5,000
1,4-Dioxane	123911		U108	100
Dioxathion	78342	500		1
Diphacinone	82666	10/10,000		1
1,2-Diphenylhydrazine	122667		U109	10
Diphosphoramide, octamethyl-	152169	100	P085	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Diphosphoric acid, tetraethyl ester	107493		P111	10
Dipropylamine	142847		U110	5,000
Di-n-propylnitrosamine	621647		U1 11	10
Diquat	85007 2764729			1,000
Disulfoton	298044	500	P039	1
Dithiazanine iodide	514738	500/10,000		1
Dithiobiuret	541537	100/10,000	P049	100
Diuron	330541			100
Dodecylbenzenesulfonic acid	27176870			1,000
Emetine, Dihydrochloride	316427	1/10,000		1
Endosulfan	115297	10/10,000	P050	1
alpha-Endosulfan	959988			1
beta-Endosulfan	33213659			1
Endosulfant sulfate	1031078			1
Endothall	145733		P088	1,000
Endothion	2778043	500/10,000		1
Endrin	72208	500/10,000	P051	1
Endrin aldehyde	7421934			1
Endrin & metabolites	72208		P051	1
Epichlorohydrin	106898	1,000	U041	100
Epinephrine	51434		P042	1,000
EPN	2104645	100/10,000		1
1,2-Epoxybutane	106887			100
Ergocalciferol	50146	1,000/10,000		1
Ergotamine tartrate	379793	500/10,000		1
Ethanal	75070		U001	1,000
Ethanamine, N-ethyl-N-nitroso-	55185		U174	1
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805		U1 55	5,000
Ethane, 1,2-dibromo-	106934		U067	1
Ethane, 1,1 -dichloro-	75343		U076	1,000
Ethane, 1,2-dichloro-	107062		U077	100
Ethanedinitrile	460195		P031	100
Ethane, hexachloro-	67721		U131	100
Ethane, 1,1 '-[methylenebis(oxy)]bis(2-chloro-	111911		U024	1,000
Ethane, 1,1'-oxybis-	60297		U117	100
Ethane, 1,1 '-oxybis(2-chloro-	111444		U025	10
Ethane, pentachloro-	76017		U1 84	10
Ethanesulfonyl chloride, 2-chloro	1622328	500		1
Ethane, 1,1,1,2-tetrachloro-	630206		U208	100
Ethane, 1,1,2,2-tetrachloro-	79345		U209	100
Ethanethioamide	62555		U218	10
Ethane, 1,1,1-trichloro-	71556		U226	1,000
Ethane, 1,1,2-trichloro-	79005		U227	100
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl	16752775		P066	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Ethanol, 1,2-Dichloro-, acetate	10140871	1,000		1
Ethanol, 2-ethoxy-	110805		U359	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547		U173	1
Ethanone, 1-phenyl-	98862		U004	5,000
Ethene, chloro-	75014		U043	1
Ethene, 2-chloroethoxy-	110758		U042	1,000
Ethene, 1,1 -dichloro-	75354		U078	100
Ethene, 1,2-dichloro- (E)	156605		U079	1,000
Ethene, tetrachloro-	127184		U210	100
Ethene, trichloro-	79016		U228	100
Ethion	563122	1,000		10
Ethoprophos	13194484	1,000		1
Ethyl acetate (I)	141786		U1 12	5,000
Ethyl acrylate (I)	140885		U113	1,000
Ethylbenzene	100414			1,000
Ethylbis(2-Chloroethyl)amine	538078	500		1
Ethyl carbamate (urethane)	51796		U238	100
Ethyl chloride	75003			100
Ethyl cyanide	107120		P101	10
Ethylenebisdithiocarbamic acid, salts & esters	111546		U1 14	5,000
Ethylenediamine	107153			5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004			5,000
Ethylene dibromide	106934		U067	1
Ethylene dichloride	107062		U077	100
Ethylene fluorohydrin	371620	10		1
Ethylene glycol	107211			5,000
Ethylene glycol monoethyl ether	110805		U359	1,000
Ethylene oxide (I,T)	75218	1,000	U115	10
Ethylenediamine	107153	10,000		5,000
Ethylenethiourea	96457		U1 16	10
Ethyleneimine	151564	500	P054	1
Ethyl ether (I)	60297		U1 17	100
Ethylthiocyanate	542905	10,000		1
Ethylidene dichloride	75343		U076	1,000
Ethyl methacrylate	97632		U1 18	1,000
Ethyl methanesulfonate	62500		U1 19	1
Famphur	52857		P097	1,000
Fenamlphos	22224926	10/1 0,000		1
Fenltrothion	122145	500		1
Fensulfothion	115902	500		1
Ferric ammonium citrate	1185575			1,000
Ferric ammonium oxalate	2944674 55488874			1,000
Ferric chloride	7705080			1,000
Ferric fluoride	7783508			100
Ferric nitrate	10421484			1,000
Ferric sulfate	10028225			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Ferrous ammonium sulfate	10045893			1,000
Ferrous chloride	7758943			100
Ferrous sulfate	7720787 7782630			1,000
Fluenetil	4301502	100/10,000		1
Fluoranthene	206440		U120	100
Fluorene	86737			5,000
Fluorine	7782414	500	P056	10
Fluoroacetamide	640197	100/10,000	P057	100
Fluoracetic acid	144490	10/10,000		1
Fluoroacetic acid, sodium salt	62786		P058	10
Fluoroacetyl chloride	359068	10		1
Fluorouracil	51218	500/10,000		1
Fonofos	944229	500		1
Formaldehyde	50000	500	U122	100
Formaldehyde cyanohydrin	107164	1,000		1
Formetanate hydrochloride	23422539	500/10,000		1
Formothion	2540821	100		1
Formparanate	17702577	100/10,000		1
Formic acid (C,T)	64186		U123	5,000
Fosthletan	21548323	500		1
Fubendazole	3878191	100/10,000		1
Fulminic acid, mercury(2⁺) salt (R,T)	628864		P065	10
Fumaric acid	110178			5,000
Furan (I)	110009	500	U124	100
Furan, tetrahydro- (I)	109999		U213	1,000
2-Furancarboxaldehyde (I)	98011		U125	5,000
2,5-Furandione	108316		U147	5,000
Furfural (I)	98011		U125	5,000
Furfuran (I)	110009		U124	100
Gallium trichloride	13450903	500/10,000		1
Glucopyranose, 2-deoxy-2-(3-methyl-3- nitrosoureido)-	18883664		U206	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664		U206	1
Glycidylaldehyde	765344		U126	10
Glycol ethers[4]				**
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257		U1 63	10
Guthion	86500			1
Heptachlor	76448		P059	1
Heptachlor epoxide	1024573			1
Hexachlorobenzene	118741		U127	10
Hexachlorobutadiene	87683		U128	1
Hexachlorocyclohexane (gamma isomer)	58899		U129	1
Hexachlorocyclopentadiene	77474	100	U130	10
Hexachloroethane	67721		U131	100
Hexachlorophene	70304		U132	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Hexachloropropene	1888717		U243	1,000
Hexaethyl tetraphosphate	757584		P062	100
Hexamethylene-1, 6-diisocyanate	822060			100
Hexamethylphosphoramide	680319			1
Hexamethylenediamine, N,N'-Dibutyl	4835114	500		1
Hexane	110543			5,000
Hexone (Methyl isobutyl ketone)	108101		U161	5,000
Hydrazine (R,T)	302012	1,000	U133	1
Hydrazine, 1,2-diethyl-	1615801		U086	10
Hydrazine, 1, 1-dimethyl-	57147		U098	10
Hydrazine, 1,2-dimethyl-	540738		U099	1
Hydrazine, 1,2-diphenyl-	122667		U1 09	10
Hydrazine, methyl-	60344		P068	10
Hydrazinecarbothioamide	79196		P116	100
Hydrochloric acid	7647010			5,000
Hydrocyanic acid	74908	100	P063	10
Hydrofluoric acid	7664393		U134	100
Hydrogen chloride (gas only)	7647010	500		5,000
Hydrogen cyanide	74908		P063	10
Hydrogen fluoride	7664393	100	U134	100
Hydrogen peroxide (Conc. >52%)	7722841	1,000		1
Hydrogen phosphide	7803512		P096	100
Hydrogen selenide	7783075	10		1
Hydrogen sulfide	7783064	500	U135	100
Hydroperoxide, 1-methyl-1 -phenylethyl-	80159		U096	10
Hydroquinone	123319	500/1 0,000		100
2-Imidazolidinethione	96457		U1 16	10
Indeno(1,2,3-cd)pyrene	193395		U1 37	100
Iodomethane	74884		U138	100
Iron, Pentacarbonyl-	13463406	100		1
Isobenzan	297789	100/10,000		1
1,3-Isobenzofurandione	85449		U1 90	5,000
Isobutyronitrile	78820	1,000		1
Isobutyl alcohol (I,T)	78831		U140	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	500/10,000		1
Isodrin	465736	100/1 0,000	P060	1
Isofluorphate	55914	100		100
Isophorone	78591			5,000
Isophorone Diisocyanate	4098719	500		1
Isoprene	78795			100
Isopropanolamine dodecylbenzene sulfonate	42504461			1,000
Isopropyl chloroformate	108236	1,000		1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	500		1
Isosafrole	120581		U141	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964		P007	1,000
Kepone	143500		U142	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Lactonitrile	78977	1,000		1
Lasiocarpine	303344		U143	10
Lead acetate	301042		U144	#
Lead arsenate	7784409 7645252 10102484			1
Lead, bis(acetato-O)tetrahydroxytri	1335326		U146	10
Lead chloride	7758954			10
Lead fluoborate	13814965			10
Lead fluoride	7783462			10
Lead iodide	10101630			10
Lead nitrate	10099748			10
Lead phosphate	7446277		U145	10
Lead stearate	7428480 1072351 52652592 56189094			10
Lead subacetate	1335326		U146	10
Lead sulfate	15739807 7446142			10
Lead sulfide	1314870			10
Lead thiocyanate	592870			10
Leptophos	21609905	500/10,000		1
Lewisite	541253	10		1
Lindane	58899	1,000/10,000	U129	1
Lithium chromate	14307358			10
Lithium hydride	7580678	100		1
Malathion	121755			100
Maleic acid	110167			5,000
Maleic anhydride	108316		U147	5,000
Maleic hydrazide	123331		U148	5,000
Malononitrile	109773	500/10,000	U149	1,000
Manganese, tricarbonyl methylcyclopentadieny	12108133	100		1
MDI (Methylene diphenyl diisocyanate)	101688			5,000
Mechlorethamine	51752	10		1
MEK (Methyl ethyl ketone)	78933		U1 59	5,000
Melphalan	148823		U150	1
Mephosfolan	950107	500		1
Mercaptodimethur	2032657			10
Mercuric acetate	1600277	500/10,000		1
Mercuric chloride	7487947	500/10,000		1
Mercuric cyanide	592041			1
Mercuric nitrate	10045940			10
Mercuric oxide	21908532	500/10,000		1
Mercuric sulfate	7783359			10
Mercuric thiocyanate	592858			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Mercurous nitrate	10415755 7782867			10
Mercury	7439976		U151	1
Mercury (acetate-O)phenyl-	62384		P092	100
Mercury fulminate	628864		P065	10
Methacrolein diacetate	10476956	1,000		1
Methacrylic anhydride	760930	500		1
Methacrylonitrile (I,T)	126987	500	U1 52	1,000
Methacryloyl chloride	920467	100		1
Methacryloyloxyethyl isocyanate	30674807	100		1
Methamidophos	10265926	100/10,000		1
Methanamine, N-methyl-	124403		U092	1,000
Methanamine, N-methyl-N-nitroso-	62759		P082	10
Methane, bromo-	74839		U029	1,000
Methane, chloro- (I,T)	74873		U045	100
Methane, chloromethoxy-	107302		U046	10
Methane, dibromo-	74953		U068	1,000
Methane, dichloro-	75092		U080	1,000
Methane, dichlorodifluoro-	75718		U075	5,000
Methane, iodo-	74884		U138	100
Methane, isocyanato-	624839		P064	10
Methane, oxybis(chloro-	542881		P016	10
Methanesulfenyl chloride, trichloro-	594423		P118	100
Methanesulfonyl fluoride	558258	1,000		1
Methanesulfonic acid, ethyl ester	62500		U1 19	1
Methane, tetrachloro-	56235		U21 1	10
Methane, tetranitro- (R)	509148		P112	10
Methane, tribromo-	75252		U225	100
Methane, trichloro-	67663		U044	10
Methane, trichlorofluoro-	75694		U121	5,000
Methanethiol (I,T)	74931		U1 53	100
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115297		P050	1
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one, 1,1 a,3,3a,4,5,5a,5b,6-	143500		U142	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-	76448		P059	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-	57749		U036	1
Methanol (I)	67561		U1 54	5,000
Methapyrilene	91805		U155	5,000
Methidathion	950378	500/10,000		1
Methiocarb	2032657	500/10,000	P199	10
Methomyl	16752775	500/10,000	P066	100
Methoxychlor	72435		U247	1
Methoxyethylmercuric acetate	151382	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Methyl alcohol (I)	67561		U1 54	5,000
Methyl aziridine	75558		P067	1
Methyl bromide	74839	1,000	U029	1,000
1 -Methylbutadiene (I)	504609		U1 86	100
Methyl chloride (I,T)	74873		U045	100
Methyl 2-chloroacrylate	80637	500		1
Methyl chlorocarbonate (I,T)	79221		U1 56	1,000
Methyl chloroform	71556		U226	1,000
Methyl chloroformate	79221	500	U1 56	1,000
3-Methylcholanthrene	56495		U1 57	10
4,4'-Methylenebis(2-chloroaniline)	101144		U1 58	10
Methylene bromide	74953		U068	1,000
Methylene chloride	75092		U080	1,000
4,4'-Methylenedianiline	101779			10
Methylene diphenyl diisocyanate (MDI)	101688			5,000
Methyl ethyl ketone (MEK) (I,T)	78933		U1 59	5,000
Methyl ethyl ketone peroxide (R,T)	1338234		U160	10
Methyl hydrazine	60344	500	P068	10
Methyl iodide	74884		U138	100
Methyl isobutyl ketone	108101		U161	5,000
Methyl isocyanate	624839	500	P064	10
Methyl isothiocyanate	556616	500		1
2-Methyllactonitrile	75865		P069	10
Methyl mercaptan	74931	500	U153	100
Methyl methacrylate (I,T)	80626		U1 62	1,000
Methyl parathion	298000		P071	100
Methyl phenkapton	3735237	500		1
Methyl phosphonic dichloride	676971	100		1
4-Methyl-2-pentanone (I)	108101		U161	5,000
Methyl tert-butyl ether	1634044			1,000
Methyl thiocyanate	556649	10,000		1
Methylthiouracil	56042		U164	10
Methyl vinyl ketone	78944	10		1
Methylmercuric dicyanamide	502396	500/10,000		1
Methyltrichlorosilane	75796	500		1
Metolcarb	1129415	100/10,000		1
Mevinphos	7786347	500		10
Mexacarbate	315184	500/10,000		1,000
Mitomycin C	50077	500/10,000	U010	10
MNNG	70257		U163	10
Monocrotophos	6923224	10/10,000		1
Monoethylamine	75047			100
Monomethylamine	74895			100
Muscimol	2763964	500/1 0,000	P007	1,000
Mustard gas	505602	500		1
Naled	300765			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**	**USEPA HW No.** [2]	**RQ (Pounds)**[3]
5, 12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9, 10-tetrahydro6,8,11 -trihydroxy-1 -	20830813		U059	10
1-Naphthalenamine	134327		U167	100
2-Naphthalenamine (beta-Naphthylamine)	91598		U168	1
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031		U026	100
Naphthalene	91203		U165	100
Naphthalene, 2-chloro-	91587		U047	5,000
1,4-Naphthalenedione	130154		U1 66	5,000
2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1, 1 '-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-	72571		U236	10
Naphthenic acid	1338245			100
1,4-Naphthoquinone	130154		U166	5,000
alpha-Naphthylamine	134327		U167	100
beta-Naphthylamine (2-Naphthalenamine)	91598		U168	1
alpha-Naphthylthiourea	86884		P072	100
Nickel++	7440020			100
Nickel ammonium sulfate	15699180			100
Nickel carbonyl	13463393	1	P073	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393		P073	10
Nickel chloride	7718549 37211055			100
Nickel cyanide	557197		P074	10
Nickel hydroxide	12054487			10
Nickel nitrate	14216752			100
Nickel sulfate	7786814			100
Nicotine & salts	54115	100	P075	100
Nicotine sulfate	65305	100/10,000		1
Nitric acid	7697372	1,000		1,000
Nitric acid, thallium(1+) salt	10102451		U217	100
Nitric oxide	10102439	100	P076	10
p-Nitroaniline	100016		P077	5,000
Nitrobenzene (I,T)	98953	10,000	U169	1,000
4-Nitrobiphenyl	92933			10
Nitrocyclohexane	1122607	500		1
Nitrogen dioxide	10102440 10544726	100	P078	10
Nitrogen oxide	10102439		P076	10
Nitroglycerine	55630		P081	10
Nitrophenol (mixed)	25154556			100
m-Nitrophenol	554847			100
o-Nitrophenol (2)	88755			100
p-Nitrophenol (4)	100027		U170	100
2-Nitropropane (I,T)	79469		U171	10
N-Nitrosodi-n-butylamine	924163		U1 72	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
N-Nitrosodiethanolamine	1116547		U173	1
N-Nitrosodiethylamine	55185		U174	1
N-Nitrosodimethylamine	62759	1,000	P082	10
N-Nitrosodiphenylamine	86306			100
N-Nitroso-N-ethylurea	759739		U176	1
N-Nitroso-N-methylurea	684935		U177	1
N-Nitroso-N-methylurethane	615532		U178	1
N-Nitrosomethylvinylamine	4549400		P084	10
N-Nitrosomorpholine	59892			1
N-Nitrosopiperidine	100754		U179	10
N-Nitrosopyrrolidine	930552		U180	1
Nitrotoluene	1321126			1,000
m-Nitrotoluene	99081			
o-Nitrotoluene	88722			
p-Nitrotoluene	99990			
5-Nitro-o-toluidine	99558		U181	100
Norbromide	991424	100/10,000		1
Octamethylpyrophosphoramide	152169		P085	100
Organorhodium complex (PMN-82-147)	0	10/10,000		1
Osmium tetroxide	20816120		P087	1,000
Ouabain	630604	100/10,000		1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733		P088	1,000
Oxamyl	23135220	100/10,000	P194	1
1,2-Oxathiolane, 2,2-dioxide	1120714		U193	10
2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180		U058	10
Oxetane, 3,3-bis(chloromethyl)-	78717	500		1
Oxirane (I,T)	75218		U115	10
Oxiranecarboxyaldehyde	765344		U126	10
Oxirane, (chloromethyl)-	106898		U041	100
Oxydisulfoton	2497076	500		1
Ozone	10028156	100		1
Paraformaldehyde	30525894			1,000
Paraldehyde	123637		U182	1,000
Paraquat	1910425	10/10,000		1
Paraquat methosulfate	2074502	10/10,000		1
Parathion	56382	100	P089	10
Parathion-methyl	298000	100/10,000		100
Paris green	12002038	500/10,000		100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
PCBs	1336363			
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
PCNB (Pentachloronitrobenzene)	82688		U1 85	100
Pentaborane	19624227	500		1
Pentachlorobenzene	608935		U1 83	10
Pentachloroethane	76017		U1 84	10
Pentachlorophenol	87865		U242	10
Pentachloronitrobenzene (PCNB)	82688		U1 85	100
Pentadecylamine	2570265	100/10,000		1
Paracetic acid	79210	500		1
1,3-Pentadiene (I)	504609		U1 86	100
Perachloroethylene	127184		U210	100
Perchloromethylmercaptan	594423	500		100
Phenacetin	62442		U187	100
Phenanthrene	85018			5,000
Phenol	108952	500/10,000	U188	1,000
Phenol, 2-chloro-	95578		U048	100
Phenol, 4-chloro-3-methyl-	59507		U039	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895		P034	100
Phenol, 2,4-dichloro-	120832		U081	100
Phenol, 2,6-dichloro-	87650		U082	100
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis- , (E)	56531		U089	1
Phenol, 2,4-dimethyl-	105679		U101	100
Phenol, 2,4-dinitro-	51285		P048	10
Phenol, methyl-	1319773		U052	1,000
m-Cresol	108394			
o-Cresol	95487			
p-Cresol	106445			
Phenol, 2-methyl-4,6-dinitro-and salts	534521		P047	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304		U132	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	100/10,000		1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857		P020	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	500/10,000		1
Phenol, 4-nitro-	100027		U170	100
Phenol, pentachloro-	87865		U242	10
Phenol, 2,3,4,6-tetrachloro-	58902		U212	10
Phenol, 2,4,5-trichloro-	95954		U230	10
Phenol, 2,4,6-trichloro-	88062		U23 1	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748		P009	10
Phenoxarsine, 10,1 0'-oxydi-	58366	500/1 0,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823		U150	1
Phenyl dichloroarsine	696286	500		1
1,1 0-(1,2-Phenylene)pyrene	193395		U1 37	100
p-Phenylenediamine	106503			5,000
Phenylhydrazine hydrochloride	59881	1,000/10,000		1
Phenylmercury acetate	62384	500/10,000	P092	100
Phenylsilatrane	2097190	100/10,000		1
Phenylthiourea	103855	100/10,000	P093	100
Phorate	298022	10	P094	10
Phosacetim	4104147	100/10,000		1
Phosfolan	947024	100/10,000		1
Phosgene	75445	10	P095	10
Phosmet	732116	10/10,000		1
Phosphamidon	13171216	100		1
Phosphine	7803512	500		100
Phosphorothioic acid, o,o-Dimethyl-s (2- Methylthio) ethyl ester	2587908	500		1
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	500		1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	100		1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	500		1
Phosphoric acid	7664382			5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455		P041	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	500		1
Phosphoric acid, lead(2+) salt (2:3)	7446277	500	U145	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044		P039	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022		P094	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582		U087	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515		P044	10
Phosphorofluondic acid, bis(1-methylethyl) ester	55914		P043	100
Phosphorothioic acid, O,O-diethyl O-(4- nitrophenyl) ester	56382		P089	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857		P097	1,000
Phosphorothioic acid, O,O-dimethyl O-(4- nitrophenyl) ester	298000		P071	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972		P040	100
Phosphorus	7723140	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Phosphorus oxychloride	10025873	500		1,000
Phosphorous pentachloride	10026138	500		1
Phosphorus pentasulfide (R)	1314803		U189	100
Phosphorus pentoxide	1314563	10		1
Phosphorus trichloride	7719122	1,000		1,000
Phthalic anhydride	85449		U190	5,000
Physostigmine	57476	100/10,000	P204	1
Phosostigmine, salicylate (1:1)	57647	100/10,000		1
2-Picoline	109068		U191	5,000
Picotoxin	124878	500/10,000		1
Piperidine	110894	1,000		1
Piperidine, 1-nitroso-	100754		U179	10
Pirimifos-ethyl	23505411	1,000		1
Plumbane, tetraethyl-	78002		P110	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363			1
Potassium arsenate	7784410			1
Potassium arsenite	10124502	500/10,000		1
Potassium bichromate	7778509			10
Potassium chromate	7789006			10
Potassium cyanide	151508	100	P098	10
Potassium hydroxide	1310583			1,000
Potassium permanganate	7722647			100
Potassium silver cyanide	506616	500	P099	1
Promecarb	2631370	500/10,000		1
Pronamide	23950585		U192	5,000
Propanal, 2-methyl-2-(methylthio)-, O- [(methylamino)carbonyl]oxime	116063		P070	1
1-Propanamine (I,T)	107108		U194	5,000
1-Propanamine, N-propyl-	142847		U1 10	5,000
1-Propanamine, N-nitroso-N-propyl-	621647		U1 11	10
Propane, 1,2-dibromo-3-chloro	96128		U066	1
Propane, 2-nitro- (I,T)	79469		U171	10
1,3-Propane sultone	1120714		U193	10
Propane 1,2-dichloro-	78875		U083	1,000
Propanedinitrile	109773		U149	1,000
Propanenitrile	107120		P101	10
Propanenitrile, 3-chloro-	542767		P027	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865		P069	10
Propane, 2,2'-oxybis[2-chloro-	108601		U027	1,000
1,2,3-Propanetnol, trinitrate- (R)	55630		P081	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		U235	10
1-Propanol, 2-methyl- (I,T)	78831		U140	5,000
2-Propanone (I)	67641		U002	5,000
2-Propanone, 1 -bromo-	598312		P017	1,000
Propargite	2312358			10
Propargyl alcohol	107197		P102	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Propargyl bromide	106967	10		1
2-Propenal	107028		P003	1
2-Propenamide	79061		U007	5,000
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717		U243	1,000
1-Propene, 1,3-dichloro-	542756		U084	100
2-Propenenitrile	107131		U009	100
2-Propenenitrile, 2-methyl- (I,T)	126987		U1 52	1,000
2-Propenoic acid (I)	79107		U008	5,000
2-Prepenoic acid, ethyl ester (I)	140885		U1 13	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632		U1 18	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626		U1 62	1,000
2-Propen-1-o1	107186		P005	100
Propiolactone, beta-	57578	500		1
Propionaldehyde	123386			1,000
Propionic acid	79094			5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721		U233	100
Propionic anhydride	123626			5,000
Propoxor (Baygon)	114261		U411	100
Propionitrile	107120	500		10
Propionitrile, 3-chloro-	542767	1,000		1,000
Propiophenone, 1, 4-amino phenyl	70699	100/10,000		1
n-Propylamine	107108		U194	5,000
Propyl chloroformate	109615	500		1
Propylene dichloride	78875		U083	1,000
Propylene oxide	75569	10,000		100
1,2-Propylenimine	75558	10,000	P067	1
2-Propyn-1-o1	107197		P102	1,000
Prothoate	2275185	100/1 0,000		1
Pyrene	129000	1,000/1 0,000		5,000
Pyrethrins	12129 9 121211			1
3,6-Pyridazinedione, 1,2-dihydro-	123331		U148	5,000
4-Pyridinamine	504245		P008	1,000
Pyridine	110861		U196	1,000
Pyridine, 2-methyl-	109068		U191	5,000
Pyridine, 2-methyl-5-vinyl-	140761	500		1
Pyridine, 4-amino-	504245	500/10,000		1,000
Pyridine, 4-nitro-, 1-oxide	1124330	500/10,000		1
Pyridine, 3-(1 -methyl-2-pyrrolidinyl)-, (S)	54115		P075	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)amino]-	66751		U237	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2- thioxo-	56042		U164	10
Pyriminil	53558251	100/10,000		1
Pyrrolidine, 1 -nitroso-	930552		U1 80	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Quinoline	91225			5,000
Quinone (p-Benzoquinone)	106514		U197	10
Quintobenzene	82688		U185	100
Reserpine	50555		U200	5,000
Resorcinol	108463		U201	5,000
Saccharin and salts	81072		U202	100
Salcomine	14167181	500/10,000		1
Sarin	107448	10		1
Safrole	94597		U203	100
Selenious acid	7783008	1,000/10,000	U204	10
Selenious acid, dithallium (1+) salt	12039520		P114	1,000
Selenium ++	7782492			100
Selenium dioxide	7446084		U204	10
Selenium oxychloride	7791233	500		1
Selenium sulfide (R,T)	7488564		U205	10
Selenourea	630104		P103	1,000
Semicarbazide hydrochloride	563417	1,000/10,000		1
L-Serine, diazoacetate (ester)	115026		U01 5	1
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1,000		1
Silver ++	7440224			1,000
Silver cyanide	506649		P104	1
Silver nitrate	7761888			1
Silvex (2,4,5-TP)	93721		U233	100
Sodium	7440235			10
Sodium arsenate	7631892	1,000/10,000		1
Sodium arsenite	7784465	500/10,000		1
Sodium azide	26628228	500	P105	1,000
Sodium bichromate	10588019			10
Sodium bifluoride	1333831			100
Sodium bisulfite	7631905			5,000
Sodium cacodylate	124652	100/10,000		1
Sodium chromate	7775113			10
Sodium cyanide	143339	100	P106	10
Sodium dodecylbenzenesulfonate	25155300			1,000
Sodium fluoride	7681494			1,000
Sodium fluoroacetate	62748	10/10,000		10
Sodium hydrosulfide	16721805			5,000
Sodium hydroxide	1310732			1,000
Sodium hypochlorite	7681529 10022705			100
Sodium methylate	124414			1,000
Sodium nitrite	7632000			100
Sodium prentachlorophenate	131522	100/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Sodium phosphate, dibasic	7558794 10039324 10140655			5,000
Sodium phosphate, tribasic	7601549 7758294 7785844 10101890 10124568 10361894			5,000
Sodium selenate	13410010	100/10,000		1
Sodium selenite	10102188 7782823	100/10,000		100
Sodium tellurite	10102202	500/10,000		1
Stannane, acetoxytriphenyl	900958	500/10,000		1
Streptozotocin	18883664		U206	1
Strontium chromate	7789062			10
Strychnidin-10-one	57249		P108	10
Strychnidin-1 0-one, 2,3-dimethoxy-	357573		P018	100
Strychnine, & salts	572494	100/10,000	P108	10
Strychnine sulfate	60413	100/10,000		1
Styrene	100425			1,000
Styrene oxide	96093			100
Sulfotep	3689245	500		100
Sulfoxide, 3-chloropropyl octyl	3569571	500		1
Sulfur monochloride	12771083			1,000
Sulfur dioxide	7446095	500		1
Sulfur phosphide (R)	1314803		U189	100
Sulfur tetrafluoride	7783600	100		1
Sulfur trioxide	7446119	100		1
Sulfuric acid	7664939 8014957	1,000		1,000
Sulfuric acid, dithallium (1+) salt	7446186 10031591		P115	100
Sulfuric acid, dimethyl ester	77781		U103	100
Tabun	77816	10		1
2,4,5-T acid	93765		U232	1,000
2,4,5-T amines	2008460 1319728 3813147 6369966 6369977			5,000
Tellurium	13494809	500/10,000		1
Tellurium hexafluoride	7783804	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2,4,5-T esters	9379 8 1928478 2545597 2516815			1,000
2,4,5-T salts	13560991			1,000
2,4,5-T	93765		U232	1,000
TDE (Dichloro diphenyl dichloroethane)	72548		U060	1
TEPP (Tetraethyl ester diphosphoric acid)	107493	100		10
Terbufos	13071799	100		1
1,2,4,5-Tetrachlorobenzene	95943		U207	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016			1
1,1,1,2-Tetrachloroethane	630206		U208	100
1,1,2,2-Tetrachloroethane	79345		U209	100
Tetrachloroethene	127184		U21 0	100
Tetrachloroethylene	127184		U21 0	100
2,3,4,6-Tetrachlorophenol	58902		U212	10
Tetraethyl lead	78002	100	P110	10
Tetraethyl pyrophosphate	107493		P111	10
Tetraethyldithiopyrophosphate	3689245		P109	100
Tetraethyltin	597648	100		1
Tetramethyllead	75741	100		1
Tetrahydrofuran (I)	109999		U21 3	1,000
Tetranitromethane (R)	509148	500	P112	10
Tetraphosphoric acid, hexaethyl ester	757584		P062	100
Thallic oxide	1314325		P113	100
Thallium ++	7440280			1,000
Thallium acetate	563688		U214	100
Thallium carbonate	6533739		U21 5	100
Thallium chloride	7791120		U216	100
Thallium nitrate	10102451		U217	100
Thallium oxide	1314325		P113	100
Thallium selenite	12039520		P114	1,000
Thallium sulfate	7446186 10031591	100/10,000	P115	100
Thallous carbonate (Thallium (1) carbonate)	6533739	100/10,000	U215	100
Thallous chloride (Thallium (1) chloride)	7791120	100/10,000	U216	100
Thallous malonate (Thallium (1) malonate)	2757188	100/10,000		1
Thallous sulfate (Thallium (1) sulfate)	7446186	100/10,000	P115	100
Thioacetamide	62555		U218	10
Thiocarbazide	2231574	1,000/10,000		1
Thiodiphosphoric acid, tetraethyl ester	3689245		P109	100
Thiofanox	39196184	100/10,000	P045	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537		P049	100
Thiomethanol (I,T)	74931		U1 53	100
Thionazin	297972	500		100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-	137268		U244	10
Thiophenol	108985	500	P104	100
Thiosemicarbazide	79196	100/10,000	P116	100
Thiourea	62566		U219	10
Thiourea, (2-chlorophenyl)-	5344821	100/10,000	P026	100
Thiourea, (2-methylphenyl)-	614788	500/10,000		1
Thiourea, 1 -naphthalenyl-	86884		P072	100
Thiourea, phenyl-	103855		P093	100
Thiram	137268		U244	10
Titanium tetrachloride	7550450	100		1,000
Toluene	108883		U220	1,000
Toluenediamine	95807 496720 823405 25376458		U221	10
Toluene diisocyanate (R,T)	584849 91087 26471625	500 100	U223	100 100
o-Toluidine	95534		U328	100
p-Toluidine	106490		U353	100
o-Toluidine hydrochloride	636215		U222	100
Toxaphene	8001352		P123	1
2,4,5-TP acid	93721		U233	100
2,4,5-TP acid esters	32534955			100
1H-1,2,4-Triazol-3 -amine	61825		U01 1	10
Trans-1,4-dichlorobutene	110576	500		1
Triamiphos	1031476	500/10,000		1
Triazofos	24017478	500		1
Trichloroacetyl chloride	76028	500		1
Trichlorfon	52686			100
1,2,4-Trichlorobenzene	120821			100
1,1,1-Trichloroethane	71556		U226	1,000
1,1,2-Trichloroethane	79005		U227	100
Trichloroethene	79016		U228	100
Trichloroethylene	79016		U228	100
Trichloroethylsilane	115219	500		1
Trichloronate	327980	500		1
Trichloromethanesulfenyl chloride	594423		P118	100
Trichloromonofluoromethane	75694		U121	5,000
Trichlorophenol	21567822			10
2,3,4-Trichlorophenol	15950660			
2,3,5-Trichlorophenol	933788			
2,3,6-Trichlorophenol	933755			
2,4,5-Trichlorophenol	95954		U230	10
2,4,6-Trichlorophenol	88062		U231	10
3,4,5-Trichlorophenol	609198			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Trichlorophenylsilane	98135	500		1
Trichloro(chloromethyl)silane	1558254	100		1
Trichloro(dichlorophenyl)silane	27137855	500		1
Triethanolamine dodecylbenzene-sulfonate	27323417			1,000
Triethoxysilane	998301	500		1
Trifluralin	1582098			10
Triethylamine	121448			5,000
Trimethylamine	75503			100
Trimethylchlorsilane	75774	1,000		1
2,2,4-Trimethylpentane	540841			1,000
Trimethylolpropane phosphite	824113	100/10,000		1
Trimethyiltin chloride	1066451	500/10,000		1
1,3,5-Trinitrobenzene (R,T)	99354		U234	10
1,3,5-Trioxane, 2,4,6-trimethyl-	123637		U1 82	1,000
Triphenyltin chloride	639587	500/10,000		1
Tris(2-chloroethyl)amine	555771	100		1
Tris(2,3-dibromopropyl) phosphate	126727		U235	10
Trypan blue	72571		U236	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA		D001	100
Unlisted Hazardous Wastes Characteristic of	NA		D002	100
Unlisted Hazardous Wastes Characteristic of	NA		D003	100
Unlisted Hazardous Wastes Characteristic of				

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Arsenic			D004	1
Barium			D005	1,000
Benzene			D018	10
Cadmium			D006	10
Carbon Tetrachloride			D019	10
Chlordane			D020	1
Chlorobenzene			D021	100
Chloroform			D022	10
Chromium			D007	10
o-Cresol			D023	100
m-Cresol			D024	100
p-Cresol			D025	100
Cresol			D026	100
2,4-D (Dichlorophenoxyacetic acid)			D016	100
1,4-Dichlorobenzene			D027	100
1,2-Dichloroethane			D028	100
1,1 -Dichloroethylene			D029	100
2,4-Dinitrotoluene			D030	10
Endrin			D012	1
Heptachlor (and epoxide)			D03 1	1
Hexachlorobenzene			D032	10
Hexachlorobutadiene			D033	1
Hexachloroethane			D034	100
Lead			D008	10
Lindane			D013	1
Mercury			D009	1
Methoxychlor			D014	1
Methyl ethyl ketone			D035	5,000
Nitrobenzene			D036	1,000
Pentachlorophenol			D037	10
Pyridine			D038	1,000
Selenium			D010	10
Silver			D011	1
Tetrachloroethylene			D039	100
Toxaphene			D015	1
Trichloroethylene			D040	100
2,4,5 Trichlorophenol			D041	10
2,4,5-TP			D017	100
Vinyl chloride			D043	1
Uracil mustard	66751		U237	10
Uranyl acetate	541093			100
Uranyl nitrate	10102064 36478769			100
Urea, N-ethyl-N-nitroso	759739		U176	1
Urea, N-methyl-N-nitroso	684935		U177	1
Urethane (Carbamic acid ethyl ester)	51796		U238	100
Valinomycin	2001958	1,000/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Vanadic acid, ammonium salt	7803556		P119	1,000
Vanadic oxide V_2O_5	1314621		P120	1,000
Vanadic pentoxide	1314621		P120	1,000
Vanadium pentoxide	1314621	100/10,000		1,000
Vanadyl sulfate	27774136			1,000
Vinyl chloride	75014		U043	1
Vinyl acetate	108054			5,000
Vinyl acetate monomer	108054	1,000		5,000
Vinylamine, N-methyl-N-nitroso-	4549400		P084	10
Vinyl bromide	593602			100
Vinylidene chloride	75354		U078	100
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	500/10,000	P001	100
Warfarin sodium	129066	100/10,000		100
Xylene (mixed)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
Xylenol	1300716			1,000
Xylylene dichloride	28347139	100/10,000		1
Yohimban-16-carboxylic acid, 11,17 dimethoxy-1 8-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,1 7-alpha, 1 8-beta,20-alpha)-	50555		U200	5,000
Zinc ++	7440666			1,000
Zinc acetate	557346			1,000
Zinc ammonium chloride	52628258 14639975 14639986			1,000
Zinc borate	1332076			1,000
Zinc bromide	7699458			1,000
Zinc carbonate	3486359			1,000
Zinc chloride	7646857			1,000
Zinc cyanide	557211		P121	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	100/10,000		1
Zinc fluoride	7783495			1,000
Zinc formate	557415			1,000
Zinc hydrosulfite	7779864			1,000
Zinc nitrate	7779886			1,000
Zinc phenosulfonate	127822			5,000
Zinc phosphide	1314847	500	P122	100
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847		P122	100
Zinc silicofluoride	16871719			5,000
Zinc sulfate	7733020			1,000
Zirconium nitrate	13746899			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Zirconium potassium fluoride	16923958			1,000
Zirconium sulfate	14644612			5,000
Zirconium tetrachloride	10026116			5,000
F001			**F001**	**10**
The following spent halogenated solvents used in degreasing: all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Trichloroethylene	79016		U228	100
(c) Methylene chloride	75092		U080	1,000
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Carbon tetrachloride	56235		U21 1	10
(f) Chlorinated fluorocarbons	NA			5,000
F002			**F002**	**10**
The following spent halogenated solvents: All spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Methylene chloride	75092		U080	1,000
(c) Trichloroethylene	79016		U228	100
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Chlorobenzene	108907		U037	100
(f) 1,1,2-Trichloro-1,2,2 trifluoroethane	76131			5,000
(g) o-Dischlorobenzene	95501		U070	100
(h) Trichlorofluoromethane	75694		U121	5,000
(i) 1,1,2-Trichloroethane	79005		U227	100
F003			**F003**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Xylene	1330207			1,000
(b) Acetone	67641			5,000
(c) Ethyl acetate	141786			5,000
(d) Ethylbenzene	100414			1,000
(e) Ethyl ether	60297			100
(f) Methyl isobutyl ketone	108101			5,000
(g) n-Butyl alcohol	71363			5,000
(h) Cyclohexanone	108941			5,000
(i) Methanol	67561			5,000
F004			**F004**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319773		U052	100
(b) Nitrobenzene	98953		U169	1,000
F005			**F005**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a)	Toluene		108883	U220
(b)	Methyl ethyl ketone		78933	U1 59
(c)	Carbon disulfide		75150	P022
(d)	Isobutanol		78831	U140
(e)	Pyndine		110861	U196

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
F006			**F006**	**10**
Wastewater treatment sludges from electroplating operations, except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.				
F007			**F007**	**10**
Spent cyanide plating bath solutions from electroplating operations.				
F008			**F008**	**10**
Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.				
F009			**F009**	**10**
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.				
F010			**F010**	**10**
Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.				
F011			**F011**	**10**
Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.				
F012			**F012**	**10**
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.				
F019			**F019**	**10**
Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process.				
F020			**F020**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)				
F021			**F021**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.				
F022			**F022**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.				
F023			**F023**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.)				
F024			**F024**	**1**
Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent desicants, wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in separately in Table AP1.T3 or wastes listed in Table AP1.T4 and having a USEPA HW No. beginning with "K.")				
F025			**F025**	**1**
Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.				

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
F026 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions.			**F026**	1
F027 Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.)			**F027**	1
F028 Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027.			**K028**	1
F032 Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**F032**	1
F034 Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**F034**	1
F035 Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**F035**	1
F037 Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K05 1 wastes are not included in this listing.			**F037**	1
F038 Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from and/or chemical separation of oil/water/solids in process wastewater from petroleum refineries. Such wastes include, limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all DAF units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from once-contact cooling water segregated from treatment from other process or oil cooling wastes, ; sludges and floats sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment K048, and K051 wastes are not included in this			**F038**	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K001 Bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**K001**	**1**
K002 Wastewater treatment sludge from the production of chrome yellow and orange pigments.			**K002**	**10**
K003 Wastewater treatment sludge from the production of molyodate orange pigments.			**K003**	**10**
K004 Wastewater treatment sludge from the production of zinc yellow pigments.			**K004**	**10**
K005 Wastewater treatment sludge from the production of chrome green pigments.			**K005**	**10**
K006 Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).			**K006**	**10**
K007 Wastewater treatment sludge from the production of iron blue pigments.			**K007**	**10**
K008 Oven residue from the production of chrome oxide green pigments.			**K008**	**10**
K009 Distillation bottoms from the production of acetaldehyde from ethylene.			**K009**	**10**
K010 Distillation side cuts from the production of acetaldehyde from ethylene.			**K010**	**10**
K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.			**K011**	**10**
K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.			**K013**	**10**
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile.			**K014**	**5,000**
K015 Still bottoms from the distillation of benzyl chloride.			**K015**	**10**
K016 Heavy ends or distillation residues from the production of carbon tetrachloride.			**K016**	**1**
K017 Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.			**K017**	**10**
K018 Heavy ends from the fractionation column in ethyl chloride production.			**K018**	**1**
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride			**K019**	**1**
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer			**K020**	**1**
K021 Aqueous spent antimony catalyst waste from fluoromethanes production.			**K021**	**10**
K022 Distillation bottom tars from the production of phenol/acetone from cumene.			**K022**	**1**
K023 Distillation light ends from the production of ophthalic anhydride from naphthalene.			**K023**	**5,000**
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene.			**K024**	**5,000**
K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene.			**K025**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K026 Stripping still tails from the production of methyl ethyl pyridines.			**K026**	**1,000**
K027 Centrifuge and distillation residues from toluene diisocyanate production.			**K027**	**10**
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1, 1-trichloroethane.			**K028**	**1**
K029 Waste from the product steam stripper in the production of 1,1,1 -trichloroethane.			**K029**	**1**
K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.			**K030**	**1**
K031 By-product salts generated in the production of MSMA and cacodylic acid.			**K031**	**1**
K032 Wastewater treatment sludge from the production of chlordane.			**K032**	**10**
K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.			**K033**	**10**
K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.			**K034**	**10**
K035 Wastewater treatment sludges generated in the production of creosote.			**K035**	**1**
K036 Still bottoms from toluene reclamation distillation in the production of disulfoton.			**K036**	**1**
K037 Wastewater treatment sludges from the production of disulfoton.			**K037**	**1**
K038 Wastewater from the washing and stripping of phorate production.			**K038**	**10**
K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.			**K039**	**10**
K040 Wastewater treatment sludge from the production of phorate.			**K040**	**10**
K041 Wastewater treatment sludge from the production of toxaphene.			**K041**	**1**
K042 Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.			**K042**	**10**
K043 2,6-Dichlorophenol waste from the production of 2,4-D.			**K043**	**10**
K044 Wastewater treatment sludges from the manufacturing and processing of explosives.			**K044**	**10**
K045 Spent carbon from the treatment of wastewater containing explosives.			**K045**	**10**
K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.			**K046**	**10**
K047 Pink/red water from TNT operations.			**K047**	**10**
K048 Dissolved air flotation (DAF) float from the petroleum refining industry.			**K048**	**10**
K049 Slop oil emulsion solids from the petroleum refining industry.			**K049**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry.			**K050**	**10**
K051 API separator sludge from the petroleum refining industry.			**K051**	**10**
K052 Tank bottoms (leaded) from the petroleum refining industry.			**K052**	**10**
K060 Ammonia still lime sludge from coking operations.			**K060**	**1**
K061 Emission control dust/sludge from the primary production of steel in electric furnaces.			**K061**	**10**
K062 Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).			**K062**	**10**
K064 Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.			**K064**	**10**
K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.			**K065**	**10**
K066 Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.			**K066**	**10**
K069 Emission control dust/sludge from secondary lead smelting.			**K069**	**10**
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.			**K071**	**1**
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.			**K073**	**10**
K083 Distillation bottoms from aniline extraction.			**K083**	**100**
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organoarsenic compounds.			**K084**	**1**
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.			**K085**	**10**
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.			**K086**	**10**
K087 Decanter tank tar sludge from coking operations.			**K087**	**100**
K088 Spent potliners from primary aluminum reduction.			**K088**	**10**
K090 Emission control dust or sludge from ferrochromiumsilicon production.			**K090**	**10**
K091 Emission control dust or sludge from ferrochromium production.			**K091**	**10**
K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.			**K093**	**5,000**
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.			**K094**	**5,000**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K095 Distillation bottoms from the production of 1,1,1 -trichloroethane.			**K095**	**100**
K096 Heavy ends from the heavy ends column from the production of 1,1,1 -trichloroethane.			**K096**	**100**
K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.			**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.			**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.			**K099**	**10**
K100 Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.			**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.			**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.			**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.			**K105**	**10**
K106 Wastewater treatment sludge from the mercury cell process in chlorine production.			**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1 -dimethylhydrazine (unsymmetrical dimethylhydrazine [UDMH]) from carboxylic acid hydrazines.			**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1 - dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K109**	**10**
K110 Condensed column overheads from intermediate separation from the production of 1,1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.			**K111**	**10**
K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K114**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.			**K116**	**10**
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.			**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.			**K118**	**1**
K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.			**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.			**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.			**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.			**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.			**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.			**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.			**K136**	**1**
K141 Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).			**K141**	**1**
K142 Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal.			**K142**	**1**
K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.			**K143**	**1**
K144 Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.			**K144**	**1**
K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.			**K145**	**1**
K147 Tar storage tank residues from coal tar refining.			**K147**	**1**
K148 Residues from coal tar distillation, including, but not limited to, still bottoms.			**K148**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No.[2]	RQ (Pounds)[3]
K149 Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. (This waste does not include still bottoms from the distillation of benzyl chloride.)			**K149**	10
K150 Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.			**K150**	10
K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.			**K151**	10
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.)			**K157**	++
K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.			**K158**	++
K159 Organics from the treatment of thiocarbamate wastes.			**K159**	++
K160 Solids (including filter wastes, separation solids, and spent catalysts) from the production of thio-carbamates and solids from the treatment of thiocarbamate wastes.			**K160**	++
K161 Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)			**K161**	++

Notes:

1 Chemical Abstract Service (CAS) Registry Number.

2 USEPA Hazardous Waste Number.

3 Reportable quantity release that requires notification. (See Chapter 18, "Spill Prevention and Response Planning").

4 Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR'. Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.

++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.

# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.

The statutory RQ for this hazardous substance may be adjusted in a future rulemaking; until then the statutory RQ applies.

1 * Indicates that the 1-pound RQ is a statutory RQ.

* * Indicates that no RQ is being assigned to the generic or broad class.

(1+) Indicates that the statutory source for designation of this hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is Clean Water Act (CWA) Section 31 1(b)(4).

(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 3071 1(a)(4).

(3+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA section 112.

(4+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is Resource Conservation and Recovery Act, Section 3001.

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AP2. APPENDIX 2

DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

AP2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

AP2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

AP2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

AP2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

AP2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

AP2.4. For installations with POL Storage Containers:

AP2.4.1. Single POL Storage Container Facilities. For facilities containing only one aboveground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

AP2.4.2. Multiple POL Storage Container Facilities

AP2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

AP2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single above ground oil or hazardous substance storage container.

AP2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

AP2.4.2.3.1. The total capacity of the above ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

AP2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

AP2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.

18

KINGDOM OF SAUDI ARABIA FINAL GOVERNING STANDARDS

March 31, 2014

Prepared by
U.S. Air Forces Central
United States Central Command

On behalf of
United States Central Command (USCENTCOM)

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FORWARD

This DoD Publication is issued under the authority and requirements of DoD Instruction (DoDI) 4715.05, "Environmental Compliance at Installations Outside the United States," November 1, 2013. This Final Governing Standard (FGS) provides criteria, standards, and management practices for environmental compliance at DoD installations in the Kingdom of Saudi Arabia (KSA). The FGS is derived from DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document (OEBGD)," dated May 2007.

To produce the FGS for KSA, a comprehensive review of environmental regulations was conducted. A review was also conducted of Gulf Cooperation Council (GCC) environmental requirements of which KSA is a party. Furthermore, any treaty, convention, protocols, etc. of which KSA may be a party to, were also reviewed. The regulatory analysis consisted of reviewing each regulation that that included an environmental requirement, per the scope of the OEBGD. Thus, Kingdom of Saudi Arabia occupational or industrial health and safety regulations were not addressed as they are not part of the 16 OEBGD chapters. Local regulations were not included as part of the regulatory review and only those regulations available via the internet were analyzed.

This FGS applies to the Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components").

This FGS is effective immediately and its use is mandatory by the DoD Components, pursuant to DoDI 4715.05. The Heads of the DoD Components may only issue supplementary instructions when deemed necessary to provide for unique requirements within their organizations.

FOR THE COMMANDER:

MICHAEL X. GARRETT
Major General, U.S.Army
USCENTCOM Chief of Staff

METHODOLOGY

Chapters 2-18 of the FGS include the scope, definitions and criteria. Appendices and tables are also presented. The applicable Kingdom of Saudi Arabia environmental regulations were compared to the May 2007 Overseas Environmental Baseline Guidance Document (OEBGD), and determinations were made as to whether a Kingdom of Saudi Arabia environmental regulation was more or less stringent, equivalent to, or in addition to, the OEBGD standard.

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APPENDICES

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REFERENCES

Department of Defense

(a) DoD Instruction 4715.05, "Environmental Compliance at Installations Outside the United States," November 1, 2013
(b) Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982
(c) Section 7158 of title 42, United States Code
(d) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(e) DoD Instruction 4715.4, "Pollution Prevention," June 18, 1996
(f) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
(g) DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006
(h) Defense Logistics Agency Instruction 4145.11, Army Technical Manual 38-410, Naval Supply Publication 573, Air Force Joint Manual 23-209, and Marine Corps Order 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999
(i) Air Force Manual 24-204(Interservice), Army Technical Manual Order 38-250, Naval Supply Publication 505, Marine Corps Order P4030.19J, Defense Logistics Agency Instruction 4145.3, "Preparing Hazardous Materials for Military Air Shipments," December 3, 2012.
(j) DoD 4160.21 -M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993
(k) DoD Directive 4001.1, "Installation Support," January 10, 2008
(l) Naval Facility Manual of Operation-213, Air Force Regulation 9 1-8, and Army Technical Manual 5-634, "Solid Waste Management," May 1990
(m) DoD 4150.7-M, "DoD Pest Management Training and Certification," April 24, 1997
(n) "Technical Guide No. 17, Military Handbook - Design of Pest Management Facilities, 1991, reviewed and validated Aug 2009."
(o) DoD Instruction 6055.1, "DoD Safety and Occupational Health (SOH) Program," August 19, 1998
(p) DoDI 6055.05, "Occupational and Environmental Health (OEH)," November 11, 2008.
(q) Section 2643 of title 15, United States Code
(r) Title 40, Code of Federal Regulations, Part 763, Subpart E, "Asbestos-Containing Materials in Schools," current edition
(s) DoD Instruction 4715.08, "Remediation of Environmental Contamination Outside the United States," November 1, 2013

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C1. CHAPTER 1

OVERVIEW

C1.1. PURPOSE

The primary purpose of this Final Governing Standard (FGS) is to provide criteria and management practices to be used by DoD Lead Environmental Components (LEC) to protect human health and the environment for the Kingdom of Saudi Arabia where the Department of Defense maintains DoD installations as defined in reference (a).

C1.2. APPLICABILITY

This FGS applies to actions of the DoD Components at installations in the Kingdom of Saudi Arabia.

C1.3. EXEMPTIONS

This FGS does not apply to:

C1.3.1. DoD installations that do not have the potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices, and other similar organizations), or for which the DoD Components exercise control only on a temporary or intermittent basis.

C1.3.2. Leased, joint use, and similar facilities to the extent that the Department of Defense does not control the instrumentality or operation that a criterion seeks to regulate.

C1.3.3. Does not apply to the operations of U.S. military vessels, to the operations of U.S. military aircraft, or to off-installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when U.S. Forces are operating as part of a multi-national force not under full control of the United States. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DoD Directives and Instructions and environmental annexes incorporated into operation plans or operation orders. However, it does apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DoD Components, including management or disposal of off-loaded waste or material. However, this FGS does apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DoD Components, including management or disposal of off-loaded waste or material.

C1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order (E.O.) 12344 (Reference (b)) and conducted pursuant to 42 United States Code (U.S.C.) 7158 (Reference (c)).

C1.3.5. The determination or conduct of remediation to correct environmental problems caused by the Department of Defense's past activities.

C1.3.6. Environmental analyses conducted under E.O. 12114 (Reference (d)).

C1.4. DEFINITIONS

For purposes of this FGS, unless otherwise indicated, the following definitions apply:

C1.4.1. Criteria and Management Practices. Particular substantive provisions of the OEBGD that are used by the LEC to develop this FGS.

C1.4.2. Existing Facility. Any facility and/or building, source, or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified.

C1.4.3. Final Governing Standards. A comprehensive set of country-specific substantive provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice.

C1.4.4. New Facility. Any facility and/or building, source, or project with a construction start date on or after 1 October 1994, or a pre-existing facility that has been substantially modified since 1 October 1994.

C1.4.5. Requirements

C1.4.5.1. Particular provisions of U.S. law respecting environmental protection on DoD installations within the United States

C1.4.5.2. Kingdom of Saudi Arabia law of general applicability, including those specifically delegated to regional or local governments for implementation, respecting environmental protection and which are generally applied to Kingdom of Saudi Arabia military.

C1.4.5.3. Applicable international treaty provisions that are used in determining FGS. DoD installations overseas shall use FGS as standards for environmental compliance rather than the individual source documents that have been reconciled by the LEC in the creation of FGS.

C1.4.6. Substantial Modification. Any modification to a facility and/or building the cost of which exceeds $1 million, regardless of funding source.

C1.5. ADDITIONAL INFORMATION

C1.5.1. FGS shall not expressly indicate the source of the standard, whether domestic, Kingdom of Saudi Arabia, or international agreement. LECs may retain draft working documents and references used in developing FGS, but may not officially issue any compilation of such materials. DoD LECs shall maintain, for purposes INTERNAL TO THE LEC AND DEPARTMENT OF DEFENSE, a record of their decision-making process which clearly identifies the comparative analysis strategy regarding how a particular FGS requirement was derived.

C1.5.2. The DoD Components shall establish and implement an environmental audit program to ensure that overseas installations assess compliance with FGS at least once every 3 years at all major installations.

C1.5.3. DoDI 4715.4 (Reference (e)) implements policy, assigns responsibility, and prescribes procedures for implementation of pollution prevention programs throughout the Department of Defense. As a matter of DoD policy, Reference (e) should be consulted for particular requirements that apply to activities outside the United States. Pollution prevention should be considered in developing the criteria and management practices for FGS. Where economically advantageous and consistent with mission requirements, pollution prevention shall be the preferred means for attaining compliance with FGS, or the OEBGD in host nations for which no FGS have been issued.

C1.5.4. Where Kingdom of Saudi Arabia or Gulf Cooperation Council analytical methods and QA/QC procedures are documented; they should be reviewed to determine if they are equivalent to US EPA analytical methods and QA/QC procedures – see http://www.epa.gov/ and search for "analytical methods" for comparison. For all parameters, the more precise method and procedure should be used.

C1.5.5. Unless otherwise specified, all record keeping requirements, including assessments, inspection records, logs, manifests, notices, forms, and formats, are described in accordance with paragraph C4.4.2. of DoD 8910.1-M (Reference (f)).

C1.5.6. This FGS does not create any rights or obligations enforceable against the United States, the Department of Defense, or any of its components, nor does it create any standard of care or practice for individuals. Although this FGS refers to other DoDDs and DoDIs, it is intended only to coordinate the requirements of those directives as required to implement the policies found in Reference (a). This FGS does not change other DoDDs or DoDIs or alter DoD policies.

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C2. CHAPTER 2

AIR EMISSIONS

C2.1. SCOPE

This Chapter contains standards for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 14, "Asbestos."

C2.2. DEFINITIONS

C2.2.1. Coal Refuse. Waste products from coal mining, cleaning, and coal preparation operations (e.g., culm and gob) containing coal, matrix material, clay, and other organic and inorganic material.

C2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soil and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, nonboiling solvent to clean the parts are classified as cold cleaning machines.

C2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

C2.2.4. De minimis. In risk assessment it refers to a level of risk that is too small to be concerned with.

C2.2.5. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

C2.2.6. Freeboard Ratio. The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

C2.2.7. Healthcare waste. The waste generated by facilities offering various types of healthcare, laboratories, facilities for the manufacture of drugs, pharmaceuticals and vaccines, veterinary institutions, research institutions, and from home treatment and patient care. It consists of two types:

C2.2.7.1. Non-hazardous healthcare waste. Consists of all the wastes that are found in municipal wastes, and it is generated by administrative institutions and by the general cleaning activities in healthcare institutions. This constitutes the major part of healthcare wastes, and it is treated in the same way as municipal waste.

C2.2.7.2. Hazardous healthcare waste. Consists of wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C2.2.8. Healthcare Waste Treatment Unit. The facility where the biological, chemical or physical properties of the hazardous healthcare waste are altered with the aim of eliminating its hazard so that it becomes safe, both for human health and the environment.

C2.2.9. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depleting Substances (ODS).

C2.2.10. Incinerator. Any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

C2.2.11. Motor Vehicle. Any commercially available vehicle that is not adapted to military use which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to, passenger cars, light duty vehicles, and heavy duty vehicles.

C2.2.12. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (MSW) including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

C2.2.13. Municipal Solid Waste (MSW). Any household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (nonmedical), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

C2.2.14. Ozone-Depleting Substances (ODS). Those substances listed in Table C2.T2.

C2.2.15. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

C2.2.16. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

C2.2.17. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

C2.2.18. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

C2.2.19. Stack. Any point in a source covered by criteria contained in C2.3.1., C2.3.2., C2.3.3., C2.3.4., or C2.3.5. designed to emit pollutants.

C2.2.20. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

C2.2.21. Substantially-Modified. Any modification to a facility/building, the cost of which exceeds $1 million, regardless of funding source.

C2.2.22. Vapor Cleaning Machine. A batch or in-line solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

C2.2.23. Wood Residue. Bark, sawdust, slabs, chips, shavings, mill trim, and other wood products derived from wood processing and forest management operations.

C2.3. CRITERIA

C2.3.1. Steam/Hot Water Generating Units. The following standards apply to units that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994.

C2.3.1.1. Air Emission Standards. The following criteria apply to units with a maximum design heat input capacity greater or equal to 10 million Btu/hr.

C2.3.1.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards for specific sized units shown in Table C2.T1. at all times, except during periods of start up, shut down, soot blowing, malfunction, or when emergency conditions exist.

C2.3.1.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight percent) and higher heating value will be measured and recorded for each new shipment of fuel. Use these data to calculate sulfur dioxide (SO_2) emissions and document compliance with the SO_2 limits using the equation in Table C2.T1. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for SO_2 and either oxygen (O_2) or carbon dioxide (CO_2).

C2.3.1.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or nitrogen oxides (NO_x) standards in C2.T1. must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

C2.3.1.2.1. For units with a maximum design heat input capacity greater than 30 million Btu/hr: Opacity, except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

C2.3.1.2.2. For fossil fuel fired units with a maximum design heat input capacity greater than 100 million Btu/hr: NO_x and either O_2 or CO_2.

C2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration.

C2.3.2.1. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Table C2.T3. and operating limits in Table C2.T4.

C2.3.2.2. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Table C2.T3. and operating limits in Table C2.T4.

C2.3.2.3. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994 and that burn more than 1 ton per day (tpd) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of start up, shut down, malfunction, or when emergency conditions exist.

C2.3.2.4. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

C2.3.2.4.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

C2.3.2.4.1.1. Unit design: dual chamber.

C2.3.2.4.1.2. Minimum temperature in primary chamber: 1400-1600°F.

C2.3.2.4.1.3. Minimum temperature in secondary chamber: 1800-2200°F.

C2.3.2.4.1.4. Minimum residence time in the secondary chamber: 2 seconds.

C2.3.2.4.1.5. Incinerator operators must be trained in accordance with applicable Service requirements.

C2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. These requirements do not apply to coin-operated machines.

C2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than 2000 gallons per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed. The temperature of the refrigerated condenser must be maintained at 45F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at 45 F or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

C2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that is most appropriate to suit local conditions:

C2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm). Control devices/methods must be operated according to manufacturer recommendations.

C2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

C2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet (ft^2); K = a conversion factor, 425 dscm/(ft^2-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

C2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains more than 5 percent by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 7 1-55-6), carbon tetrachloride (CAS No. 56-23-5), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents.

C2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 1-inch water layer or a freeboard ratio of at least 0.75.

C2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

C2.3.6. Units Containing ODS Listed in Table C2.T2. The following criteria apply to direct atmospheric emissions of ODS, HFCs, and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment.

C2.3.6.1. Refrigerant Recovery/Recycling. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or Kingdom of Saudi Arabia equivalent.

C2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant shall not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners. *De minim is* releases associated with good faith attempts to recycle or recover ODS, HFC, and PFC refrigerants are not subject to this prohibition.

C2.3.6.3. Refrigerant Leak Monitoring and Repair. Monitor and repair refrigeration equipment for ODS leakage in accordance with the following criteria and repair, if found to be leaking.

C2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing more than 50 pounds of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 percent of the total charge during a 12-month period.

C2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing more than 50 pounds of refrigerant and not covered by subparagraphs C2.3.6.3. 1. or C2.3.6.3.2. of this chapter must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 percent of the total charge during a 12-month period.

C2.3.6.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of halon-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following halon releases:

C2.3.6.4.1. *De minimis* releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

C2.3.6.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

C2.3.6.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulant agent cannot be used.

C2.3.7. Motor Vehicles. This criteria applies to DoD-owned motor vehicles as defined in paragraph C2.2.8.

C2.3.7.1. All vehicles shall be inspected every two years to ensure that no tampering with factory-installed emission control equipment has occurred.

C2.3.7.2. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

C2.3.8. Stack Heights. Hg is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures.

C2.3.8.1. Stacks shall be designed and constructed to heights at least equal to the largest H_g calculated from either of the following two criteria:

C2.3.8.1.1. $H_g = H +\_1.5L$, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but not greater than 0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest H_g.

C2.3.8.1.2. H_g is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum ground-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40 percent in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means not greater than 0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height (H_t) of the feature, not to exceed 2 miles if such feature achieves a height (H_t) 0.8 km from the stack that is at least 40 percent of the good engineering practice stack height determined by the formulae provided in C2.3.8.1.1. of this part or 26 meters, whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

C2.4. ADDITIONAL REQUIREMENTS

C2.4.1. Sulfur Dioxide (SO_2)

C2.4.1.1. For all industrial and urban activities (including existing and those constructed in the future), the following apply to sulfur dioxide emissions:

C2.4.1.1.1. During any 30 day period, one hour average SO_2 shall not exceed 730 microgram/m^3 (0.28 ppm) more than twice at any location.

C2.4.1.1.2. During any 12 months period, 24 hour average SO_2 shall not exceed 365 microgram/m^3 (0.14 ppm) more than once at any location.

C2.4.1.1.3. During any 12 months period, the annual average SO_2 shall not exceed 80 microgram/m^3 (0.03 ppm) at any location.

C2.4.1.1.4. Measurement Method – the Pararosaniline method (World Health Organization 1976) shall be the reference method of measurement for sulfur dioxide concentration.

C2.4.2. Inhalable Suspended Particulates. Inhalable particles are substances (liquid or solid) dispersed into the atmosphere that are less than 15 micron diameter. For all industrial and urban activities (including existing and those constructed in the future), the following apply to inhalable suspended particulates:

C2.4.2.1.1. During any 12 month period, 24 hour maximum inhalable suspended particulate concentration shall not exceed 340 microgram/m^3 more than once at any location.

C2.4.2.1.2 During any 12 month period, the average annual inhalable suspended particulate concentration shall not exceed 80 microgram/m^3 at any location.

C2.4.2.1.3 Note: Exceeding the 24 hours or annual inhalable suspended particulate standard because of abnormal natural background concentrations shall not be considered a violation of the designated standard.

C2.4.2.1.4. Measurement Method- the inhalable suspended particulates concentration shall be determined by use of a size selective high volume sampler.

C2.4.3. Photochemical Oxidants Defined as Ozone

C2.4.3.1. Emissions limits for photochemical oxidants includes ozone, peroxyacyl nitrates, and organic oxides. For all industrial and urban activities (including existing and those constructed in the future), the following apply to photochemical oxidants defined as ozone:

C2.4.3.1.1. During any 30 day period, one hour average concentration of Photochemical oxidants shall not exceed 295 microgram/cubic meter (0.15 ppm) more than twice at any location.

C2.4.3.1.2. Measurement Method - the Chemi-luminescence method (World Health Organization, 1976) shall be the reference method for measuring photochemical oxidants as ozone.

C2.4.4. Nitrogen oxides defined as nitrogen dioxide (NO_2)

C2.4.4.1 This requirement applies to all equipment and emission sources generating nitrogen oxides. For all industrial and urban activities (including existing and those constructed in the future), the following apply to nitrogen oxides defined as nitrogen dioxide (NO_2):

C2.4.4.1.1. During any 30 day period, one hour average NO_2 concentration shall not exceed 660 microgram/cubic meter (0.35 ppm) more than twice at any location.

C2.4.4.1.2. During any 12 months period, the annual NO_2 concentration shall not exceed

100 microgram/cubic meter at any location.

C2.4.4.1.3. Measurement Method - An NO_2 analyzer based on the gas phase chemi-luminescence measurement principle of nitrogen monoxide and ozone is the designated measurement method.

C2.4.5. Carbon Monoxide

C2.4.5.1. This requirement for carbon monoxide (regardless of the emission source)applies to all industrial and urban activities (including existing and those constructed in the future) and includes the following:

C2.4.5.1.1. During any 30 day period. One hour average carbon monoxide concentration shall not exceed 40 milligram/cubic meter (35 ppm) more than twice at any location.

C2.4.5.1.2. During any 30 day period. Eight (8) hour average carbon monoxide concentration shall not exceed 10 milligram/cubic meter (09 ppm) more than twice at any location.

C2.4.5.1.3. Measurement Method - Non-dispersive infrared (NDIR) technique (WHO, 1972) will be the reference method for measuring carbon monoxide

C2.4.6. Hydrogen Sulfide (H_2S)

C2.4.6.1. This requirement provides emission limits for hydrogen sulfide (regardless of the emission source). It applies to all industrial and urban activities (including existing and those constructed in the future) and includes the following:

C2.4.6.1.1. During any 12 month period, One hour average H_2S concentration shall not exceed 200 microgram/cubic meter (0.14 ppm) more than once at any location.

C2.4.6.1.2. During any 12 months period, 24 hour average H_2S concentration shall not exceed 40 microgram/cubic meter (0.03 ppm) more than once at any location.

C2.4.6.1.3. Measurement Method - Gas bubbler methylene blue method (American Public Health Association (APHA) 1972) shall be the reference method used for measuring hydrogen sulfide.

C2.4.7. Fluorides

C2.4.7.1. This requirement is for all equipment and emission sources generating fluorides. It applies to fluoride emission limits from any location for all industrial and urban activities (including existing and those constructed in the future) and includes the following:

C2.4.7.1.1. During any 30 day period, the monthly average fluoride concentrations shall not exceed 1.0 microgram/cubic meter (0.001 ppm) at any location.

C2.4.7.2. Measurement Method - Specific ion electrode method (Thompson, R. J., "Fluoride Concentrations in the Ambient Air" Journal of the Air Pollution Control Association, 21:484-487, 1971) shall be the reference method to measure fluorides.

C2.4.8. Petroleum and Petrochemical Facilities - Storage Vessels for petroleum liquid. Storage vessels for volatile organic compounds (VOC) which have a capacity greater than 1000 barrels (5614 cubic feet) shall be equipped with vapor emission control system as follows:

C2.4.8.1. Vapor recovery or equivalent systems are required for volatile organic compounds (VOC) having a vapor pressure in excess of 570 mm Hg. Floating roof tanks shall be considered adequate for crude oil storage providing that a consistent seal inspection and reporting program is implemented by the owner.

C2.4.8.2. Floating roof with double boot seal or equivalent systems are required for VOC having a vapor pressure in excess of 78 mm Hg (1.5 psi) but less than 570 mm Hg (11 psi).

C2.4.9. Ambient Air Quality Standards. Ambient air pollution level limits have been established in the Arab states of the Gulf to protect human health from hazards from pollutants emitted from fixed and mobile sources. Ambient air quality standards are included in Table C2.T5.

C2.4.10. Operating Records for Hazardous Healthcare Waste Treatment Facility

C2.4.10.1. If a hazardous healthcare waste treatment facility is in operation, records must be maintained of measurements of the concentration of the emissions released into the atmosphere as a result of the treatment process.

C2.4.11. Guidelines regulating the standards of emissions resulting from the incineration of hazardous healthcare wastes. Table C2.T6. provides the guidelines regulating the standards of emissions resulting from the incineration of hazardous healthcare wastes,

Table C2.T1. Emission Standards for Steam Generating Units[a]

Fuel Type	Maximum Design Heat Input Capacity: 10 – 100 million BTU/hr			Size >100 million BTU/hr			
	PM	Opacity[b]	SO_2[c]	PM	Opacity[b]	SO_2[c]	NOx[d]
Gaseous	N/A	N/A	N/A	N/A	N/A	N/A	0.20
Gaseous - Coal Derived	N/A	N/A	N/A	N/A	N/A	N/A	***0.20***
Liquid Fossil Fuel	N/A	20%	0.50[e]	0.10	20%	0.80	0.30
Solid Fossil Fuel	0.10	20%	1.20	0.10	20%	1.20	0.70
Other Solid Fuel[f]	0.30	20%	N/A	***0.1***	20%	N/A	N/A

N/A = Not applicable.

a. Standards apply to units constructed or substantially modified after 1 October 1994. Standards do not apply during periods of startup, shutdown, malfunction, soot blowing, or when emergency conditions exist. Unless specified otherwise, emission standards are in lb/million BTU.

b. The opacity standards do not apply to units < 30 million BTU/hr. The 20% standard applies to the average opacity over a six-minute period. A 30% opacity value is allowed for one six-minute period per hour.

c. SO_2 is best controlled and compliance documented by limiting fuel sulfur content. SO_2 emissions (lb/ million BTU) = 0.02 X sulfur content of fuel (%) / heat content of fuel (HHV, million BTU/lb fuel). [E.g., for fuel oil with 0.5% sulfur, SO_2 = 0.02 X 0.5 / 0.019 = 0.53 lb/million BTU.]

d. Emission limitation for NOx is based on a 30-day rolling average. NOx standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.

e. Instead of 0.5 lb/million BTU of SO_2, fuel oil combustion units may comply with a 0.5% average fuel sulfur content limit (weight percent) which is statistically equivalent to 0.5 lb/million BTU.

f. Other solid fuels include wood or waste derived fuels.

Table C2.T2. Class I and II Ozone-Depleting Substances

Class I			
CFC - 11	CFC - 114	CFC - 215	Halon - 1211
CFC - 12	CFC - 115	CFC - 216	Halon - 1301
CFC - 13	CFC - 211	CFC - 217	Halon - 2402
CFC - 111	CFC - 212		Carbon Tetrachloride
CFC - 112	CFC - 213		Methyl Chloroform
CFC - 113	CFC - 214		Methyl Bromide
$CHFBr_2$	$C_2H_2F_3Br$	C_3HF_6Br	$C_3H_3F_4Br$
HBFC-2201 (CHF_2Br)	$C_2H_3FBr_2$	$C_3H_2FBr_5$	$C_3H_4FBr_3$
CH_2FBr	$C_2H_3F_2Br$	$C_3H_2F_2Br_4$	$C_3H_4F_2Br_2$
C_2HFBr_4	C_2H_4FBr	$C_3H_2F_3Br_3$	$C_3H_4F_3Br$
$C_2HF_2Br_3$	C_3HFBr_6	$C_3H_2F_4Br_2$	$C_3H_5FBr_2$
$C_2HF_3Br_2$	$C_3HF_2Br_5$	$C_3H_2F_5Br$	$C_3H_5F_2Br$
C_2HF_4Br	$C_3HF_3Br_4$	$C_3H_3FBr_4$	C_3H_6FBr
$C_2H_2FBr_3$	$C_3HF_4Br_3$	$C_3H_3F_2Br_3$	Chlorobromomethane
$C_2H_2F_2Br_2$	$C_3HF_5Br_2$	$C_3H_3F_3Br_2$	
Class II			
HCFC - 21	HCFC - 133a	HCFC - 225cb	HCFC - 243
HCFC - 22	HCFC – 141b	HCFC - 226	HCFC - 244
HCFC - 31	HCFC – 142b	HCFC - 231	HCFC - 251
HCFC - 121	HCFC - 151	HCFC - 232	HCFC - 252
HCFC - 122	HCFC - 221	HCFC - 233	HCFC - 253
HCFC - 123	HCFC - 222	HCFC - 234	HCFC - 261
HCFC - 124	HCFC - 223	HCFC - 235	HCFC - 262
HCFC - 131	HCFC - 224	HCFC - 241	HCFC - 271
HCFC - 132b	HCFC - 225ca	HCFC - 242	

Note: All isomers of the above chemicals are ODS, except isomers of (1,1,1 -trichloroethane (also known as methyl chloroform)) such as 1,1 ,2-trichloroethane.

Table C2.T3. Emission Standards for Incinerators

Pollutant	**Emission Standards [1]**				
Incinerator Type	**Existing MWC units[2]**		**MWC units that begin new construction or undergo substantial modification[2]**		**CISWI units**
Rated Capacity	**35-250 tpd**	**> 250 tpd**	**35-250 tpd**	**> 250 tpd**	**All units**
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm
Opacity	10 percent		10 percent		10 percent
NOx	N/A	See Note 3	500 ppmv	1 50ppmv	388 ppmv
SO2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv
Dioxins/furans	125 ng/dscm	See Note 4	13 ng/dscm		0.41 ng/dscm
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.47 mg/dscm
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	62 ppmv
Fugitive Ash	5% of hourly observation period		5% of hourly observation period		N/A

Notes:

[1] Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

[3] NOx limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.

[4] Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

Table C2.T4. Carbon Monoxide Operating Limits for Incinerators[1]

Incinerator Type	**Existing MWC units[2]**		**MWC units that begin new construction or undergo substantial modification[2]**		**CISWI units All units**
Rated Capacity	**35-250 tpd**	**35-250 tpd**	**35-250 tpd**	**> 250 tpd**	**All**
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		157 ppmv
Fluidized bed, mixed fuel, (wood/refuse-derived fuel)	200 ppmv (24-hour average)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)	100 ppmv (4-hr avg)	100 ppmv (24-hr avg)		
Mass burn rotary waterwall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		
Mass burn waterwall and refractory	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Mixed fuel-fired, (pulverized coal/refuse-derived fuel)	150 ppmv (4-hr avg)		150 ppmv (4-hr avg)		
Modular starved-air and excess air	50 ppmv (4-hr avg)		50 ppmv (4-hr avg)		
Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel)	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		
Stoker, refuse-derived fuel	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		

Notes:

[1] Compliance is determined by continuous emission monitoring systems.

[2] Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

Table C2.T5. Ambient Air Quality Standards

Pollutant	Standard		Average Period
	ppm	µg/m^3	
Sulfur Dioxide (SO_2)	0.169	441	One hour
	0.083	217	24 hours
	0.076	65	One year
Hydrogen Sulfide (H_2S)	0.10	200	One hour
	0.030	40	24 hours
Nitrogen Dioxide (NO_2)	0.350	660	One hour
	0.050	100	One year
Ozone (O_3)	0.120	235	One hour
	0.080	157	8 hours
(PM_{10}) inhalable Particulates		340	24 hours
		80	One hour
Carbon Monoxide (CO)	32	40,000	One hour
	8.1	10,000	8 hours
Nonmetha Hydrocarbons	0.24	160	3 hours
Lead (Pb)	NA	NA	24 hours
Sulfates (SO_4)		23	24 hours
Fluorides (F)		1.0	One month
Ammonia (NH_3)	0.8		One hour

Table C2.T6. Guidelines Regulating the Standards of Emissions Resulting From the Incineration of Hazardous Healthcare Wastes

Pollutants	Measurements
Total suspended particles	34 mg/m^3 (1) (modified to 7% Oxygen)
Opacity	10 % except for 6 minutes during any hour
Carbon monoxide	50 mg/m^3
Sulfur dioxide	150 mg/m^3
Hydrogen chloride	100 mg/m^3 or removal of at least 97 %
Nitrogen oxides	400 mg/m^3
Organic compounds	8 parts out of million or removal of at least 99.99 %
Hydrogen fluoride	5mg/m^3
Dioxin and furan	125 ng/m^3
Cadmium	0.16 mg/m^3
Lead	1.2 mg/m^3
Arsenic	1.2 mg/m^3
Mercury	0.55 mg/m^3

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C3. CHAPTER 3

DRINKING WATER

C3.1. SCOPE

This Chapter contains criteria for providing potable water.

C3.2. DEFINITIONS

C3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

C3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater DoD Component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the DoD Component's installations.

C3.2.3. Artesian Water. Water obtained from a well built in an underground water reservoir, in which the water surface level is slightly above the surface level of the underground water reservoir. Artesian water is drawn by means of external force supported by natural underground pressure.

C3.2.4. Bottled Drinking Water. Treated drinking water intended for human consumption bottled in suitable tightly sealed containers.

C3.2.5. Bottled Natural Mineral Water. Water which is clearly distinguishable from ordinary drinking water by its content of certain mineral salts in their relative proportions. It is obtained directly from natural or drilled sources from underground water-bearing-strata for which all possible precautions are taken to avoid any pollution of; or external influence on the chemical and physical qualities of natural mineral water. It is collected under conditions which guarantee the original microbiological purity and chemical composition of essential components. Separation of suspended constituents may be achieved by decantation or filtration. It is packaged close to the point of emergence of the source with particular hygienic precautions in hermetically sealed containers.

C3.2.6. Concentration/Time (CT). The product of residual disinfectant concentration, C, in milligrams per liter (mg/L) determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables C3.T1 1. through C3.T24.

C3.2.7. Conventional Treatment. Water treatment, including chemical coagulation, flocculation, sedimentation, and filtration.

C3.2.8. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited onto a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.

C3.2.9. Direct Filtration. Water treatment, including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

C3.2.10. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

C3.2.11. DoD Water System. A public or non-public water system.

C3.2.12. Emergency Assessment. Evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service caused by natural disasters, accidents, and sabotage.

C3.2.13. First Draw Sample. A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.

C3.2.14. Haloacetic Acids. The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

C3.2.15. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

C3.2.16. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

C3.2.17. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

C3.2.18. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

C3.2.19. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

C3.2.20. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

C3.2.21. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

C3.2.22. Potable Water. Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

C3.2.23. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

C3.2.23.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

C3.2.23.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

C3.2.23.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least six months per year, but not year- round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

C3.2.23.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least six months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

C3.2.24. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

C3.2.25. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (1.2 ft/hr), resulting in particulate removal by physical and biological mechanisms.

C3.2.26. Spring Water. Water flowing naturally from an underground crack to the ground surface, which is collected only at the spring or through the crack which reaches the underground layer feeding the spring. This requires the existence of a natural force making the water flow to the surface through the natural opening.

C3.2.27. Total Trihalomethanes. The sum of the concentration in milligrams per liter of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

C3.2.28. Unbottled Drinking Water. Water fit for human consumption supplied to consumers by means of a public or limited distribution network, from wells, springs or any other source of surface water used for drinking.

C3.2.29. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever the principal function of the well is emplacement of any fluid.

C3.2.30. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities, which provide a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

C3.2.31. Water Source. A source of water supply whether it is an artesian well, drilled well, a spring, public or private water distribution system or any other source water suitable for human consumption.

C3.2.32. Well Water. Water obtained from an opening which has been drilled or dug or constructed in any other way in the ground and which reaches the groundwater table.

C3.2.33. Thermopile Bacteria. Bacteria that prefer temperatures above 55 °C and can tolerate temperatures up to 75-80 °C.

C3.3. CRITERIA

C3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:

C3.3.1.1. Maintain a map/drawing of the complete potable water system.

C3.3.1.2. Update the potable water system master plan at least every 5 years.

C3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintaining septic systems and on-site treatment units, and by appropriate land use management on DoD installations.

C3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years for systems using surface water, and every 5 years for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with Kingdom of Saudi Arabia authorities.

C3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table C3.T1. Groundwater supplies, at a minimum, must be disinfected.

C3.3.1.6. Maintain a continuous positive pressure of at least 20 pounds per square inch (psi) in the water distribution system.

C3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

C3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority);

C3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing);

C3.3.1.7.3. An effective annual water main flushing program;

C3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs; and

C3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

C3.3.1.8. Establish an effective cross connection control and backflow prevention program.

C3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

C3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

C3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption:

C3.3.1.10.2. Identification of key personnel;

C3.3.1.10.3. Procedures to restore service;

C3.3.1.10.4. Procedures to isolate damaged lines;

C3.3.1.10.5. Identification of alternative water supplies; and

C3.3.1.10.6. Installation public notification procedures.

C3.3.1.1 1. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

C3.3.1.12. Maintain records showing monthly operating reports for at least 3 years, and records of bacteriological results for not less than 5 years, and chemical results for not less than 10 years.

C3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least three years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

C3.3.1.14. Conduct vulnerability assessments, which include, but are not limited to, a review of:

C3.3.1.14.1. Pipes and constructed conveyances, physical barriers, water collection, pretreatment, treatment, storage, and distribution facilities, electronic, computer, or other automated systems utilized by the PWS;

C3.3.1.14.2. Use, storage, or handling of various chemicals; and

C3.3.1.14.3. Operation and maintenance of the water storage, treatment, and distribution systems.

C3.3.2. Regardless of whether a DoD water system produces or purchases water, it will, by independent testing or validated supplier testing, ensure conformance with the following:

C3.3.2.1. Total Coliform Bacteria Requirements

C3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining 40 or more samples a month, and no more than one positive sample per month when a system analyzes less than 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms, *E. coli* or thermopile coliform bacteria or any repeat sample is positive for total coliforms. Unbottled drinking water must be totally free of microbes causing diseases or viruses detrimental to human health.

C3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table C3.T2., "Total Coliform Monitoring Frequency."

C3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

C3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

C3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection C3.3.3. to:

C3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

C3.3.2.2. Inorganic Chemical Requirements

C3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed for human consumption does not exceed applicable limitations set out in Table C3.T3. Except for nitrate, nitrite, and total nitrate/nitrite, for systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For nitrate, nitrite, and total nitrate/nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

C3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table C3.T4., "Inorganics Monitoring Requirements."

C3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph C3.3.3. as soon as possible. If the nitrate, nitrite, or total nitrate and nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

C3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

C3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table C3.T4., "Inorganics Monitoring Requirements," until remedial actions are completed and authorities determine the system is reliable and consistent.

C3.3.2.2.4. The MCL for arsenic applies to CWS and NTNCWS.

C3.3.2.3. Fluoride Requirements

C3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 4 mg/L, as stated in Table C3.T3., "Inorganic Chemical MCLs."

C3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample annually at the entry point to the distribution system for surface water systems, and once every three years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table C3.T5., "Recommended Fluoride Concentrations at Different Temperatures."

C3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.4. Lead and Copper Requirements

C3.3.2.4.1. DoD CWS and NTNCWS will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead or copper levels are exceeded in more than 10% of all sampled taps.

C3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table C3.T6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table C3.T6.

C3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table C3.T6., "Monitoring Requirements for Lead and Copper Water Quality Parameters." Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and Kingdom of Saudi Arabia) within 60 days and will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

C3.3.2.5. Synthetic Organics Requirements

C3.3.2.5.1. An installation responsible for CWS and NTNCWS will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table C3.T7., "Synthetic Organic Chemical MCLs." For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an organic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

C3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements."

C3.3.2.5.3. If a system is out of compliance, the notification set out in paragraph C3.3.3. shall be completed as soon as possible, but in no case later than 14 days after the violation. The installation will immediately begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL, as noted in Table C3.T8., "Synthetic Organic Chemical Monitoring Requirements," and will continue until the installation commander determines the system is back in compliance, and all necessary remedial measures have been implemented.

C3.3.2.6. Disinfectant/Disinfection Byproducts (DDBP) Requirements

C3.3.2.6.1. An installation responsible for a CWS and NTNCWS that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

C3.3.2.6.1.1. Ensure that the MCL of ***0.1*** mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of ***0.7*** mg/L for chlorite, and the MCL of 0.01 mg/L for bromate are met in drinking water.

C3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of 0.5 mg/L for chlorine (after staying at least for 30 minutes at a pH value of less than 5), the MRDL of 3.0 mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are met in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections. The chlorine content shall be increased in case of epidemics or in special circumstances - consult the installation Bioenvironmental Engineer for recommendations.

C3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table C3.T9, “Disinfectant/Disinfection Byproducts Monitoring Requirements.” Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone are also included in Table C3.T9.

C3.3.2.6.3. For TTHM and HAA5 a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table C3.T9. for chlorine, chloramine, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table C3.T9., the installation will accomplish the notification requirements outlined in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

C3.3.2.7. Radionuclide Requirements

C3.3.2.7.1. An installation responsible for a CWS will test the system for conformance with the applicable radionuclide limits contained in Table C3.T10., “Radionuclide MCLs and Monitoring Requirements.”

C3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table C3.T10.

C3.3.2.7.3. If the average annual MCL for gross alpha activity for radium is exceeded, the installation will complete the notification according to the procedures in paragraph C3.3.3. within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

C3.3.2.7.4. The concentration of the radiation activity of radon in drinking water shall not exceed 100 be/l.

C3.3.2.7.5. The concentration of the radiation activity of radionuclides in drinking water must be in conformity with Table C3.T25.

C3.3.2.8. Surface Water Treatment Requirements. DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table C3.T1. If the turbidity readings in Table C3.T1. are exceeded, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DDBP requirements (C3.3.2.6.), will ensure that protection from microbial pathogens is not compromised.

C3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored for total coliforms, at a minimum, and disinfectant residuals periodically.

C3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources, including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

C3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct and conventional filtration processes. This requirement only applies to DoD PWSs that:

C3.3.2.11.1. Use surface water or GWUDISW;

C3.3.2.11.2. Use direct or conventional filtration processes; and

C3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

C3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and Kingdom of Saudi Arabia) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps being taken to correct the violation, the necessity for seeking an alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.

C3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

C3.3.5. Quality-Related Properties

C3.3.5.1. Drinking water shall be free of any substances that can adversely affect its color, taste, odor or appearance. It shall also be free of any extraneous substances such as soil, dust, threads, hair or similar substances visible to the naked eye.

C3.3.5.2. The pH value of unbottled drinking water shall range between 6.5 and 8.

C3.3.5.3. The total dissolved solids concentration in unbottled drinking water shall range between 100 and 1000 ppm.

C3.3.5.3. Permitted levels of chemical components affecting health in drinking water are shown in Tables C3.T25, C3.T26, C3.T27 and C3.T28.

C3.3.6. Organic (biological) properties. Unbottled drinking water must be totally free of any algae, fungi and insects and their eggs, spores or parts as well as any protozoa, including amoeba.

C3.4. ADDITIONAL REQUIREMENTS

C3.4.1. The priority for use of water shall be as follows:

C3.4.1.1. Basic human needs.

C3.4.1.2. Providing water for animals.

C3.4.1.3. Requirements for agriculture, industry, construction, and other purposes.

C3.4.2. Bottled Drinking Water

C3.4.2.1. Treatment Requirements

C3.4.2.1.1. Collection of water from source must not alter the physical or chemical properties of the water prior to treatment.

C3.4.2.1.2. Transportation of water from extraction or collection points to bottling facilities, if necessary, shall be conducted in a way that does not have any significant effect on the safety and the characteristic composition of the transported water. Packaged water shall be transported or stored in bulk tanks or processed or packaged through equipment or lines made up of materials suitable for prohibiting water contamination.

C3.4.2.1.3. Method of treatment whether chemical, physical or thermal, singly or in combination, shall be sufficient for destruction of microorganisms. Treated bottled water shall comply with specific microbiological properties for bottled water mentioned in section C3.4.2.2.3.

C3.4.2.2. Characteristics. The following shall be met in bottled drinking water.

C3.4.2.2.1. Aesthetic Quality Characteristics

C3.4.2.2.1.1. Bottled drinking water shall not contain any substances that would affect its color, taste, odor or appearance. It shall be completely free from foreign substances such as soil, sand, hair or other impurities which are visible to the naked eye.

C3.4.2.2.1.2. The substances and parameters of aesthetic quality in bottled drinking water shall be according to Table C3.T29.

C3.4.2.2.1.3. Chemical constituents in bottled drinking water shall be according to Tables C3.T30, C3.T31, C3.T32, C3.T33.

C3.4.2.2.1.4. Activity concentration of various radionuclides in bottled drinking water shall be according to Table C3.T34. Radioactive constituents shall meet Table C3.T35 standards.

C3.4.2.2.2. Biological characteristics. Bottled drinking water shall be completely free from algae, moulds, insects, their eggs, larvae, vesicles and insects parts and parasites including amoeba.

C3.4.2.2.3. Microbiological characteristics. Bottled drinking water during filling and marketing shall be free from

C3.4.2.2.3.1. Parasites and pathogenic microorganisms

C3.4.2.2.3.2. Total coliforms and Escherichiacoli in any 250 ml sample examined.

C3.4.2.2.2.3. Sulfite - reducing clostridia in any 250 ml sample examined.

C3.4.2.2.2.4. Pseudomonas aeruginosa in any 250 ml sample examined.

C3.4.2.2.2.5. Fecal streptococci in any 250 ml sample examined.

C3.4.2.3. Packaging

C3.4.2.3.1. Bottled water shall be packed in hygienic, suitable, clean and hermetically sealed containers that would prevent contamination of the water and preserve its physical and chemical properties.

C3.4.2.3.2. Filling and sealing operations of containers shall be done in an aseptic atmosphere.

C3.4.2.4. Labeling. The following information shall be included on the label for bottled drinking water.

C3.4.2.4.1. The name of the product shall be "bottled drinking water". Any statement that would give wrong impression regarding the nature and properties of the product shall not be declared on the label.

C3.4.2.4.2. Water content of the different anions and cations, total hardness and total dissolved solids expressed in ppm.

C3.4.2.4.3. pH

C3.4.2.4.4. The net volume in the metric system

C3.4.2.4.5. Water source according to section C3.2.31 and the geographic location may be indicated on the label for water source.

C3.4.2.4.6. Packaged water containing added fluoride shall be labeled "Fluoridated water".

C3.4.2.4.7. Filing date and expiry date by day, month and year in a non-coded manner. The expiry date for drinking water bottled in plastic containers shall not exceed one year from filling date.

C3.4.2.4.8. The labeling information shall be written on individual containers as well as the packaging boxes.

C3.4.2.5. Transportation, Storage and Handling

C3.4.2.5.1. Transportation. Bottled drinking water shall be transported by any suitable means of transport that would protect it from damages and contamination.

C3.4.2.5.2. Storage and Handling

C3.4.2.5.2.1. Bottled drinking water shall be stored in room temperature away from any poisonous materials and as far away as possible from high temperature and contamination sources.

C3.4.2.5.2.2. Bottled drinking water shall be stored in good and well-ventilated areas free from distinctive odors.

C3.4.2.5.3. Bottled drinking water shall be protected from direct sunlight, high temperature, and other weather conditions.

Table C3.T1. Surface Water Treatment Requirements

1. Unfiltered Systems

   a. Systems which use unfiltered surface water or GUDISW will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily, and must continue as long as the unfiltered system is in operation. If the total coliforms and/or fecal coliforms exceed 100/100 milliliters (mL) and 20/1 00 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU).

   b. Disinfection must achieve at least 99.9% (3-log) inactivation of *Giardia lamblia* cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T1 1. through C3.T24.

   c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods.

   d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made at the same times as total coliforms are sampled.

   e. Disinfectant residual of water entering the distribution system cannot be less than 0.2 mg/L for greater than four hours.

   f. Water in a distribution system with a heterotrophic bacteria concentration less than or equal to 500/mL measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements.

   g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.

2. Filtered Systems

   a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of *Giardia lamblia* cysts and 99.99% (4-log) removal of viruses.

   b. The turbidity of filtered water will be monitored at least once every four hours. The turbidity of filtered water for direct and conventional filtration systems will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU.

   c. Disinfection must provide the remaining log-removal of *Giardia lamblia* cysts and viruses not obtained by the filtration technology applied.*

   d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems.

   *Proper conventional treatment typically removes 2.5-log *Giardia*/ 2.0-log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0-log *Giardia*/ 1.0-log viruses. Slow sand filtration removes typically removes 2.0-log *Giardia*/ 2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.

3. SW or GWUDISW systems will provide at least 99% (2-log) removal of *Cryptosporidium*. A system is considered to be compliant with the *Cryptosporidium* removal requirements if:

   a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU.

Table C3.T1. Surface Water Treatment Requirements (continued)

b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs.

c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of *Giardia lamblia* cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of *Cryptosporidium* oocysts.

d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1 a above to remain unfiltered.

4. Individual Filter Effluent Monitoring. Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for three months in a row (for the same filter), the installation must conduct a self assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.

5. Covers for Finished Water Storage Facilities. Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table C3.T2. Total Coliform Monitoring Frequency

Population Served	Number of Samples [1]	Population Served	Number of Samples [1]
25 to 1,000 [2]	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes:

1. Minimum Number of Routine Samples Per Month
2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve less than 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table C3.T3. Inorganic Chemical MCLs

Contaminant	**MCL**	
Arsenic[1]	0.010	mg/L
Antimony [1]	0.006	mg/L
Asbestos [1]	7 million	fibers/L (longer than 10 µm)
Barium	0.7	mg/L
Beryllium [1]	0.004	mg/L
Cadmium [1]	0.003	mg/L
Chromium [1]	0.05	mg/L
Cyanide [1]	0.07	mg/L (as free cyanide)
Fluoride [2]	4.0	mg/L
Mercury [1]	0.001	mg/L
Nickel [1]	0.07	mg/L
Nitrate [3]	10	mg/L (as N)
Nitrite [3]	1	mg/L (as N)
Total Nitrite and Nitrate [3]	10	mg/L (as N)
Nitrite (Long-term exposure)	0.2	mg/L (as NO_2)
Selenium [1]	0.01	mg/L
Sodium [4]		
Thallium	0.002	mg/L
Boron	0.5	mg/L
Manganese	0.4	mg/L
Molybdenum	0.07	mg/L
Iodine	0.015	mg/L

Notes:

1. MCLs apply to CWS and NTNCWS.
2. Fluoride also has a secondary MCL at 2.0 mg/L. MCL applies only to CWS.
3. MCLs apply to CWS, NTNCWS, and TNCWS.
4. No MCL established. Monitoring is required so concentration levels can be made available on request. Sodium levels shall be reported to the DoD medical authority upon receipt of analysis.

Table C3.T4. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---
Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos[3]	1 sample every 9 years	1 sample every 9 years	>MCL	Yes
Total Nitrate/Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [6]
Nitrite	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [7]
Corrosivity [8]	Once	Once	---	---

Notes:

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a sanitary survey conducted by the PWS.
4. Any sampling point with an analytical value greater than or equal to 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is >50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are <50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50% of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country-specific FGS to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Saturation Index.

Table C3.T5. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (°F)	Control Limits (mg/L)		
	Lower	Optimum	Upper
50.0 - 53.7	0.9	1.2	1.5
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table C3.T6. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	No. of Sites for Standard Monitoring [1, 2]	No. of Sites for Reduced Monitoring [3]	No. of Sites for Water Quality Parameters [4]
>100,000	100	50	25
10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes:

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multi-family residences with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNCWS, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6-month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every three years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table C3.T7. Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
	Pesticides/PCBs	
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008
Aldicarb sulfoxide	0.004	0.0005
Aldrine and dialdrine	0.00003	
Andrine	0.0006	
Atrazine	0.002	0.0001
Benzo[a]pyrene	0.0002	
Carbofuran	0.007	0.0009
Chlordane	0.0002	0.0002
Chlorotoluron	0.03	
Dalapon	0.2	
2,4-D	0.07	0.0001
2,4 – DB	0.09	
1 ,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
2,1 Dibromo-3-chloropropane	0.001	
2,1 Dibromoethane	0.0004	
Dicarb	0.01	
Dichlorobrob	0.1	
2,3 Dichlorophenox-yacetic acid	0.03	
2,1 Dichloropropane	0.04	
3,1 Dichloropropane	0.02	
Di (2-ethylhexyl) adipate	0.4	
Dimethoate	0.006	
Di (2-ethylhexyl) phthalate	0.006	
Dinoseb	0.007	
Diquat	0.02	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.0000 1
Glyphosphate	0.7	
Heptachlor	0.0004	0.00004
Heptachlorepoxide	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Isoproturon	0.009	
Lindane	0.0002	0.00002
MCBA	0.002	
Methoxychlor	0.02	0.0001
Metolachlor	0.01	
Microbrob	0.01	
Molinate	0.006	
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.000 1
Pendimethaline	0.02	
Pentachlorophenol	0.00 1	0.00004
Phenobrob	0.009	
Picloram	0.5	
Sianazin	0.0006	

Table C3.T7. Synthetic Organic Chemical MCLs

Simazine	0.002	
4,2,5 T	0.009	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Terbuthylazine	0.007	
Toxaphene	0.003	0.001
2,4,5-TP (Silvex)	0.05	0.0002
Trifluoraline	0.02	
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Carbon tetrachloride	0.004	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1 ,2-Dichloroethylene	0.05	0.0005
trans-1 ,2-Dichloroethylene	0.05	0.0005
1 ,1-Dichloroethylene	0.007	0.0005
1,1 ,1-Trichloroethane	0.20	0.0005
1 ,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.005	
1,1 ,2-Trichloroethane	0.005	
1 ,2,4-Trichloro-benzene	0.07	
1 ,2-Dichloropropane	0.005	0.0005
4,1-Dioxin	0.05	
EDTA	0.6	
Ethylbenzene	0.3	0.0005
Hexachlorobutadiene	0.0006	
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Pentachlorovinyl	0.009	
Styrene	0.02	0.0005
Tetrachloroethane	0.04	
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	0.7	0.0005
Trichloroethane	0.02	
Vinyl chloride	0.002	0.0005
Xylene (total)	10	0.0005
Yacetid acid	0.2	
Zeoline	0.5	
Other Organics		
Acrylamide	0.05% dosed at 1 ppm [1]	
Epihydrochlorin	treatment technique 0.0 1% dosed at 20 ppm [1]	

Note:

1. Only applies when adding these polymer flocculants to the treatment process. No sampling is required; the system certifies that dosing is within specified limits.

Table C3.T8. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement [1]		Trigger for more monitoring [2]	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes [3, 4]
Pesticides/PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit [5]	Yes [4, 6]

Notes:

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNCW, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 quarterly samples for groundwater systems, and at least 4 quarterly samples for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a sanitary survey of the PWS.
5. Detection limits noted in Table C3.T7., or as determined by the best available testing methods.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection: systems >3,300 reduce to a minimum of 2 quarterly samples in one year during each repeat compliance period, or systems <3,300 reduce to a minimum of 1 sample every 3 years.
7. Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements

Source Water Type	Population Served by System	Analyte & Frequency of Samples	Number of Samples
Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW)	10,000 or more	TTHM & HAA5 - Quarterly[1,2]	4[1,2,3]
SW or GWUDISW	Serving 500 to 9,999	TTHM & HAA5 - Quarterly[4]	1[5,6]
SW or GWUDISW	499 or less	TTHM & HAA5 - Yearly	1[7,8]
Ground Water (GW)	10,000 or more	TTHM & HAA5 - Quarterly[9]	1[10,11]
GW	9,999 or less	TTHM & HAA5 - Yearly[12]	1[13,14]
		Chlorite - Daily & Monthly[15,16,17,18]	
		Bromate - Monthly[19,20]	
		Chlorine[21,22]	
		Chloramines[23,24]	
		Chlorine Dioxide[25,26,27]	
		TOC[28]	

Notes:

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.
2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least one year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to one sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.
4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.
5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to one sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.
6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to one sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HHA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.
10. System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to one sample per three-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A three-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.

Table C3.T9. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of one year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least one sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is less than 0.05 mg/L based upon monthly measurements for one year.
20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Not withstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, three additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take three samples in the distribution system as close as possible to the first customer at intervals of not less than 6 hours
26. If any daily sample from the distribution system exceeds the MRDL and if one or more of the three samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any two consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following an exceedance of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce TOC and alkalinity to one paired sample per plant per quarter.

Table C3.T10. Radionuclide MCLs and Monitoring Requirements

Contaminant	**MCL**
Gross Alpha [1]	***13.5*** pCi/L
Combined Radium-226 and -228	5 pCi/L
Beta Particle and Photon Radioactivty [2]	4 mrem/yr
Uranium	30 ¡g/L

Notes:

1. Gross alpha activity includes radium-226, but excludes radon and uranium.
2. Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides.

Monitoring Requirements:

All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed if activity is <5 picoCuries per liter (pCi/L). Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the MCL, analysis of a single sample may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Table C3.T11. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 0.5C or Lower*

Chlorine Concentration (mg/L)	p11< =6 Log Inactivations						p11 = 6.5 Log Inactivations						p11 = 7.0 Log Inactivations						p11 = 7.5 Log Inactivations					
	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0
<=0.4	23	46	69	91	114	137	27	54	82	109	136	163	33	65	98	130	163	195	40	79	119	158	198	237
0.6	24	47	71	94	118	141	28	56	84	112	140	168	33	67	100	133	167	200	40	80	120	159	199	239
0.8	24	48	73	97	121	145	29	57	86	115	143	172	34	68	103	137	171	205	41	82	123	164	205	246
1	25	49	74	99	123	148	29	59	88	117	147	176	35	70	105	140	175	210	42	84	127	169	211	253
1.2	25	51	76	101	127	152	30	60	90	120	150	180	36	72	108	143	179	215	43	86	130	173	216	259
1.4	26	52	78	103	129	155	31	61	92	123	153	184	37	74	111	147	184	221	44	89	133	177	222	266
1.6	26	52	79	105	131	157	32	63	95	126	158	189	38	75	113	151	188	226	46	91	137	182	228	273
1.8	27	54	81	108	135	162	32	64	97	129	161	193	39	77	116	154	193	231	47	93	140	186	233	279
2	28	55	83	110	138	165	33	66	99	131	164	197	39	79	118	157	197	236	48	95	143	191	238	286
2.2	28	56	85	113	141	169	34	67	101	134	168	201	40	81	121	161	202	242	50	99	149	198	248	297
2.4	29	57	86	115	143	172	34	68	103	137	171	205	41	82	124	165	206	247	50	99	149	199	248	298
2.6	29	58	88	117	146	175	35	70	105	139	174	209	42	84	126	168	210	252	51	101	152	203	253	304
2.8	30	59	89	119	148	178	36	71	107	142	178	213	43	86	129	171	214	257	52	103	155	207	258	310
3	30	60	91	121	151	181	36	72	109	145	181	217	44	87	131	174	218	261	53	105	158	211	263	316

Chlorine Concentration (mg/L)	p11< =8 Log Inactivations						p11 = 8.5 Log Inactivations						p11 = 9.0 Log Inactivations					
	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0
<=0.4	46	92	139	185	231	277	55	110	165	219	274	329	65	130	195	260	325	390
0.6	48	95	143	191	238	286	57	114	171	228	285	342	68	136	204	271	339	407
0.8	49	98	148	197	246	295	59	118	177	236	295	354	70	141	211	281	352	422
1	51	101	152	203	253	304	61	122	183	243	304	365	73	146	219	291	364	437
1.2	52	104	157	209	261	313	63	125	188	251	313	376	75	150	226	301	376	451
1.4	54	107	161	214	268	321	65	129	194	258	323	387	77	155	232	309	387	464
1.6	55	110	165	219	274	329	66	132	199	265	331	397	80	159	239	318	398	477
1.8	56	113	169	225	282	338	68	136	204	271	339	407	82	163	245	326	408	489
2	58	115	173	231	288	346	70	139	209	278	348	417	83	167	250	333	417	500
2.2	59	118	177	235	294	353	71	142	213	284	355	426	85	170	256	341	426	511
2.4	60	120	181	241	301	361	73	145	218	290	363	435	87	174	261	348	435	522
2.6	61	123	184	245	307	368	74	148	222	296	370	444	89	178	267	355	444	533
2.8	63	125	188	250	313	375	75	151	226	301	377	452	91	181	272	362	453	543
3	64	127	191	255	318	382	77	153	230	307	383	460	92	184	276	368	460	552

*$CT_{99.9}$ =CT for 3 log inactivation.

Table C3.T12. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 5.0C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139	28	55	83	111	138	166
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	114	143	171
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149	30	60	90	119	149	179
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152	31	61	92	122	153	183
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155	31	62	94	125	156	187
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158	32	64	96	128	160	192
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162	33	65	98	131	163	196
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165	33	67	100	133	167	200
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169	34	68	102	136	170	204
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172	35	70	105	139	174	209
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175	36	71	107	142	178	213
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178	36	72	109	145	181	217
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182	37	74	111	147	184	221

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	33	66	99	132	165	198	39	79	118	157	197	236	47	93	140	186	233	279
0.6	34	68	102	136	170	204	41	81	122	163	203	244	49	97	146	194	243	291
0.8	35	70	105	140	175	210	42	84	126	168	210	252	50	100	151	201	251	301
1	36	72	108	144	180	216	43	87	130	173	217	260	52	104	156	208	260	312
1.2	37	74	111	147	184	221	45	89	134	178	223	267	53	107	160	213	267	320
1.4	38	76	114	151	189	227	46	91	137	183	228	274	55	110	165	219	274	329
1.6	39	77	116	155	193	232	47	94	141	187	234	281	56	112	169	225	281	337
1.8	40	79	119	159	198	238	48	96	144	191	239	287	58	115	173	230	288	345
2	41	81	122	162	203	243	49	98	147	196	245	294	59	118	177	235	294	353
2.2	41	83	124	165	207	248	50	100	150	200	250	300	60	120	181	241	301	361
2.4	42	84	127	169	211	253	51	102	153	204	255	306	61	123	184	245	307	368
2.6	43	86	129	172	215	258	52	104	156	208	260	312	63	125	188	250	313	375
2.8	44	88	132	175	219	263	53	106	159	212	265	318	64	127	191	255	318	382
3	45	89	134	179	223	268	54	108	162	216	270	324	65	130	195	259	324	389

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T13. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 10C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104	21	42	63	83	104	125
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107	21	43	64	85	107	128
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112	22	45	67	89	112	134
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114	23	46	69	91	114	137
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116	23	47	70	93	117	140
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	96	120	144
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122	25	49	74	98	123	147
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124	25	50	75	100	125	150
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129	26	52	79	105	131	157
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131	27	53	80	107	133	160
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134	27	54	82	109	136	163
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137	28	55	83	111	138	166

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	15	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	35	70	105	139	174	209
0.6	26	51	77	102	128	153	31	61	92	122	153	183	36	73	109	145	182	218
0.8	26	53	79	105	132	158	32	63	95	126	158	189	38	75	113	151	188	226
1	27	54	81	108	135	162	33	65	98	130	163	195	39	78	117	156	195	234
1.2	28	55	83	111	138	166	33	67	100	133	167	200	40	80	120	160	200	240
1.4	28	57	85	113	142	170	34	69	103	137	172	206	41	82	124	165	206	247
1.6	29	58	87	116	145	174	35	70	106	141	176	211	42	84	127	169	211	253
1.8	30	60	90	119	149	179	36	72	108	143	179	215	43	86	130	173	216	259
2	30	61	91	121	152	182	37	74	111	147	184	221	44	88	133	177	221	265
2.2	31	62	93	124	155	186	38	75	113	150	188	225	45	90	136	181	226	271
2.4	32	63	95	127	158	190	38	77	115	153	192	230	46	92	138	184	230	276
2.6	32	65	97	129	162	194	39	78	117	156	195	234	47	94	141	187	234	281
2.8	33	66	99	131	164	197	40	80	120	159	199	239	48	96	144	191	239	287
3	34	67	101	134	168	201	41	81	122	162	203	243	49	97	146	195	243	292

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T14. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 15C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	16	25	33	41	49	10	20	30	39	49	59	12	23	35	47	58	70	14	28	42	55	69	83
0.6	8	17	25	33	42	50	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
0.8	9	17	26	35	43	52	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88
1	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75	15	30	45	60	75	90
1.2	9	18	27	36	45	54	11	21	32	43	53	64	13	25	38	51	63	76	15	31	46	61	77	92
1.4	9	18	28	37	46	55	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
1.6	9	19	28	37	47	56	11	22	33	44	55	66	13	26	40	53	66	79	16	32	48	64	80	96
1.8	10	19	29	38	48	57	11	23	34	45	57	68	14	27	41	54	68	81	16	33	49	65	82	98
2	10	19	29	39	48	58	12	23	35	46	58	69	14	28	42	55	69	83	17	33	50	67	83	100
2.2	10	20	30	39	49	59	12	23	35	47	58	70	14	28	43	57	71	85	17	34	51	68	85	102
2.4	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86	18	35	53	70	88	105
2.6	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88	18	36	54	71	89	107
2.8	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89	18	36	55	73	91	109
3	11	21	32	42	53	63	13	25	38	51	63	76	15	30	46	61	76	91	19	37	56	74	93	111

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	17	33	50	66	83	99	20	39	59	79	98	118	23	47	70	93	117	140
0.6	17	34	51	68	85	102	20	41	61	81	102	122	24	49	73	97	122	146
0.8	18	35	53	70	88	105	21	42	63	84	105	126	25	50	76	101	126	151
1	18	36	54	72	90	108	22	43	65	87	108	130	26	52	78	104	130	156
1.2	19	37	56	74	93	111	22	45	67	89	112	134	27	53	80	107	133	160
1.4	19	38	57	76	95	114	23	46	69	91	114	137	28	55	83	110	138	165
1.6	19	39	58	77	97	116	24	47	71	94	118	141	28	56	85	113	141	169
1.8	20	40	60	79	99	119	24	48	72	96	120	144	29	58	87	115	144	173
2	20	41	61	81	102	122	25	49	74	98	123	147	30	59	89	118	148	177
2.2	21	41	62	83	103	124	25	50	75	100	125	150	30	60	91	121	151	181
2.4	21	42	64	85	106	127	26	51	77	102	128	153	31	61	92	123	153	184
2.6	22	43	65	86	108	129	26	52	78	104	130	156	31	63	94	125	157	188
2.8	22	44	66	88	110	132	27	53	80	106	133	159	32	64	96	127	159	191
3	22	45	67	89	112	134	27	54	81	108	135	162	33	65	98	130	163	195

*$CT_{99.9}$=CT for 3 log inactivation.

C3.T15. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 20C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54	11	21	32	43	53	64
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57	12	23	35	46	58	69
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58	12	23	35	47	58	70
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59	12	24	36	48	60	72
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61	12	25	37	49	62	74
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62	13	25	38	50	63	75
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63	13	26	39	51	64	77
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66	13	27	40	53	67	80
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67	14	27	41	54	68	81
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68	14	28	42	55	69	83

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	18	35	53	70	88	105
0.6	13	26	39	51	64	77	15	31	46	61	77	92	18	36	55	73	91	109
0.8	13	26	40	53	66	79	16	32	48	63	79	95	19	38	57	75	94	113
1	14	27	41	54	68	81	16	33	49	65	82	98	20	39	59	78	98	117
1.2	14	28	42	55	69	83	17	33	50	67	83	100	20	40	60	80	100	120
1.4	14	28	43	57	71	85	17	34	52	69	86	103	21	41	62	82	103	123
1.6	15	29	44	58	73	87	18	35	53	70	88	105	21	42	63	84	105	126
1.8	15	30	45	59	74	89	18	36	54	72	90	108	22	43	65	86	108	129
2	15	30	46	61	76	91	18	37	55	73	92	110	22	44	66	88	110	132
2.2	16	31	47	62	78	93	19	38	57	75	94	113	23	45	68	90	113	135
2.4	16	32	48	63	79	95	19	38	58	77	96	115	23	46	69	92	115	138
2.6	16	32	49	65	81	97	20	39	59	78	98	117	24	47	71	94	118	141
2.8	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	95	119	143
3	17	34	51	67	84	101	20	41	61	81	102	122	24	49	73	97	122	146

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T16. CT Values for Inactivation of *Giardia* Cysts by Free Chlorine at 25C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	28	35	42
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39	8	16	24	31	39	47
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40	8	16	24	32	40	48
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41	8	16	25	33	41	49
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41	8	17	25	33	42	50
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42	9	17	26	34	43	51
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43	9	17	26	35	43	52
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44	9	18	27	35	44	53
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45	9	18	27	36	45	54
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46	9	18	28	37	46	55

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	12	23	35	47	58	70
0.6	9	17	26	34	43	51	10	20	31	41	51	61	12	24	37	49	61	73
0.8	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75
1	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
1.2	9	18	28	37	46	55	11	22	34	45	56	67	13	27	40	53	67	80
1.4	10	19	29	38	48	57	12	23	35	46	58	69	14	27	41	55	68	82
1.6	10	19	29	39	48	58	12	23	35	47	58	70	14	28	42	56	70	84
1.8	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
2	10	20	31	41	51	61	12	25	37	49	62	74	15	29	44	59	73	88
2.2	10	21	31	41	52	62	13	25	38	50	63	75	15	30	45	60	75	90
2.4	11	21	32	42	53	63	13	26	39	51	64	77	15	31	46	61	77	92
2.6	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
2.8	11	22	33	44	55	66	13	27	40	53	67	80	16	32	48	64	80	96
3	11	22	34	45	56	67	14	27	41	54	68	81	16	32	49	65	81	97

*$CT_{99.9}$=CT for 3 log inactivation.

Table C3.T17. CT Values for Inactivation of Viruses by Free Chlorine

	Log Inactivation		Log Inactivation		Log Inactivation	
	2.0 pH		3.0 pH		3.0 pH	
Temperature (C)	**6-9**	**10**	**6-9**	**10**	**6-9**	**10**
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table C3.T1 8. CT Values for Inactivation of *Giardia* Cysts by Chlorine Dioxide

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	10	4.3	4	3.2	2.5	2
1-log	21	8.7	7.7	6.3	5	3.7
1.5-log	32	13	12	10	7.5	5.5
2-log	42	17	15	13	10	7.3
2.5-log	52	22	19	16	13	9
3-log	63	26	23	19	15	11

Table C3.T19. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

	Temperature (C)					
Removal	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	8.4	5.6	4.2	2.8	2.1	1.4
3-log	25.6	17.1	12.8	8.6	6.4	4.3
4-log	50.1	33.4	25.1	16.7	12.5	8.4

Table C3.T20. CT Values for Inactivation of *Giardia* Cysts by Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	0.48	0.32	0.23	0.16	0.12	0.08
1-log	0.97	0.63	0.48	0.32	0.24	0.16
1.5-log	1.5	0.95	0.72	0.48	0.36	0.24
2-log	1.9	1.3	0.95	0.63	0.48	0.32
2.5-log	2.4	1.6	1.2	0.79	0.60	0.40
3-log	2.9	1.9	1.43	0.95	0.72	0.48

Table C3.T21. CT Values for Inactivation of Viruses by Free Ozone

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	0.9	0.6	0.5	0.3	0.25	0.15
3-log	1.4	0.9	0.8	0.5	0.4	0.25
4-log	1.8	1.2	1.0	0.6	0.5	0.3

Table C3.T22. CT Values for Inactivation of *Giardia* Cysts by Chloramine pH 6-9

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
0.5-log	635	365	310	250	185	125
1-log	1,270	735	615	500	370	250
1.5-log	1,900	1,100	930	750	550	375
2-log	2,535	1,470	1,230	1,000	735	500
2.5-log	3,170	1,830	1,540	1,250	915	625
3-log	3,800	2,200	1,850	1,500	1,100	750

Table C3.T23. CT Values for Inactivation of Viruses by Chloramine

	Temperature (C)					
Inactivation	**<=1**	**5**	**10**	**15**	**20**	**25**
2-log	1,243	857	643	428	321	214
3-log	2,063	1,423	1,067	712	534	356
4-log	2,883	1,988	1,491	994	746	497

Table C3.T24. CT Values for Inactivation of Viruses by UV

Log Inactivation	
2.0	**3.0**
21	36

Table C3.T25 Radionuclides

Radionuclide	Bq/l	Radionuclide	Bq/l	Radionuclide	Bq/l
Hydrogen 3	10000	Cobalt 58	100	Radium 224	1
Beryllium 7	10000	Cobalt 60	100	Radium 225	1
Carbon 14	100	Nickel 59	1000	Radium 226	1
Sodium 22	100	Nickel 63	1000	Radium 228	0.1
Phosphorus 32	100	Zinc 65	100	Molybdenum 93	100
Phosphorus 33	1000	Arsenic 73	1000	Molybdenum 99	100
Sulphur 35	100	Arsenic 74	100	Technetium 96	100
Chloride 36	100	Arsenic 76	100	Technetium 97	1000
Cadmium 45	100	Arsenic 77	1000	Technetium 99	100
Cadmium 47	100	Selenium 75	100	Ruthenium 97	1000
Scandium 46	100	Brome 82	100	Ruthenium 103	100
Scandium 47	100	Rubidium 86	100	Ruthenium 106	10
Scandium 48	100	Strontium 85	100	Radium 105	1000
Vanadium 48	100	Strontium 89	100	Palladium 103	1000
Chromium 51	10000	Strontium 90	10	Silver 105	100
Manganese 52	100	Yttrium 90	100	Silver 110	100
Manganese 53	10000	Yttrium 91	100	Silver 111	100
Manganese 54	100	Zirconium 93	100	Cadmium 109	100
Iron 55	1000	Zirconium 95	100	Cadmium 110	100
Iron 59	100	Niobium 93	1000	Indrium 111	1000
Cobalt 56	100	Niobium 94	100	Indrium 114	100
Cobalt 57	100	Niobium 95	100	Osmium 191	100
Tin 113	100	Uranium 237	100	Osmium 193	100
Tin 125	100	21 Uranium 238	10	Iridium 190	100
Antimony 122	100	Lanthanum 140	100	Iridium 192	100
Antimony 124	100	Sirium 139	1000	Platinum 191	1000
Antimony 125	100	Sirium 141	100	Platinum 193	1000
Tellurium 123	100	Sirium 143	100	Gold 198	100
Tellurium 127	1000	Sirium 144	10	Gold 199	1000
Tellurium 129	1000	Niobium 147	100	Mercury 197	1000
Tellurium 131	1000	Promethium 147	1000	Mercury 203	100
Tellurium 132	100	Promethium 149	100	Thallium 200	1000
Iodine 125	10	Samarium 151	1000	Thallium 201	1000
Iodine 126	10	Samarium 153	100	Thallium 202	1000
Iodine 129	1000	Erbium 152	100	Thallium 204	100
Iodine 131	10	Erbium 154	100	Lead 203	1000

Table C3.T25 Radionuclides

Radionuclide	Bq/l	Radionuclide	Bq/l	Radionuclide	Bq/l
Strontium 129	1000	Erbium 155	1000	Bismuth 206	100
Strontium 131	1000	Gadolinium 153	1000	Bismuth 207	100
Strontium 132	100	Terbium 160	100	Bismuth 210	100
Strontium 134	10	Erbium 169	1000	Lead 210	0.1
Strontium 135	100	Thulium 171	1000	Polonium 210	0.1
Strontium 136	100	Ytterbium 175	1000	Radium 223	1
Strontium 137	10	Tantabium 182	100	Chromium 242	10
Barium 131	1000	Tungsten 181	1000	Chromium 243	1
Barium 140	100	Tungsten 185	1000	Chromium 244	1
Uranium 235	1	Rhenium 186	100	Chromium 245	1
Uranium 236	1	Osmium 185	100	Chromium 246	1
Thorium 227	10	Uranium 234	10	Chromium 247	1
Thorium 228	1	Niobium 237	1	Chromium 248	0.1
Thorium 229	0.1	Niobium 239	100	Berkelium 249	100
Thorium 230	1	Plutonium 236	1	Californium 246	100
Thorium 231	1000	Plutonium 237	1000	Californium 247	10
Thorium 232	1	Plutonium 238	1	Californium 249	1
Thorium 234	100	Plutonium 239	1	Californium 250	1
Protactinium 230	100	Plutonium 240	1	Californium 251	1
Protactinium 231	0.1	Plutonium 241	10	Californium 252	1
Protactinium 233	100	Plutonium 242	1	Californium 253	100
Uranium 230	1	Plutonium 244	1	Californium 254	1
Uranium 231	1000	Americium 241	1	Einsteinium 253	10
Uranium 232	1	Americium 242	1000	Einsteinium 254	10
Uranium 233	1	Americium 243	1		

Table C3.T26. Chemical Components used in Treatment of Drinking Water and Related Components

Component	Maximum Level
Derivatives of purification substances	µg/l
Dichloromethane bromate	60
Bromoform	100
Chlorate	700
Chloroform	300
Cyanogen chloride	70
Dibromoacetonitrile	70
Dibromochloromethane	100
Dichloroacetate	50
Dichloroacetonitrile	20
Monochloroacetate	20
Trichloroacetate	200
4,2 – 6 Trichlorophenol	200
Contaminants from treatment chemicals	µg/l
Acrylamide	0.5
Epichlorohydrin	0.4
Contaminants from pipes and equipment	µg/l
Benzo [alpha] benzene	0.7
Copper	1000
Lead	10
Vinyl chloride	0.3

Table C3.T27. Residues of Insecticides used for Public Health Purposes

Residues of insecticides used for public health purposes	Maximum level (ug/L)
Chlorpirifos	30
DDT and substitutes	1
Permethrin	300
Pyriproxyfen	300

Table C3.T28. Toxic Substances

Toxic Substance	Maximum level (ug/L)
Micrositin LR	1

Table C3.T29. Substances and Parameters Related to Quality of Bottled Drinking Water

Substances and Parameters	Measurement unit	Maximum permissible level
Physical Characteristics		
Color	True color unit	15
Turbidity	Nephelometric turbidiry unit	5
Taste	-	Tasteless
Odor	-	Odorless
Inorganic Constituents		
Total hardness	ppm	200
Sulfate	ppm	150
Chloride	ppm	150
Iron	ppm	0.3
Manganese	ppm	0.1
Copper	ppm	1
Sodium	ppm	100
Zinc	ppm	3
Aluminium	ppm	0.2
Ammonia	ppm	0.5
Hydrogen Sulfide	ppm	0.05
Total dissolved solids	ppm	100 – 500
pH	pH units	6.5 – 8.5

Table C3.T30. Maximum Level of Inorganic Constituents in Bottled Drinking Water

Substances and Parameters	Maximum level (ppm)
Arsenic	0.01
Barium	0.7
Boron	0.5
Cadmium	0.003
Chromium	0.05
Copper	2
Cyanide	0.07
Fluoride	0.8 – 1.5
Silver	0.1
Tin	1 ug/L
Uranium	2 ug/L
Beryllium	1 ug/L
Lead	0.01
Manganese	0.5
Mercury (total)	0.001
Molybdenum	0.07
Nickel	0.02
Nitrate (as NO_3)[1]	50
Nitrite (as NO_2)[1]	3
Selenium	0.01
Antimony	0.005

1 – Total concentration of nitrate and nitrite should not exceed 1, i.e. $C_{nitrate}/50 + C_{nitrite}/3 \leq 1$

Table C3.T31.Maximum Level of Organic Constituents in Bottled Drinking Water

Constituent	Maximum level (ug/L)
a- Chlorinated alkanes:	
Carbon tetrachloride	2
Dichloromethane	20
1,2-dichloroethane	30
1,1,1-trichloroethane	2000
b- Chlorinated ethenes:	
Vinyl chloride	5
1,1-dichloroethene	30
1,2-dichloroethene	50
Trichloriethene	70
Tetrachloroethene	40
c- Aromatic hydrocarbons:	
Benzene	10
Toluene	700
Xylene	500
Ethylbenzene	300
Styrene	20
Benzopyrene	0.7
d- Chlorinated benzenes:	
Monochlorobenzene	300
1,2-dichlorobenzene	1000
1,4-dichlorobenzene	300
Trichlorobenzene	20
e- Miscellaneous organic chemicals:	
Di ethylhexyl adipate	80
Di ethylhexyl phthalate	0.8
Acrylamide	0.5
Epichlorohydrin	0.4
Hexachlorobutadiene	0.6
Edetic acid (EDTA)	600
Nitrilotriacetic acid	200
Tributyltin oxide	2
Mycrocytin – RL	1

Table C3.T32. Maximum Levels of Pesticides in Bottled Drinking Water

Constituent	Maximum level (ug/L)
Alachlor	20
Aldicarb	10
Aldrin/dialdrin	0.03
Atrazine	2
Bentazone	300
Carbofuran	7
Chlordane	0.2
Chlorotoluron	30
DDT	2
1,2-dibromo-3-chloropropane	1
2,4-dichlorophenoxyacetic acid	30
1,2-dichloropropane	40
1,3-dichloropropane	20
Heptachlor and Heptachlor epoxide	0.03
Hexachlorobenzene	1
Isoproturon	9
Lindane	2
MCPA	2
Methoxychlor	20
Metolachlor	10
Molinate	6
Pendimethalin	20
Pentachlorophenol	9
Permethrin	20
Propanil	20
Pyridate	100
Simazine	2
Trifluralin	20
2,4-DB	90
Dichlorprop	100
Fenoprop	9
Mecoprop	10
2,4,5-T	9
Cyanazine	0.6
1,2-dibromomethane	15
Diquat	10
Terbuthylazine (TBA)	7

Table C3.T33. Maximum Level of Disinfectants and Disinfectant By-products in Bottled Drinking Water

Disinfectants	**Maximum level (ppm)**
Monochloramine	3
Chlorine	5
Disinfectants by-products	**Maximum level (ug/L)**
Bromate	25
Chlorite	200
2,4,6-trichlorophenol	200
Formaldehyde	900
Bromoform	100
Dibromo chlomethane	100
Bromo dichloromethane	60
Chloroform	200
Dichloroacetic acid	50
Trichloroacetic acid	100
Chloral hydrate (trichloroacetaldehyde)	10
Dichloro acetonitrile	90
Dibromo acetonitrile	100
Trichloro acetonitrile	1
Cyanogen chloride	70

Note: Total concentration of trihalomethanes should not exceed 1.

$C_{bromoform}/GV_{bromoform} + C_{DBCM}/GV_{DBCM} + C_{BDCM}/GV_{BDCM} + C_{chloroform}/GV_{chloroform} \leq 1$

Where: C = conentration and GV = guideline value

DBCM = dibromochloromethane

BDCM = bromodichloromethane

Table C3.T34. Activity Concentration of Various Radionuclides in Bottled Drinking Water Corresponding to a Dose of 0.1 mSv from 1 Years Intake

Radionuclide	Dose conversion factor (Sv/Bq)	Calculated rounded value (Bq/litre)
3H	1.8×10^{-11}	7800
14C	5.6×10^{-10}	250
60Co	7.2×10^{-9}	20
89Sr	3.8×10^{-9}	37
90Sr	2.8×10^{-8}	5
129I	1.1×10^{-7}	1
131I	2.2×10^{-8}	6
134Cs	1.9×10^{-8}	7
137Cs	1.3×10^{-8}	10
210Pb	1.3×10^{-6}	0.1
210Po	6.2×10^{-7}	0.2
224Ra	$8.0 \times, 10^{-8}$	2
226Ra	2.2×10^{-7}	1
228Ra	2.7×10^{-7}	1
232Th	1.8×10^{-6}	0.1
234U	3.9×10^{-8}	4
238U	3.6×10^{-8}	4
239Pu	5.6×10^{-7}	0.3

Table C3.T35. Maximum Level of Radioactive Constituents in Bottled Drinking Water

Radioactive	Maximum level (Bq/liter)
Gross alpha activity	0.1
Gross beta activity	1

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C4. CHAPTER 4

WASTEWATER

C4.1. SCOPE

This Chapter contains criteria to control and regulate discharges of wastewater into surface waters. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges, and pollutants from indirect dischargers.

C4.2. DEFINITIONS

C4.2.1. 7-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of seven consecutive days.

C4.2.2. 30-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

C4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

C4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

C4.2.5. Ballast Water. The water found inside a tank on a ship if its oil contents exceed 15 ppm.

C4.2.6. Best Management Practices (BMP). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into waters of the Kingdom of Saudi Arabia.

C4.2.7. Biochemical Oxygen Demand (BOD_5). The five-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

C4.2.8. Carbonaceous BOD_5 ($CBOD_5$). The five-day measure of the pollutant parameter, $CBOD_5$. This test can substitute for the BOD_5 testing which suppresses the nitrification reaction/component in the BOD_5 test.

C4.2.9. Conventional Pollutants. BOD_5, total suspended solids (TSS), oil and grease, fecal coliforms, and pH.

C4.2.10. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

C4.2.11. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

C4.2. 12. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to waters of the Kingdom of Saudi Arabia from any "point source."

C4.2.13. Domestic Wastewater Treatment System (DWTS). Any DoD or Kingdom of Saudi Arabia facility designed to treat wastewater before its discharge to waters of the Kingdom of Saudi Arabia and in which the majority of such wastewater is made up of domestic sewage.

C4.2. 14. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into waters of the Kingdom of Saudi Arabia.

C4.2.15. Existing Source. A source in operation, or under construction, prior to 1 October 1994, unless it is subsequently substantially modified, that discharges pollutants.

C4.2.16. Facility. Means any installation or activity expected to be a source of pollution or environmental deterioration.

C4.2.17. Guidelines. Guidelines are not standards and are adopted in cases where baseline information is not sufficient for the issuance of specific standards at the respective time.

C4.2.18. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

C4.2.19. Industrial Activities Associated with Storm Water. Activities that may contribute pollutants to storm water runoff or drainage during wet weather events. (See Table C4.T3., "Best Management Practices.")

C4.2.20. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to waters of the Kingdom of Saudi Arabia.

C4.2.21. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

C4.2.22. Maritime Environment. The coasts, the sea, internal seas, the regional sea water, the neighboring area, the pure economical area and its depths, and all its components, live and inanimate creatures.

C4.2.23. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

C4.2.24. Maximum Pollutant Level. This is the highest limit for any pollutant permitted to exist in wastewater.

C4.2.25. Mixing Zone. It is a defined area of water directly adjacent to an area for discharging contaminants where the receiving water quality standards may be exceeded.

C4.2.26. New Source. A source built or substantially modified on or after 1 October 1994 that directly or indirectly discharges pollutants to the wastewater system.

C4.2.27. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft, or any conveyance that merely collects natural surface flows of precipitation.

C4.2.28. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical waste; biological material; radioactive material; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

C4.2.29. Pretreatment. Means the stage of application of controls to waste water in industrial areas prior to its discharge to central treatment facilities.

C4.2.30. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

C4.2.31 Public Sewer. A common sewer directly controlled by public authority.

C4.2.32. Receiving Water. Means a surface water body into which pollutants are or may be directly discharged.

C4.2.33. Regulated Facilities. Those facilities for which criteria are established under this Chapter, such as DWTS, IWTS, or industrial discharges.

C4.2.34. Rock Layer. A part of the geological composition of a given area, the rocks of which appear on the surface of the earth.

C4.2.35. Storm Water. Run-off and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

C4.2.36. Substantial Modification. Any modification to a facility, the cost of which exceeds $1,000,000, regardless of funding source.

C4.2.37. Tertiary Treatment. This is the level of treatment which can be achieved by aeration which ends in percolation, cleansing, and any other operations. It is possible to use water treated in this way for unrestricted irrigation.

C4.2.38. Total Suspended Solids (TSS). The pollutant parameter total filterable suspended solids.

C4.2.39. Total Toxic Organics (TTO). The summation of all quantifiable values greater than 0.01 mg/L for the toxic organics in Table C4.T1., "Components of Total Toxic Organics."

C4.2.40. Waste Water. Means any contaminated water resulting from industrial or agricultural operations or any other activities which are of equivalent environmental impact, including sanitary wastewater.

C4.2.41. Waters of the Kingdom of Saudi Arabia. Surface water including the territorial seas recognized under customary international law, including:

C4.2.41.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce.

C4.2.41.2. Waters which are or could be used for recreation or other purposes.

C4.2.41.3. Waters from which fish or shellfish are or could be taken and sold.

C4.2.41.4. Waters which are used or could be used for industrial purposes by industries.

C4.2.41.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

C4.2.41.6. Tributaries of waters identified in subparagraphs C4.2.29.1. through C4.2.29.5. of this definition.

C4.2.41.7. Exclusions to waters of the Kingdom of Saudi Arabia. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this Chapter, are not waters of the Kingdom of Saudi Arabia. This exclusion applies only to manmade bodies of water that were neither originally waters of the Kingdom of Saudi Arabia nor resulted from impoundment of waters of the Kingdom of Saudi Arabia.

C4.3. CRITERIA

C4.3.1. Effluent Limitations for Direct Dischargers of Conventional Pollutants

C4.3.1.1. All new sources of pollutants directly discharged to waters of the Kingdom of Saudi Arabia will comply with the following effluent limitations:

C4.3.1.1.1. <u>BOD_5</u>

C4.3.1.1.1.1. The 30-day average will not exceed **25** mg/L.

C4.3.1.1.1.2. The 7-day average will not exceed 45 mg/L.

C4.3.1.1.1.3. $CBOD_5$ may be substituted for BOD_5. $CBOD_5$ limit, if substituted for the parameter BOD_5, should be at least 5 mg/L less than each numerical limit for the 30-day and 7-day average for the BOD_5 limit. The $CBOD_5$ test procedure suppresses the nitrification component in the BOD_5 test procedure, thereby reducing the value or effects and lowering the oxygen demand. When $CBOD_5$ is substituted for BOD_5, the following limits will apply:

C4.3.1.1.1.3.1. 30-day average will not exceed 25 mg/L.

C4.3.1.1.1.3.2. The 7-day average will not exceed 40 mg/L.

C4.3.1.1.2. TSS

C4.3.1.1.2.1. The 30-day average will not exceed 15 mg/L.

C4.3.1.1.2.2. The 7-day average will not exceed 15 mg/L.

C4.3.1.1.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.1.2. Existing sources of pollutants to waters of the Kingdom of Saudi Arabia will comply with the following effluent limitations:

C4.3.1.2.1. BOD_5

C4.3.1.2.1.1. The 30-day average will not exceed 25 mg/L.

C4.3.1.2.1.2. The 7-day average will not exceed 50 mg/L.

C4.3.1.2.2. TSS

C4.3.1.2.2.1. The 30-day average will not exceed 15 mg/L.

C4.3.1.2.2.2. The 7-day average will not exceed 15 mg/L.

C4.3.1.2.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

C4.3.1.3. <u>Monitoring.</u> Monitoring requirements apply to all regulated facilities. The monitoring frequency (including both sampling and analysis) given in Table C4.T2., "Monitoring Requirements," includes all three parameters which are regulated (BOD_5, TSS, and pH). Samples shall be collected at the point of discharge to the waters of the Kingdom of Saudi Arabia.

C4.3.1.4. <u>Recordkeeping Requirements.</u> The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. Retain records for three years.

C4.3.1.4.1. The effluent, concentration, or other measurement specified for each regulated parameter.

C4.3.1.4.2. The daily volume of effluent discharge from each point source.

C4.3.1.4.3. Test procedures for the analysis of pollutants.

C4.3.1.4.4. The date, exact place, and time of sampling and/or measurements.

C4.3.1.4.5. The name of the person who performed the sampling and/or measurements.

C4.3.1.4.6. The date of analysis.

C4.3.1.5. Complaint System. A system for investigating water pollution complaints from individuals or Kingdom of Saudi Arabia water pollution control authorities will be established, involving the LEC, as appropriate.

C4.3.1.6. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 0.049 million gallons per day (MGD), monthly sample must comply with level for 30-day average.

C4.3.2. Effluent Limitations For Non-Categorical Industrial Indirect Dischargers

C4.3.2.1. Effluent Limits. The following effluent limits will apply to all discharges of pollutants to DWTSs and associated collection systems from process wastewater for which categorical standards have not been established (see subparagraphs C4.3.3.1.1.8., C4.3.3.1.1.9., and C4.3.3.1.1.10. for a list of categorical standards). It is prohibited for any person to damage sewage facilities.

C4.3.2.1.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants that would result in an obstruction to the domestic wastewater treatment plant flow is prohibited.

C4.3.2.1.2. Ignitability and Explosivity

C4.3.2.1.2.1. The discharge of wastewater with a closed cup flashpoint of less than 60C (140F) is prohibited.

C4.3.2.1.2.2. The discharge of waste with any of the following characteristics is prohibited:

C4.3.2.1.2.2.1. A liquid solution that contains more than 24% alcohol by volume and has a flash point less than 60 C (140 F).

C4.3.2.1.2.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction.

C4.3.2.1.2.2.3. An ignitable compressed gas.

C4.3.2.1.2.2.4. An oxidizer, such as peroxide.

C4.3.2.1.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

C4.3.2.1.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

C4.3.2.1.3.2. Wastes that react violently with water;

C4.3.2.1.3.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water;

C4.3.2.1.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

C4.3.2.1.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

C4.3.2.1.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material"; and

C4.3.2.1.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers.

C4.3.2.1.4. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 or above a pH of 10.0 is allowed, unless the DWTS is specifically designed to handle that type of wastewater.

C4.3.2.1.5. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin. The maximum limit of discharge of oil and grease is 120 mg/L.

C4.3.2.1.6. Spills and Batch Discharges (slugs). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

C4.3.2.1.6.1. Description of discharge practices, including non-routine batch discharges;

C4.3.2.1.6.2. Description of stored chemicals;

C4.3.2.1.6.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this Chapter, including procedures for subsequent written notification within five days;

C4.3.2.1.6.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training;

C4.3.2.1.6.5. Proper procedures for building containment structures or equipment;

C4.3.2.1.6.6. Necessary measures to control toxic organic pollutants and solvents; and

C4.3.2.1.6.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

C4.3.2.1.7. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

C4.3.2.1.8. Heat. Heat in amounts that inhibit biological activity in the DWTS resulting in interference, but in no case in such quantities that the temperature of the process water at the DWTS exceeds 40°C (104°F).

C4.3.2.2. Complaint System. A system for investigating water pollution complaints from Kingdom of Saudi Arabia water pollution control authorities will be established, involving the LEC as appropriate.

C4.3.3. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect). Any installations which have activities that fall into any of the industrial categories listed below must comply with the following effluent limitations (i.e., either direct or indirect discharge limitations at the source of the discharge). For most categories, the effluent limitations are the same for new and existing activities. Where differences in limitations exist, activities constructed or substantially modified on or after 1 October 1994 will meet the limitations for new activities.

C4.3.3.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

C4.3.3.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

C4.3.3.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

C4.3.3.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

C4.3.3.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

C4.3.3.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

C4.3.3. 1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

C4.3.3.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

C4.3.3.1.8. The following discharge standards apply to new and existing facilities in the above electroplating subparts which directly or indirectly discharge less than 38,000 liters per day (10,000 gallons per day):

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, amenable	5.0	2.7
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Toxic Organics	4.57	---

C4.3.3.1.9. The following discharge standards apply to new and existing facilities in the above electroplating subparts that directly, or indirectly, discharge 38,000 liters per day (10,000 gallons per day) or more:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Cyanide, total	1.9	1.0
Copper	4.5	2.7
Nickel	4.1	2.6
Chrome	7.0	4.0
Zinc	4.2	2.6
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Metals	10.5	6.8
Total Toxic Organics	2.13	---

C4.3.3.1.10. In addition to the above standards, new and existing facilities that electroplate precious metals and that directly or indirectly discharge 38,000 liters per day (10,000 gallons per day) or more must comply with the following standard:

Pollutant	Daily Maximum (mg/L)	4-day Average (mg/L)
Silver	1.2	0.7

C4.3.3.2. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters that are specified in the paragraph of this Chapter dealing with industrial dischargers. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan. (See Table C4.T2., "Monitoring Requirements.")

C4.3.4. Storm Water Management

C4.3.4.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table C4.T3., "Best Management Practices." Update the SWPPP annually using in-house resources.

C4.3.4.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events, should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

C4.3.5. Septic System. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

C4.3.6. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate.

C4.4. ADDITIONAL REQUIREMENTS

C4.4.1. Government or private authorities, including commercial and industrial institutions, are responsible for wastewater pretreatment at their own expense before discharging into the public sewer.

C4.4.2. General Pretreatment Guidelines for Discharge to Public DWTS. Wastewaters of different characteristics shall be segregated to the maximum extent possible. Sanitary wastes may be sent to a public DWTS without pretreatment. Contaminated wastewaters other than sanitary wastewater shall be treated on site to meet pretreatment requirements in Table C4.T4.

C4.4.3. Any wastewater discharged to the public DWTS shall not exceed standards presented in Table C4.T4.

C4.4.4. Any industrial wastewater discharged to the public sewer shall not exceed standards presented in Table C4.T5.

C4.4.5 General Performance Standards for Direct Discharge. The performance standards for direct discharge are intended to adopt the best practical controls for new and existing sources of pollutants. Wastewaters of different characteristics shall be segregated to the maximum extent possible. Uncontaminated surface runoff and once-through cooling waters may be discharged into receiving waters without treatment.

C4.4.6. Any wastewater, treated or directly discharged to the maritime environment from new and existing sources shall not exceed standards presented in Table C4.T6.

C4.4.7. Ballast water discharged to the maritime or land environment shall not exceed standards presented in Table C4.T7.

C4.4.8. Mixing Zone. Each direct discharge shall be dispersed and mixed with the receiving waters.

C4.4.9. Receiving Water Guidelines. Guidelines for receiving water quality at the edge of the mixing zone and beyond for the discharge from any facility to the maritime environment are provided in Table C4.T8.

C4.4.10. If the water discharged from the wastewater treatment plant does not meet the standards in Table C4.T6, and if the water can not be directed to a public sewage network, then the owner of the wastewater treatment plant must cease operations of the wasterwater treatment plant until the standards in Table C4.T6 are met.

C4.4.11. In the event a DWTS shuts down, it is not permissible to discharge the untreated wastewater to areas of exposed rock layers which are part of the water table, or into water channels. It is also not permissible to bury wastewater in such areas.

C4.4.12. It is not permissible to discharge treated wastewater into surface water bodies such as dam reservoirs.

C4.4.13. In the absence of a public sewer, all building drains shall be routed to a septic tank with the ability to connect to a public sewer in the future.

C4.4.14. It is prohibited to discharge any kind of wastewater or materials into a DWTS that can impede the operation of a DWTS or impact the DWTS effluent quality.

C4.4.15. It is prohibited to use untreated sewage or wastewater for irrigation or any agricultural purposes.

C4.4.16. A DWTS must be operated and maintained by the owner at the owner's expense. The DWTS must be equipped with flow measuring devices and equipment necessary for wastewater sample collection and analyses.

C4.4.17. The operator of a hazardous healthcare waste treatment facility should maintain an operating record that contains test results of the water discharged from the treatment process, and the methods and location of discharged water disposal.

Table C4.T1. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1 ,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1 ,2-Dichloropropane
Methyl bromide (bromomethane)	1 ,3-Dichloropropylene (1 ,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1 ,2-Trichloroethane
1,1 -Dichloroethene	Benzene
1 ,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1 ,2-Dichloroethane	Bromoform (tribromomethane)
1 ,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1 -Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1 ,2-Diphenylhydrazine
1 ,3-Dichlorobenzene	N-nitrosodiphenylamine
1 ,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1 ,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1 ,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1 ,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate
Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11 ,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)

Table C4.T1. Components of Total Toxic Organics (continued)

Base/Neutral Extractable Organics (continued)	
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractables Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	
Pesticides/PCBs	
Alpha-Endosulfan	Endrin
Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor
Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)
Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and metabolites)	PCB-1016 (Arochlor 1016)
Dieldrin	

Table C4.T2. Monitoring Requirements

Plant Capacity (MGD)	**Monitoring Frequency**
0.001 - 0.99	Monthly
1.0 - 4.99	Weekly
> 5.0	Daily

Table C4.T3. Best Management Practices

Activity	**Best Management Practice**
Aircraft Ground Support Equipment Maintenance	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids. Cap hoses to prevent drips and spills.
Aircraft/runway deicing	Perform anti-icing before the storm. Put critical aircraft in hangars/shelters.
Aircraft/vehicle fueling operations	Protect fueling areas from rain. Provide spill response equipment at fueling station.
Aircraft/vehicle maintenance & repair	Perform maintenance/repair activities inside. Use drip pans to capture drained fluids.
Aircraft/vehicle washing	Capture wash water and send to wastewater treatment plant Treat wash water with oil water separator before discharge.
Bulk fuel storage areas	Use dry camlock connectors to reduce fuel loss. Capture spills with drip pans when breaking connections. Curb fuel transfer areas; treat with oil water separator.
Construction activities	Construct sediment dams/silt fences around construction sites.
Corrosion control activities	Capture solvent/soaps used to prepare aircraft for painting. Perform corrosion control activities inside.
Hazardous material storage	Store hazardous materials inside or under cover. Reduce use of hazardous materials.
Outdoor material storage areas	Cover and curb salt, coal, urea piles. Store product drums inside or under cover. Reduce quantity of material stored outside.
Outdoor painting/depainting operations	Capture sandblasting media for proper disposal. Capture paint clean up materials (thinners, rinsates).
Pesticide operations	Capture rinse water when mixing chemicals. Store spray equipment inside.
Power production	Capture leaks and spills from power production equipment using drip pans, etc.
Vehicle storage yards	Check vehicles in storage for leaks and spills. Use drip pans to capture leaking fluids.

Table C4.T4. Pretreatment Criteria for Acceptance of Liquid Waste to the Public DWTS

Parameter	Standards	Unit
pH	5-10	mg/l
Color	Non-resistance	mg/l
BOD5	1000	mg/l
COD5	1500	mg/l
Temperature	60	mg/l
Total Suspended Solids	2000	mg/l
Total Dissolved Solids	4000	mg/l
Grease and Oil	120	mg/l
Sulfide (as ions)	10	mg/l
Sulfate (as ions)	1000	mg/l
Phenols	150	mg/l
Cyanide	1	mg/l
Detergents (capable of vigorous decomposition)	100	mg/l
Total Chlorinated Hydrocarbons	0.5	mg/l
Total Organic Carbon	1000	mg/l
Caustic Alkali (calcium carbonates)	3000	mg/l
Total toxic metals	10	mg/l
Aluminum	30	mg/l
Arsenic	1	mg/l
Barium	10	mg/l
Cadmium	0.5	mg/l
Total Chromium	2	mg/l
Copper	1	mg/l
Iron	25	mg/l
Lead	1	mg/l
Mercury	0.01	mg/l
Nickel	2	mg/l
Silver	5	mg/l
Zinc	10	mg/l

Table C4.T5. Criteria for the Discharge of Industrial Effluents into Public Sewers

Parameter	Standards	Unit
Synthetic detergents	10-30	mg/l
Cyanide Compounds	0.1-1	mg/l
Sulfides	8-10	mg/l
Sulfates	80-100	mg/l
Tar & Tar Oils	0-5	mg/l
Floating oils & Grease	5-30	mg/l
Emulsified Oil & Grease	50-75	mg/l
Suspended Solids	300-500	mg/l
Chemical Oxygen Demand	700-1500	mg/l
Trace Metals (Total)		
Cadmium	0.5-5	mg/l
Chromium	0.1-2	mg/l
Copper	1-4	mg/l
Lead	2-4	mg/l
Nickel	1-4	mg/l
Silver	2-4	mg/l
Zinc	2-5	mg/l
Arsenic	0.1-4	mg/l
Mercury	0.00-0.1	mg/l

Table C4.T6. Criteria for Direct Discharge or Discharge of Treated Wastewater to the Maritime Environment

Parameter	Standards	Unit
Physical Parameters		
Total Dissolved Solids	1500	mg/l
Floating Particles	0	mg/l
Temperature	10	C°
Turbidity	5-75	N.T.U
Inorganic Parameters		
Ammonia	1	mg/l
Chlorine Residual	0.5	mg/l
Cyanide	0.05	mg/l
Dissolved Oxygen	>2-4	mg/l
Fluoride	2-25	mg/l
Phosphate as P	1	mg/l
Sulfide	0.1-0.5	mg/l
Total Kjeldahl Nitrogen as N	5	mg/l
Trace Metals		
Aluminum	3-25	mg/l
Arsenic	0.1	mg/l
Barium	2	mg/l
Cadmium	0.02	mg/l
Chromium, total	0.1	mg/l
Cobalt	0.05-2	mg/l
Copper	0.2	mg/l
Iron	1.5-10	mg/l
Lead	0.1	mg/l
Manganese	0.2-1	mg/l
Mercury	0.001	mg/l
Nickel	0.2	mg/l
Zinc	1	mg/l
Silver	0.005-0.1	mg/l
Selenium	0.02	mg/l
Organic Parameters		
Chemical Oxygen Demand	150	mg/l
Oil & Grease	8	mg/l
Phenols (estimated as Phenols)	0.1	mg/l
Total Organic Carbon	50	mg/l
Halogenated Hydrocarbons & Pesticides	0.001-0.2	mg/l
Total Chlorinated Hydrocarbons	0.1	mg/L
Biological Parameters		
Total Coliform	10-100	MPN/100ml
Egg Parasites	0	count/l
Worm Parasites	0	count/l
Fecal Coliform	1000	MPN/100 ml

Table C4.T7. Criteria for Ballast Water Discharge

Parameter	Standards	Unit
Ammonia, as N	2-3	mg/l
Biochemical Oxygen Demand	40-50	mg/l
pH	6-9	pH
Chemical Oxygen Demand	200-250	mg/l
Floatable Oil and Grease	0	mg/l
Suspended Solid	40-50	mg/l
Total Oil (Hexane Extractable)	10-15	mg/l
Total Organic Carbon	90-100	mg/l

Table C4.T8. Guidelines for Receiving Water Quality at the Edge of the Mixing Zone

Parameter	Standards[1,2]
Physiochemical Pollutants	
Floatables	Non-attributable to the discharge
pH	0.1units
Total suspended solids	5%
Temperature	1°C
Dissolved oxygen	5%
Turbidity	5%
Organic Pollutants	
Chemical Oxygen Demand	5%
Total Organic Carbon	5%
Total Kjeldahl Nitrogen	5%
Chlorinated Hydrocarbons	5%
Oil and Grease	5%
Phenols	5%
Inorganic Pollutants	
Ammonia	5%
Arsenic	5%
Cadmium	5%
Chloride	5%
Residual chlorine	5%
Total chromium	5%
Copper	5%
Cyanide (Total)	5%
Lead	5%
Mercury	5%
Nickel	5%
Total Phosphate	5%
Zinc	5%
Biological Pollutants	
Total Coliform	70 MPN/100ml

1. Maximum allowable variation in comparison with local baseline conditions at the edge of the mixing zone.
2. Unless otherwise stated, each guideline refers to a thirty (30) day average.

C5. CHAPTER 5

HAZARDOUS MATERIAL

C5.1. SCOPE

This Chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements, which are covered under other Chapters. This FGS does not cover munitions.

C5.2. DEFINITIONS

C5.2.1. Hazardous Chemicals. Gas, liquid or solid chemicals referred to in the lists of classification (attached to this System), which are characterized by their own effectiveness, toxicity, explosiveness, causing corrosion, or any other characteristics that could endanger the human health and environment, whether alone or when coming into contact with other substances.

C5.2.2. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the following information:

C5.2.2.1. Identification/name of hazardous chemicals;

C5.2.2.2. Appropriate hazard warnings; and

C5.2.2.3. The name and address of the manufacturer, importer, or other responsible party; and that is prepared in accordance with DoDI 6050.05 (Reference (g)).

C5.2.3. Hazardous Material. Any material that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table C5.T1., "Typical Hazardous Materials Characteristics," or the material is listed in Table AP1.T4., "List of Hazardous Waste/Substances/Materials." Munitions are excluded.

C5.2.4. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with Reference (g).

C5.2.5. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle, either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

C5.2.6. Material Safety Data Sheet (MSDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

C5.2.7. Package. The complete product of wrapping process that consists of packaging and contents ready to be transported.

C5.2.8. Packaging. Containers and any other related materials necessary for the containers to contain these substances and make sure that the requirements of wrapping are met.

C5.2.9 Tare Weight. The weight of an empty vehicle or container. By subtracting the tare weight from the gross weight (laden weight), the weight of the goods carried (the net weight) may be determined.

C5.2.10. Wrapping. Methods by which substances are wrapped either by rolling up, packaging in packets or by any other secure way.

C5.3. CRITERIA

C5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and Marine Corps Order (MCO) 4450.1 2A (Reference (h)) provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Interservice Manual 24-204(I), Army Technical Order (TO) 3 8-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, DCMAD1, Ch3.4 (HM24), (Reference (i)).

C5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

C5.3.3. Installations will ensure that for each hazardous material shipment:

C5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material and include an MSDS;

C5.3.3.2. All drivers are trained on the hazardous material included in the shipment, including health risks of exposure and the physical hazards of the material, including potential for fire, explosion, and reactivity;

C5.3.3.3. Drivers will be trained on spill control and emergency notification procedures;

C5.3.3.4. For any hazardous material categorized on the basis of section AP1.1. of this FGS, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes;

C5.3.3.5. The transport vehicles are subjected to a walk-around inspection by the driver before and after the hazardous material is loaded; and

C5.3.3.6. Packages are labeled in accordance with paragraph C5.3.7.

C5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material as well as an inventory of all hazardous materials contained therein. (See paragraph C18.3.2.)

C5.3.5. Each MSDS shall be in English or the predominant language in the work place, and shall contain at least the following information:

C5.3.5.1. The identity used on the label.

C5.3.5.1.1. If the hazardous chemical is a single substance, its chemical and common name.

C5.3.5.1.2. If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or

C5.3.5.1.3. If the hazardous chemical is a mixture that has not been tested as a whole:

C5.3.5.1.3.1. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

C5.3.5.1.3.2. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations that would exceed an established Occupational Safety and Health Administration (OSHA)-permissible exposure limit, or could present a health hazard to employees; and

C5.3.5.1.3.3. The chemical and common name(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

C5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

C5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

C5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical;

C5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

C5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available;

C5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen;

C5.3.5.8. Any generally applicable precautions for safe handling and use that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

C5.3.5.9. Any generally applicable control measures that are known to the chemical manufacturer, importer, or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment;

C5.3.5.10. Emergency and first aid procedures;

C5.3.5.11. The date of preparation of the MSDS or the last change to it; and

C5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

C5.3.6. Each work center will maintain a file of MSDSs for each hazardous material procured, stored, or used at the work center. MSDSs that are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site.

C5.3.7. All hazardous materials on DoD installations will have a Hazardous Chemical Warning Label in accordance with Reference (g) (or Kingdom of Saudi Arabia equivalent) and have MSDS information either available or in the HMIRS in accordance with Reference (g) and other DoD Component instructions. These requirements apply throughout the life-cycle of these materials.

C5.3.7.1. Each container shall be marked as follows and as specified for individual gases:

C5.3.7.1.1. Identification of its contents.

C5.3.7.1.2. Tare weight in kg, or other identified unit of weight, for cylinders with water capacity of 140 kg or less.

C5.3.7.1.3. Water capacity of container in kg or in liters.

C5.3.7.1.4. With a notation whether the container system is designed for underground or aboveground installation or both.

C5.3.7.1.5. With marking indicating the maximum level (liquefied gases) to which the containers may be filled except on containers with fixed level indicators, such as fixed length dip tubes, or containers that are filled by weight.

C5.3.7.1.6. Refrigerated containers shall also be marked with minimum temperature in degree Celsius for which container is designed and with the density of the product in kg/m^3 for which the container is designed.

C5.3.7.1.7. Markings specified shall be affixed to the container and located in such a manner as to remain visible after installation.

C5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

C5.3.9. All excess hazardous material will be processed through the Defense Reutilization and Marketing Service (DRMS) in accordance with the procedures in DoD 4160.21-M (Reference (j)). The DRMS will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local pharmacy or exchange program.

C5.3.10. All personnel who use, handle, or store hazardous materials will be trained in accordance with Reference (g) and other DoD Component instructions.

C5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

C5.4. ADDITIONAL REQUIREMENTS

C5.4.1. Packaging

C5.4.1.1 Hazardous chemicals are to be placed inside good quality, sealed packages that are able to withstand all conditions of transport, storage, trading, vibration effects, and temperature changes.

C5.4.1.2. The inside of the packages must be coated with anti-rust, anti-corrosion, and anti-interaction substances that are compatible with the substances. The chemicals may not be packed in breakable or cracked packages. The package shall be double-sealed with two layers. For dried hazardous chemicals, packages shall be compatible with the contents, be able to withstand transport conditions, and shall not be packed in paper packages.

C5.4.1.3. The United Nations packaging specifications and/or the Kingdom of Saudi Arabia national specifications shall be used.

C5.4.2. Transportation by Land

C5.4.2.1. Hazardous chemicals shall safely be transported within defined speed limits and on allowed roadways.

C5.4.2.2. Tanks assigned to transport chemicals shall be made of certain material suitable for external environment and for the transported chemical. The tanks' containers shall be designed with a wide opening for inspection. This opening shall contain an appropriate device for pressure relief.

C5.4.2.3. Metal plates shall be installed on the outer surface from all sides of the transport units to define the tank contents and the risk involved. The tanks shall be painted with a reflective painting in the required color that is able to withstand the weather conditions.

C5.4.2.4. All hazardous chemical carriers in liquid form shall use a yellow lamp with flashing light installed on the driver compartment.

C5.4.2.5. Drivers who transport dangerous substances shall be trained in spill planning and have necessary equipment to initially respond to a spill.

C5.4.6. Storage

C5.4.6.1. Storage shall be designed to limit fire risks, spilling, include secondary containment, prevent injuries, and ensue that incompatible substances are separated.

C5.4.6.2. Provide access to easily-opened emergency egress including emergency lighting and exit sign placement at floor level to be visible during smoke conditions.

C5.4.6.3. Provide proper ventilation.

C5.4.6.4. Design non-slippery smooth floors free from cracks and equipped with special channels able to collect contaminated fire water.

C5.4.6.5. Ground all electrical devices inside the storage and provide electrical circuits with grounding circuit breakers and overload protection devices.

C5.4.6.6. Establishment of dining room or clothing changing room as a basic part of the storage is prohibited. Such dining or locker room buildings shall be kept at least 10 meters away from storage area.

C5.4.6.7. Aisle must be kept clear such that forklifts and handling or emergency devices are not impeded.

C5.4.6.8. The height of stored substances may not exceed 3 m unless a rack shelving system is used.

C5.4.6.9. Battery charging, thermal packing, or welding may not be performed in storage area.

C5.4.6.10. A plan must be prepared illustrating the nature of risk in every part of the storage area including a list of places and stored quantities of chemicals with their dangerous characteristics. The plan must also address emergency equipment location, fire protection devices, and available emergency procedures. Staff shall be initially trained on the emergency procedures, weekly safety issues presented, and the documentation filed in a separate facility.

C5.4.7. Hazardous chemicals must be separated from any area frequented by the public according to the requirements in Table C5.T2.

C5.4.8. Separation of chemicals shall be done according to the UN specifications and requirements in Table C5.T3

C5.4.9. Hazardous chemicals shall be stored in industrial facilities; there must be a separation distance of 3 m for a facility that produces non-flammable substances and 10 m between combustible substances and any combustion source.

C5.4.10. Material Safety Data Sheet (MSDS) information will be reviewed prior to handling spilled or leaked chemicals.

C5.4.11. Necessary equipment must be provided and maintained to deal with spills and personal protection.

C5.4.12. Properly dispose of all damaged and non-usable packages. Keep storage areas clean. Remove cardboard, wood, package material, and any other unused material.

C5.4.13. Provide appropriate fire extinguishers in accessible areas after consulting the fire department. Install a fire alarm system and conduct periodic inspection to ensure operability of extinguishers and alarms.

C5.4.14. Operations of storage areas shall be carefully monitored by an experienced and trained inspector.

Table C5.T1. Typical Hazardous Materials Characteristics

1.	The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials that damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gases, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive materials.
2.	The item and/or its disposal is regulated by the Kingdom of Saudi Arabia because of its hazardous nature.
3.	The item has a flashpoint below 93℃ (200℉) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control.
4.	The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of greater than 1.0 volt or less than -1.0 volt.
5.	In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics.
6.	The item has special characteristics that, in the opinion of the manufacturer or the DoD Components, could cause harm to personnel if used or stored improperly.

Table C5.T2. <u>Minimum Separation of Hazardous Chemicals from the Public</u>

UN Class/Division[a]	**Minimum separation in meters**
1	50
2.1	5
2.2	5
2.3	15
3.1	10
4.1, 4.2	5
5.1, 5.2	5
6.1, 6.2	5
8	5

Table C5.T3. <u>Minimum Separation of Hazardous Chemicals from Other Chemicals</u>

UN Class/ Division	**1.1**	**2.1**	**2.2**	**2.3**	**3.1**	**4.1**	**4.2**	**4.3**	**5.1**	**5.2**	**6.1**	**8**
1.1		C	C	C	C	C	C	C	C	C	C	C
2.1	C			C	B	B	C	B	C	C	B	B
2.2	C			C	A	A	B	A	A	B	A	A
2.3	C	C	C		C	C	C	C	C	C	C	C
3.1	C	B	A	C		B	B	B	C	C	B	A
4.1	C	B	A	C	B		B	B	C	C	B	A
4.2	C	C	B	C	B	B		B	C	C	B	A
4.3	C	B	A	C	B	B	B		C	C	B	B
5.1	C	C	A	C	C	C	C	C		B	B	B
5.2	C	C	B	C	C	C	C	C	B		C	B
6.1	C	B	A	C	B	B	B	B	B	C		A
8	C	B	A	C	A	A	A	B	B	B	A	

Legend:

A- Separation shall be on a distance of at least 3 m.
B- Separation shall be on a distance of at least 5 m.
C- They shall not be stored in the same chamber and the minimum separation distance between storage areas is 10 m.

UN Class/ Divisions

Substances (including mixtures and solutions) and articles are assigned to one of nine classes according to the hazard or the most predominant of the hazards they present. Some of these classes are subdivided into divisions. The classes and divisions are:

Class 1: Explosives

- Division 1.1: Substances and articles which have a mass explosion hazard
- Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard

	- Division 1.3:	Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard	
	- Division 1.4:	Substances and articles which present no significant hazard	
	- Division 1.5:	Very insensitive substances which have a mass explosion hazard	
	- Division 1.6:	Extremely insensitive articles which do not have a mass explosion hazard	

Class 2: Gases

- Division 2.1: Flammable gases
- Division 2.2: Non-flammable, non-toxic gases
- Division 2.3: Toxic gases

Class 3: Flammable liquids

Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, on contact with water, emit flammable gases

- Division 4.1: Flammable solids, self-reactive substances and solid desensitized explosives
- Division 4.2: Substances liable to spontaneous combustion
- Division 4.3: Substances which in contact with water emit flammable gases

Class 5: Oxidizing substances and organic peroxides

- Division 5.1: Oxidizing substances
- Division 5.2: Organic peroxides

Class 6: Toxic and infectious substances

- Division 6.1: Toxic substances
- Division 6.2: Infectious substances

Class 7: Radioactive material

Class 8: Corrosive substances

Class 9: Miscellaneous dangerous substances and articles, including environmentally hazardous substances

C6. CHAPTER 6

HAZARDOUS WASTE

C6.1. SCOPE

This Chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed, and recycled in an environmentally sound manner.

C6.2. DEFINITIONS

C6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4., "List of Hazardous Waste/Substances/Material." with a U.S. Environmental Protection Agency (USEPA) waste number with the "P" designator, or those hazardous wastes in Table AP1.T4. with Hazard Code "H".

C6.2.2. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into or on any land or water that would allow the waste or constituent to enter the environment. Proper disposal effectively mitigates hazards to human health and the environment. All operations of incineration, precipitation, or intentional or unintentional, direct or indirect, discharge of any wastes or hazardous, toxic or radioactive substances, either in gaseous, liquid or solid forms, into the environment.

C6.2.3. DoD Hazardous Waste Generator. The Department of Defense considers a generator to be the installation, or activity on an installation, that produces a hazardous waste.

C6.2.4. Hazardous Constituent. A chemical compound listed by name in Table AP1.T4., "List of Hazardous Waste/Substances/Material," or that possesses the characteristics described in section AP1.1.

C6.2.5. Hazardous Waste. A discarded material that may be solid, semi-solid, liquid, or contained gas, and either exhibits a characteristic of a hazardous waste as defined in section AP1.1. or is listed as a hazardous waste in Tables AP1.T1. through AP1.T4. Excluded from this definition are domestic sewage sludge, household wastes, and medical wastes.

C6.2.6. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area (HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator of the process generating the waste.

C6.2.7. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending, or other treatment is also hazardous waste fuel.

C6.2.8. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this FGS.

C6.2.9. Hazardous Waste Profile Sheet (HWPS). A document that identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

C6.2.10. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. An HWSA may store more than 55 gallons of a HW stream, and more than one quart of an acute HW stream.

C6.2.11. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

C6.2.12. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

C6.2.13. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste that would render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

C6.2.14. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The number could be the Unit Identification Code (UIC) or the DoD Activity Address Code (DoDAAC). The LEC should specify the method for determining the unique identification number in the FGS.

C6.2.15. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment. "Used oil," means any oil or other waste petroleum, oil, or lubricant (POL) product that has been refined from crude oil, or is synthetic oil, has been used and as a result of such use, is contaminated by physical or chemical impurities, or is off-specification and cannot be used as intended. Although used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, it is still considered used oil, unless it has been mixed with hazardous waste. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

C6.2.16. Hazardous Waste Log. A listing of HW deposited and removed from an HWSA. Information such as the waste type, volume, location, and storage removal dates should be recorded.

C6.2.17. Elementary Neutralization. A process of neutralizing a HW, that is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

C6.2.18. Treatment, Storage and/or Disposal Facility (TSD). Refers to a treatment, storage and/or disposal facility, including recycling facilities (including the soil and its changes)."

C6.2.19. Producer. This refers to any person, natural or legal, who produces wastes or is the main reason of its production. See also C6.2.3.

C6.2.20. Storage. All operations intended to keep or contain wastes and other hazardous, toxic or radioactive substances for the purpose of treatment, transportation or disposal.

C6.2.21. Transportation. This refers to the process of transporting wastes outside the site whether through land, air or sea.

C6.2.22. Transporter. This is the person who transports wastes through land, air or sea.

C6.2.23. Treatment. Any means or techniques of altering the physical, chemical or biological properties of wastes. The intention being to neutralize the waste; utilize substances or energy contained therein or released by them; transform the hazardous wastes into ones that are non-hazardous, less hazardous or safer and suitable for transportation, storage or disposal; or reduce the volume of waste.

C6.3. CRITERIA

C6.3.1. DoD Hazardous Waste Generators

C6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using their knowledge of the materials and processes that generated the waste, or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name), and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics should be measurable by standardized, and available testing protocols.

C6.3.1.2. An HWPS will be used to identify each hazardous waste stream. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams or process modifications that change the character of the hazardous waste being handled at the storage area.

C6.3.1.3. Each generator will use a unique identification number for all recordkeeping, reports, and manifests for hazardous waste.

C6.3.1.4. Pre-Transport Requirements

C6.3.1.4.1. Transportation

C6.3.1.4.1.1. When transporting HW via commercial transportation on Kingdom of Saudi Arabia public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable Kingdom of Saudi Arabia transportation regulations. Requirements may include placarding, marking, containerization, and labeling. Hazardous waste designated for international transport will be prepared in accordance with applicable international regulations. In the absence of Kingdom of Saudi Arabia regulations, international standards will be used.

C6.3.1.4.1.1.1 Prior to shipping any hazardous waste outside the facility, the generator of hazardous waste shall comply with the hazardous waste transportation instructions provided in the transportation document, and provide full and detailed information on the waste and samples for analysis to both the transporter who will carry the waste and the receiving facility designated in the transportation documents as the destination for the waste.

C6.3.1.4.1.1.2 The hazardous waste transportation standards shall apply to any person who removes or intends to remove or relocate hazardous waste outside the site. These standards, however, shall apply neither to the wastes excluded nor to the relocation of hazardous waste within the site by the waste generator or owners and operators of the hazardous waste management facilities. The following wastes are excluded from the transportation standard:

1. Domestic sanitary waste water and other wastes passing through the sanitary drainage network to the treatment facility. This exclusion does not cover sludge resulting from the sanitary wastewater treatment facility.

2. Final discharge of treated industrial waste water. This exclusion does not cover pre final discharge waste water.

3. Agricultural drainage runoff.

4. Mining residual matter remaining at their natural location in the mine during extraction.

5. Domestic waste: means any waste generated in the household, hotels, residential complexes and recreational facilities.

6. Inert waste: means any substance that is not chemically or biologically active in the natural environment. Usually in the form of glass, concrete, construction debris, plastic, wood, rubber, metal wire, metal sheets or uncontaminated soil.

7. Commercial and industrial garbage: means commercial and industrial wastes similar to domestic inert wastes. This exclusion does not cover waste containing solvents, degreasers, oils, inks, sludge pastes, acids, alkali, or any non domestic waste.

8. Waste resulting from agricultural and harvesting activities which are returned to the soil as fertilizer, but do not include pesticides, herbicides and chemical fertilizers.

9. Waste resulting from animal breeding which is returned to the soil as

fertilizer.

10. The soil returned to mines after completion of the mining operations.

11. Wastes that have been recycled in an acceptable manner.

C6.3.1.4.1.1.3. The transporter who stores documented shipments of hazardous waste for more than five days shall be deemed a storage facility operator and shall be required to comply with the standards for hazardous waste management facilities in C6.3.3. Hazardous Waste Storage Area (HWSA).

C6.3.1.4.1.1.4. A transporter who mixes hazardous wastes with different shipping requirements inside a single container shall be required to comply with the standards for the hazardous waste generators in C6.3.1. DoD Hazardous Waste Generators.

C6.3.1.4.1.2. When transporting HW via military vehicle on Kingdom of Saudi Arabia public roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, if required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), Kingdom of Saudi Arabia transportation regulations.

C6.3.1.4.2. Manifesting. All HW leaving the installation will be accompanied by a manifest to ensure a complete audit trail from point of origin to ultimate disposal. The manifest will include the information listed below. Kingdom of Saudi Arabia forms will be used when applicable; otherwise, DD Form 1348-1A, "Issue Release/Receipt Document," or DD Form 1348-2, "Issue Release/Receipt Document with Address Label," may be used. This manifest should include:

C6.3.1.4.2.1. Generator's name, address, and telephone number;

C6.3.1.4.2.2. Generator's unique identification number;

C6.3.1.4.2.3. Transporter's name, address, and telephone number;

C6.3.1.4.2.4. Destination name, address, and telephone number;

C6.3.1.4.2.5. Description of waste;

C6.3.1.4.2.6. Total quantity of waste;

C6.3.1.4.2.7. Date of shipment;

C6.3.1.4.2.8. Date of receipt; and

C6.3.1.4.2.9. Provide the transporter with the transportation manifest document and copy of the material safety data sheets for each type of hazardous waste being transported.

C6.3.1.4.3. Generators will maintain an audit trail of HW from the point of generation to disposal. Generators using DRMS disposal services will obtain a signed copy of the manifest from the initial DRMS recipient of the waste, at which time the DRMS will assume responsibility. A generator, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different unique identification number (see definition C6.2.14.) will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer, and disposal of the waste. Activities desiring to dispose of their HW outside the DRMS system will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal.

C6.3.1.4.3.1. Transporters shall keep a copy of each transportation document signed by himself, the hazardous waste supplier, and hazardous waste receiver.

C6.3.2. Hazardous Waste Accumulation Point (HWAP)

C6.3.2.1. An HWAP is defined in paragraph C6.2.6. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those that are chemically incompatible. Each HWAP will have warning signs (National Fire Protection Association or appropriate international sign) appropriate for the waste being accumulated at that site.

C6.3.2.2. An HWAP will comply with the storage limits in paragraph C6.2.6. When these limits have been reached, the generator will make arrangements within five working days to move the HW to an HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348-1A) to appropriate authorities responsible for removing the HW (e.g., Defense Logistics Agency). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) are exempt from the 208-liter (55-gallons)/1-liter (1-Quart) volume accumulation limits, but must be transported off-site to a final destination facility within one year.

C6.3.2.3. All criteria of paragraph C6.3.4., "Use and Management of Containers," apply to HWAPs with the exception of subparagraph C6.3.4.1.5., "Weekly Inspections."

C6.3.2.4. The following provisions of paragraph C6.3.5., "Recordkeeping Requirements," apply to HWAPs: C6.3.5.1. ("Turn-in Documents"), C6.3.5.5. ("Manifests"), and C6. 3.5.6. ("Waste Analysis/Characterization Records").

C6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate HW training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph C6.3.9.

C6.3.3. Hazardous Waste Storage Area (HWSA)

C6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

C6.3.3.2. Design and Operation of HWSAs. HWSAs must be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned release of HW or HW constituents to air, soil, groundwater or surface water that could threaten human health or the environment. Hazardous waste should not be stored longer than one year in an HWSA.

C6.3.3.3. Waste Analysis and Verification

C6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served, will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

C6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, an HWPS for each waste stream that is stored at each HWSA.

C6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

C6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided.

C6.3.3.3.3.2. Ensure that no waste is accepted for storage unless an HWPS is provided, or is available and properly referenced.

C6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

C6.3.3.3.4. Analyze waste shipments in accordance with the waste analysis plan to determine whether it matches the waste description on the accompanying manifest and documents; and

C6.3.3.3.4.1. Reject shipments that do not match the accompanying waste descriptions unless the generator provides an accurate description.

C6.3.3.4. Security

C6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the HWSA grounds.

C6.3.3.4.2. Security System Design. An acceptable security system for a HWSA consists of either:

C6.3.3.4.2.1. A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the HWSA; or

C6.3.3.4.2.2. An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff) that completely surrounds the HWSA, combined with a means to control entrance at all times (e.g., an attendant, television monitors, locked gate, or controlled roadway access).

C6.3.3.4.3. Required Signs. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the HWSA, and at other locations, in sufficient numbers to be seen from any approach to the HWSA. The legend must be written in English and in any other language predominant in the area surrounding the installation, and must be legible from a distance of at least 25 feet. Existing signs with a legend other than "Danger Unauthorized Personnel Keep Out," may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the HWSA, and that entry can be dangerous.

C6.3.3.5. Required Aisle Space. Aisle space must allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation during an emergency. Containers must not obstruct an exit.

C6.3.3.6. Access to Communications or Alarm System

C6.3.3.6.1. General. Whenever HW is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

C6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

C6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

C6.3.3.7.1. An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel.

C6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams.

C6.3.3.7.3. Portable fire extinguishers, fire control equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), spill control equipment, and decontamination equipment.

C6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems.

C6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, and eyewash and shower facilities.

C6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA communications alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its proper operation in time of emergency.

C6.3.3.8. General Inspection Requirements

C6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of HW constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

C6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of HW, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

C6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems

(e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, or eroding dike).

C6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in subparagraph C6. 3.4.1.5. Minimum frequencies for inspecting tank systems are found in subparagraph C6.3.7.5.2. For equipment not covered by those paragraphs, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

C6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

C6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep the records for at least five years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

C6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate HW training program in accordance with the training requirements in paragraph C6.3.9.

C6.3.3.10. Storage Practices

C6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion, and generation of toxic gases.

C6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No Smoking" signs, or the appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "No Smoking" legend must be written in English and in any other language predominant in the area. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

C6.3.3.11. Closure and Closure Plans

C6.3.3.11.1. Closure. At closure of an HWSA, HW and HW waste residues must be removed from the containment system, including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of HW and according to the Closure Plan.

C6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA will also develop a Closure Plan. The Closure Plan will be implemented concurrent with the decision to close the HWSA. The Closure Plan will include: estimates of the storage capacity of the HW, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

C6.3.3.11.2.1. Plan showing the closure procedures of the hazardous waste units, pollution cleanup operations, maintenance and monitoring of units and facilities as may be required after each closure.

C6.3.4. Use and Management of Containers

C6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following guidelines will apply when handling and storing HW containers.

C6.3.4.1.1. Containers holding HW will be in good condition, free from severe rusting, bulging, or structural defects.

C6.3.4.1.2. Containers used to store HW, including overpack containers, must be compatible with the materials stored.

C6.3.4.1.3. Management of Containers

C6.3.4.1.3.1. A container holding HW must always be closed during storage, except when it is necessary to add or remove waste.

C6.3.4.1.3.2. A container holding HW must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

C6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

C6.3.4.1.4. Containers holding HW will be marked with the words "Hazardous Waste", and a label indicating the hazard class of the waste contained (flammable, corrosive, etc.).

C6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking and deteriorating containers as well as deterioration of the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

C6.3.4.2. Containment. Container storage areas must have a secondary containment system meeting the following:

C6.3.4.2.1. Must be sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

C6.3.4.2.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

C6.3.4.2.3. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in subparagraph C6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

C6.3.4.2.4. Rainwater captured in secondary containment areas will be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the HW in the containers. Contaminated water shall be treated as HW until determined otherwise.

C6.3.4.3. Special Requirements for Ignitable or Reactive Waste. Areas that store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

C6.3.4.4. Special Requirements for Incompatible Wastes

C6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

C6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

C6.3.4.4.3. A storage container holding HW that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments, must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

C6.3.4.4.4. A transporter shall not mix wastes of different shipment characteristics by putting them in a single container. Moreover, he/she shall abide by the labels that show the nature of wastes and take the necessary precautions prescribed.

C6.3.5. Recordkeeping Requirements. Copies of such reports shall be retained for at least five years from the date of completion. Retain, for at least five years from the last date of handling of such waste, copies of the results of all tests and analysis performed on the hazardous waste as well as copies of all pertinent reports, correspondence and documents.

C6.3.5.1. Turn-in Documents. Turn-in documents, e.g., DD 1348-1A or manifests, must be maintained for 5 years.

C6.3.5.2. Hazardous Waste Log. A written HW log will be maintained at the HWSA to record all HW handled and should consist of the following:

C6.3.5.2.1. Name/address of generator;

C6.3.5.2.2. Description and hazard class of the hazardous waste;

C6.3.5.2.3. Number and types of containers;

C6.3.5.2.4. Quantity of hazardous waste;

C6.3.5.2.5. Date stored;

C6.3.5.2.6. Storage location; and

C6.3.5.2.7. Disposition data, to include: dates received, sealed, and transported, and transporter used.

C6.3.5.3. The HW log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

C6.3.5.4. Inspection Logs. Records of inspections should be maintained for a period of 5 years.

C6.3.5.5. Manifests. Manifests of incoming and outgoing hazardous wastes will be retained for a period of 5 years.

C6.3.5.5.1. The producer [generator] shall keep a copy of every transportation document until a signed copy from the facility specified in the document, to which wastes are shipped, is received. Also, the signed copy shall be kept for at least five years starting from the date wastes are received by the transporter. Keep one copy of each transport document it has generated pending receipt of the signed copy from the facility designated in the document. It shall also keep the signed copy for at least 5 years as of the date of receipt of the waste by that facility.

C6.3.5.5.2. Hazardous waste transporter shall keep a copy of the transportation document signed by him/her, by the producer [generator] of wastes, and by the recipient of wastes for five years upon reception of wastes.

C6.3.5.6. <u>Waste Analysis/Characterization Records.</u> These records will be retained until 5 years after closure of the HWSA. The producer [generator] shall keep copies of all letters, reports, any results of waste test or analysis, or any other results for at least five years after the last date of waste treatment in the site.

C6.3.5.7. The installation will maintain records, identified in subparagraphs C6.3.5.1., C6.3.5.5., and C6.3.5.6. for all HWAPs on the installation.

C6.3.6. <u>Contingency Plan</u>

C6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of HW in accordance with the provisions of Chapter 17, "Spill Prevention and Response Planning."

C6.3.6.2. A current copy of the installation contingency plan must be:

C6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan that are pertinent to their facilities and operation); and

C6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and upon which the plan relies to provide emergency services. Contingency Plans should be available in both English and the language of the Kingdom of Saudi Arabia.

C6.3.7. <u>Tank Systems.</u> The following criteria apply to all storage tanks containing HW. See Chapter 18, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POLs and hazardous substances.

C6.3.7.1. <u>Application.</u> The requirements of this subparagraph apply to HWSAs that use tank systems for storing or treating HW. Tank systems that are used to store or treat HW that contain no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in subparagraph C6.3.7.4., Containment and Detection of Releases. Tank systems, including sumps that serve as part of a secondary containment system to collect or contain releases of HW, are exempted from the requirements in subparagraph C6.3.7.4.

C6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of subparagraph C6.3.7.4., installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

C6.3.7.3. Design and Installation of New Tank Systems or System Components. Managers of HWSAs installing new tank systems or system components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating HW. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

C6.3.7.4. Containment and Detection of Releases. To prevent the release of HW or hazardous constituents to the environment, secondary containment that meets the requirements of this subparagraph must be:

C6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

C6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

C6.3.7.4.3. Provided for tank systems that store or treat HW by 1 January 1999;

C6.3.7.4.4. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

C6.3.7.4.5. Constructed to include one or more of the following: a liner external to the tank, a vault, or double-walled tank.

C6. 3.7.5. General Operating Requirements

C6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

C6.3.7.5.2. The installation must inspect and log at least once each operating day:

C6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

C6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

C6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of HW (e.g., wet spots, dead vegetation).

C6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA.

C6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or that is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

C6.3.7.6.1. Cessation of use; prevention of flow or addition of wastes. The installation must immediately stop the flow of HW into the tank system or secondary containment system and inspect the system to determine the cause of the release.

C6.3.7.6.2. Containment of visible releases to the environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

C6.3.7.6.2.1. Prevent further migration of the leak or spill to soil or surface water;

C6.3.7.6.2.2. Remove and properly dispose of any contaminated soil or surface water;

C6.3.7.6.2.3. Remove free product to the maximum extent possible; and

C6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

C6.3.7.6.3. Make required notifications and reports.

C6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable, and structures and equipment.

C6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

C6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

C6.3.8.1.1. Industrial furnaces.

C6.3.8.1.2. Boilers that are identified as follows:

C6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

C6.3.8.1.2.2. Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids;

C6.3.8.1.2.3. Used oil-fired space heaters provided that:

C6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

C6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.5 million BTU per hour; and

C6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

C6.3.8.2. Prohibitions on Dust Suppression or Road Treatment. Used oil, HW, or used oil contaminated with any HW will not be used for dust suppression or road treatment.

C6.3.8.3. Lead-acid batteries that are to be recycled will be managed as hazardous material. Lead-acid batteries that are not recycled will be managed as HW.

C6.3.9. Hazardous Waste Training

C6.3.9.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty after the effective date of this FGS must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05 (Reference (g)).

C6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

C6.3.9.3. Training Contents and Requirements. The training program must:

C6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

C6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience.

C6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

C6.3.9.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

C6.3.9.3.4. 1. Emergency procedures (response to fire/explosion/spills; use of communications/alarm systems; body and equipment clean up);

C6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures;

C6.3.9.3.4.3. Employee Protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

C6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

C6.3.9.4. Documentation of Training. Installations must document all HW training for each individual assigned duties involving actual or potential exposure to HW. Updated training records on personnel assigned duties involving actual or potential exposure to HW must be kept by the HWSA manager or the responsible installation office and retained for at least five years after termination of duty of these personnel.

C6.3.10. Hazardous Waste Disposal

C6.3.10.1. All DoD HW should normally be disposed of through the DRMS. A decision not to use the DRMS for HW disposal may be made in accordance with DoDD 4001.1 (Reference (k)) to best accomplish the installation mission, but should be concurred with by the component chain of command to ensure that installation contracts and disposal criteria are at least as protective as criteria used by the DRMS.

C6.3.10.2. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or Kingdom of Saudi Arabia law are not disposed of in the Kingdom of Saudi Arabia unless the disposal is conducted in accordance with FGS and the following:

C6.3.10.2.1. When HW cannot be disposed of in accordance with FGS within the Kingdom of Saudi Arabia, it will either be retrograded to the United States or, if permissible under international agreements, transferred to another country outside the United States where it can be disposed of in an environmentally sound manner and in compliance with FGS applicable to the country of disposal, if any exist. Transshipment of HW to a country other than the United States for disposal must be approved by, at a minimum, the DUSD(I&E).

C6.3.10.2.2. The determination of whether particular DoD-generated HW may be disposed of in the Kingdom of Saudi Arabia will be made by the LEC, in coordination with the unified combatant commander, the Director of Defense Logistics Agency, other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

C6.3.10.2.3. Any harmful pollutants, poisonous, hazardous or radioactive wastes are prohibited from being disposed of, or discharged from vessels or alike in the Kingdom of Saudi Arabia's territorial waters (belt of coastal waters extending at most twelve nautical miles from the baseline-usually the mean low-water mark of a coastal state) or its exclusive economic zone (extends from the outer limit of the territorial waters to a maximum of 200 nautical miles from the territorial water baseline).

C6.3.10.3. Disposal Procedures

C6.3.10.3.1. The determination of whether HW may be disposed of in the Kingdom of Saudi Arabia must include consideration of whether the means of treatment and/or containment technologies employed in the Kingdom of Saudi Arabia program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the Kingdom of Saudi Arabia program includes:

C6.3.10.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

C6.3.10.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

C6.3.10.3.1.3. Appropriate standards and limitations on the methods that may be used to treat and dispose of HW.

C6.3.10.3.1.4. Standards designed to minimize the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface, or groundwater.

C6.3.10.3.2. The LEC must also be satisfied, either through reliance on the Kingdom of Saudi Arabia regulatory system and/or provisions in the disposal contracts, that:

C6.3.10.3.2.1. Persons and facilities in the waste management process have demonstrated the appropriate level of training and reliability; and

C6.3.10.3.2.2. Effective inspections, monitoring, and recordkeeping will take place.

C6.3.10.4. Kingdom of Saudi Arabia facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the Kingdom of Saudi Arabia as being in compliance with their regulatory requirements. This evaluation and approval may consist of having a valid permit or Kingdom of Saudi Arabia equivalent for the HW that will be handled.

C6.3.10.5. Hazardous waste will be recycled or reused to the maximum extent practical. Safe and environmentally acceptable methods will be used to identify, store, prevent leakage, and dispose of HW, to minimize risks to health and the environment.

C6.3.10.6. Land Disposal Requirements. Hazardous wastes will only be land-disposed when there is a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal site for as long as the wastes remain hazardous. Hazardous waste may be land-disposed only in facilities meeting the following criteria:

C6.3.10.6.1. The land disposal facility has a liner and a leachate collection system. The liner will be of natural or man-made materials and restrict the downward or lateral escape of HW, hazardous constituents, or leachate. The permeability of such liners will be no greater than 10^{-7} cm/sec;

C6.3.10.6.2. The land disposal facility has a groundwater monitoring program capable of determining the facility's impact on the quality of water in the aquifers underlying the facility; and

C6.3.10.6.3. The requirements of subparagraphs C6.3.10.6.1. or C6.3.10.6.2., above, may be waived for a particular land disposal facility by the LEC if a written determination is made by a qualified geologist or geotechnical engineer that there is a low potential for migration of HW, hazardous constituents, or leachate from the facility to water supply wells, irrigation wells, or surface water. This determination will be based on an analysis of local precipitation, geologic conditions, physical properties, depth to groundwater, and proximity of water supply wells or surface water, as well as use of alternative design and operating practices. Methods for preventing migration will be at least as effective as liners and leachate collection systems required in subparagraph C6. 3.10.6.1.

C6.3.10.6.4. Landfills have to be designed, established, operated and kept in a way that ensures that no leakage of wastes to soil layers, ground water, or surface water, and that no dispersal due to winds would take place.

C6.3.10.7. <u>Incinerator Standards.</u> This subparagraph applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

C6.3.10.7.1. Incinerators used to dispose of HW must be licensed or permitted by a component Kingdom of Saudi Arabia authority or approved by the LEC. This license, permit, or approval must comply with the criteria listed in subparagraph C6.3.10.7.2.

C6.3.10.7.2. A license, permit, or LEC approval for incineration of HW must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme that would require an incinerator to achieve the standards set forth in either subparagraphs C6. 3.10.7.2.1. or C6.3.10.7.2.2. is acceptable.

C6.3.10.7.2.1. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission of particulate matter, and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

C6.3.10.7.2.2. The incinerator has demonstrated, as a condition for obtaining a license, permit, or LEC approval, the ability to effectively destroy the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the competent 11N authority or the LEC to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

C6.3.10.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes categorized as hazardous on the basis of section AP1.1. and which, after treatment as described herein, no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix 1 will continue to be managed as 11W under the criteria of this FGS, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of 11N disposal alternatives. These technologies should not be implemented without consultation with the LEC, or the Combatant Commander, if there is no LEC.

C6.3.10.8.1. Organics

C6.3.10.8.1.1. Incineration in accordance with the requirements of subparagraph C6.3.10.7.1.

C6.3.10.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

C6.3.10.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentrations of a representative compound or indicator parameter (e.g., total organic carbon) has been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the 11W being biodegraded.

C6.3.10.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction;

liquid extraction; precipitation/crystallization, or phase separation techniques, such as decantation, filtration, and centrifugation when used in conjunction with one of the above techniques.

C6.3.10.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions.

C6.3.10.8.2. Heavy Metals

C6.3.10.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

C6.3.10.8.2.2. Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals.

C6.3.10.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits the characteristic for reactivity defined in Appendix 1.

C6.3.10.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3., will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

C6.3.10.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with subparagraphs C6.3.10.8.2.1. or C6.3.10.8.2.2. to stabilize, fix or recover heavy metals, as appropriate, and in accordance with subparagraph C6.3.10.8.4. to neutralize any corrosives before disposal.

C6.3.10.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accord with subparagraphs C6.3.10.7. and C6.3.10.8.

C6.4. ADDITIONAL REQUIREMENTS

C6.4.1. Anyone performing digging, demolition, construction, or debris and earth transportation works must take necessary precautions for safe storage and transportation of any waste, as well as the proper treatment and disposal of such waste.

C6.4.2. Hazardous, toxic or radioactive wastes are prohibited from entering the Kingdom of Saudi Arabia or its territorial waters and exclusive economic zone.

C6.4.3. Waste generators shall be held responsible for identification of the types of waste and hazardous waste they generate, as well as for ensuring that such wastes are stored, treated and disposed of in an environmentally sound manner and also does not cause any detrimental effect on human health, safety and welfare or the environment and the natural resources.

C6.4.4. Each operator or owner who transports or ships wastes from the facilities shall be required to comply with the standards for producers [generators] of hazardous wastes as provided for in paragraph C6.3.1. DoD Hazardous Waste Generators.

C6.4.5. All owners and operators of hazardous waste facilities shall be required to develop an occupational health and safety program and a plan describing personnel medical check up procedures.

C6.4.6. The concerned agencies and persons shall be fully responsible, as part of their activities and projects, for incidents of environmental pollution with toxic, hazardous or radioactive wastes and materials during the stages of production, transportation, storage or recycling. The party that caused such incident shall bear all the costs of pollution control, abatement, treatment and remediation of the polluted environment.

C7. CHAPTER 7

SOLID WASTE

C7.1. SCOPE

This Chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated, and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4 (Reference (e)) and service solid waste management manuals. The criteria in this Chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are located in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste Management," Chapter 10, "Pesticides," and Chapter 13, "Polychlorinated Biphenyls."

C7.2. DEFINITIONS

C7.2.1. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

C7.2.2. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

C7.2.3. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

C7.2.4. Collection Frequency. The number of times collection is provided in a given period of time.

C7.2.5. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

C7.2.6. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

C7.2.7. Construction and Demolition Waste. The waste building materials, packaging, and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures.

C7.2.8. Curb Collection. Collection of solid waste placed adjacent to a street.

C7.2.9. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

C7.2.10. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

C7.2.11. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

C7.2.12. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

C7.2.13. Generation. The act or process of producing solid waste.

C7.2.14. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

C7.2.15. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

C7.2.16. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities.

C7.2.17. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

C7.2.18. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C and atmospheric pressure.

C7.2.19. Municipal Solid Waste (MSW). Normally, residential and commercial solid waste generated within a community, not including yard waste. (See also definition in Chapter 2, "Air Emissions.")

C7.2.20. Municipal Solid Waste Landfill (MSWLF) Unit. A discrete area of land or an excavation, on or off an installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. An MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

C7.2.21. Open Burning. Burning of solid wastes in the open, such as in an open dump.

C7.2.22. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

C7.2.23. Residential Solid Waste. The wastes generated by normal household activities, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

C7.2.24. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

C7.2.25. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

C7.2.26. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

C7.2.27. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

C7.2.28. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 9 1-8, Army TM 5-634 (Reference (l)), or their successor documents.

C7.2.29. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.30. Solid Wastes. Garbage, refuse, sludge, and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

C7.2.3 1. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

C7.2.32. Stationary Compactor. A powered machine that is designed to compact solid waste or recyclable materials and that remains stationary when in operation.

C7.2.33. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

C7.2.34. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

C7.2.35. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

C7.2.36. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

C7.2.37. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

C7.3. CRITERIA

C7.3.1. DoD solid wastes will be treated, stored, and disposed of in facilities that have been evaluated against paragraphs C7.3.12., C7.3.14., and C7.3.15. These evaluated facilities will be used to the maximum extent practical.

C7.3.2. Installations will cooperate with Kingdom of Saudi Arabia officials, to the extent possible, in the solid waste management planning process.

C7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting, and waste minimization efforts.

C7.3.4. All solid wastes or materials that have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled to avoid spillage.

C7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2, "Air Emissions," or hazardous constituents as defined in Chapter 6, "Hazardous Waste." Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 13, and 14 of this FGS.

C7.3.6. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of this FGS, there will be provisions for storage in accordance with these guidelines that will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

C7.3.7. Storage containers should be leakproof, waterproof, and vermin-proof, including sides, seams and bottoms, and be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking, or deforming in a manner that would impair serviceability. Storage containers should have functional lids.

C7.3.8. Containers should be stored on a firm, level, well-drained surface that is large enough to accommodate all of the containers and that is maintained in a clean, spillage-free condition.

C7.3.9. Recycling programs will be instituted on DoD installations in accordance with the policies in Reference (e).

C7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located, and only after justification that unique circumstances mandate a new unit.

C7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

C7.3.11.1. Location restrictions with regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, and unstable areas;

C7.3.11.2. Procedures for excluding hazardous waste;

C7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions, and record keeping requirements; and

C7.3.11.4. Inspection program.

C7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

C7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with the LEC, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

C7.3.12. Installations operating MSWLF units will:

C7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day.

C7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

C7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, PCBs, and wastes determined unsuitable for the specific MSWLF unit.

C7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling.

C7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

C7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

C7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation.

C7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

C7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

C7.3.12.10. Operate in an aesthetically acceptable manner.

C7.3.12.11. Operate in a manner to protect aquifers.

C7.3.12.12. Control public access to landfill facilities.

C7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

C7.3.12.14. Maintain records on the preceding criteria.

C7.3.12.15. During closure and post-closure operations, installations will:

C7.3.12.15.1. Install a final cover system that is designed to minimize infiltration and erosion.

C7.3.12.15.2. Ensure that the infiltration layer is composed of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or a combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present, or a permeability no greater than .00005 cm/sec, whichever is less.

C7.3.12.15.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earthen material that is capable of sustaining native plant growth.

C7.3.12.15.4. If possible, revegetate the final cap with native plants that are compatible with the landfill design, including the liner.

C7.3.12.15.5. Prepare a written Closure Plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, groundwater monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. The post-closure period will be a minimum of 5 years.

C7.3.13. Open burning will not be the regular method of solid waste disposal. Where burning is the method, incinerators meeting air quality requirements of Chapter 2, "Air Emissions," will be used.

C7.3.14. A composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") will comply with the following criteria:

C7.3.14.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge, and other materials, such as nutrient or bulking agents being composted, including the source and volume or weight of the material.

C7.3.14.1.1. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

C7.3.14.1.2. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically.

C7.3.14.1.3. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system.

C7.3.14.1.4. The temperature and retention time for the material being composted must be monitored and recorded.

C7.3.14.1.5. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate, nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCBs. In addition the following tests shall be carried out.

C7.3.14.1.5.1. Visual inspection.

C7.3.14.1.5.2. Test for radioactivity.

C7.3.14.1.5.3. Test for particle size.

C7.3.14.1.5.4. Determination of organic matter content (% by mass).

C7.3.14.1.5.5. Determination of organic carbon content (% by mass).

C7.3.14.1.5.6. Determination of moisture content (% by mass).

C7.3.14.1.5.7. Determination of arsenic content (ppm).

C7.3.14.1.5.8. Determination of non-compostable materials (metal and glass pieces) content (% by mass)

C7.3.14.1.5.9. Determination of electrical conductivity of the product

C7.3.14.1.5.10. Test for phytotoxicity and possible presence of viable weed seeds or plant parts.

C7.3.14.1.5.11. Determination of fecal coliform bacteria numbers.

C7.3.14.1.5.12. Determination of salmonella numbers.

C7.3.14.1.6. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

C7.3.14.1.6.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing to maintain aerobic conditions during the composting process; and

C7.3.14.1.6.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55°C. A stabilization period of at least 7 days must follow the decomposition period.

C7.3.15. <u>Classification and Use of Compost from DoD Composting Facilities.</u> Compost produced at a composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

C7.3.15.1. Class A compost must be stored until the compost is matured, i.e., 60 percent decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated below. The compost must be stabilized and contain no greater amounts of inert material than indicated. Allowable average contaminant concentrations in milligrams per kilogram on a dry weight basis are:

PCB	1
Cadmium	10
Chromium	1,000
Copper	500
Lead	500
Mercury	5
Nickel	100
Zinc	1,000

C7.3.15.2. Class B compost consists of any compost generated that fails to meet Class A standards.

C7.3.15.3. Compost distribution and end use:

C7.3.15.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

C7.3.15.3.2. Class B compost may not be distributed for agricultural applications.

C7.4. ADDITIONAL REQUIREMENTS

C7.4.1. The use of sludge for agricultural purposes in exposed rock layer areas that are part of the water table is prohibited, as is disposal of the sludge in the ocean or surface water bodies.

C7.4.2. Use of sludge in agricultural lands. Liquid, wet, dry or composted sludge can be used in different fields, provided that the concentration of pollutants in the sludge shall not exceed the limits shown in Tables C7.T1, C7.T2, C7.T3, C7.T4. These types of sludge can also be used in reclamation of non-agricultural lands, such as parks, green playgrounds, graveyards, highways and airport aprons, provided that the concentration of pollutants in the sludge shall not exceed the limits shown in table C7.T5.

C7.4.3. Use of Non-Dry Sludge in Silviculture (Forestry). Non-dry sludge must be placed in a minimum 50 cm trench. The trench must be covered with a minimum of 30 cm of soil. Mixing of the sludge cannot occur until 3 months after initial disposal.

C7.4.4. Use of Dry Sludge in silviculture, horticulture and productive cultivation, except cultivation of vegetables that have fruits in the soil and that are eaten fresh, such as carrot, radish and green onion. Must have a minimum soil or combination of soil/gravel cover of 20 cm over the dry sludge.

C7.4.5. Provisions for collecting and drying of sludge produced from a DWTS. The following requirements apply to collection and drying of sludge produced from a DWTS:

C7.4.5.1. Collect the sludge in a proper site with the following:

C7.4.5.1.1. Specify a site away from residential areas, with a proper protection wall.
C7.4.5.1.2. Provide the site with required health utilities and facilities.
C7.4.5.1.3. Provide the site with required services (electricity, water, roads)
C7.4.5.1.4. Provide the site with required spreading and mixing machines.
C7.4.5.1.5. Provide technical staff, as well as integrated supervision staff for receiving and distribution.

C7.4.5.2. Cover the sludge with a 50 cm layer as a maximum.

C7.4.5.3. Provide automatic mixing of the sludge periodically for a minimum of 6 months, in order to ensure drying is complete and bacteria are eliminated.

C7.4.6. The maximum limits allowed for the concentrations of heavy metals and organic compounds in the piled sludge in the surface landfill sites are provided in table C7.T6.

C4.4.7. Maximum limits allowed for concentrations of pollutants in the leachate (TCLP) are provided in table C7.T7.

Table C7.T1. Maximum Limits Allowed for Concentrations of Heavy Metals in the Dry Sludge Used in Agricultural Lands

#	Pollutants	Maximum limits, mg/kg (dry)
1	Arsenic (As)	75
2	Cadmium (Cd)	85
3	Chromium (Cr)	3000
4	Copper (Cu)	4300
5	Lead (Pb)	840
6	Mercury (Hg)	18
7	Molybenum (Mo)	40
8	Nickel (Ni)	420
9	Selenium (Se)	10
10	Zinc (Zn)	7500
11	Cobalt (Co)	150

Table C7.T2. Maximum Limits Allowed for Annual Loading Rate of Heavy Metals and Organic Pollutants in Sewage Sludge Used in Agricultural Lands (kg/ha/year)

#	Pollutants	Maximum limits, mg/kg (dry)
1	Arsenic (AS)	2
2	Cadmium (Cd)	0.15
3	Chromium (Cr)	150
4	Copper (Cu)	15
5	Lead (Pb)	15
6	Mercury (Hg)	0.1
7	Molybenum (Mo)	0.9
8	Nickel (Ni)	3
9	Selenium (Se)	5
10	Zinc (Zn)	30
11	Cobalt (Co)	1.8
12	Aldrin/diealdrin	0.016
13	Benzo (a)pyrene	0.13
14	Chloradane	1.2
15	DDT/DDE/DDD	0.0055
16	Dimethyl nitrosamine	0.039
17	Heptachlor	0.073
18	Hexachlorobenzene	0.039
19	Hexachlorobutadiene	0.34
20	Lindane	4.6
21	Polychlorindated biphenyl	0.0056
22	Toxaphene	0.048
23	Trichloroethylene	0.013

Table C7.T3. Maximum Limits Allowed for Accumulative Loading Rates of Heavy Metals Concentration in Sewage Sludge Used in Agricultural Lands and Soil

#	Pollutants	In the sludge, ha/kg
1	Arsenic (AS)	14
2	Cadmium (Cd)	18
3	Chromium (Cr)	530
4	Copper (Cu)	46
5	Lead (Pb)	125
6	Mercury (Hg)	15
7	Molybenum (Mo)	5
8	Nickel (Ni)	78
9	Selenium (Se)	32
10	Zinc (Zn)	170

Table C7.T4. Maximum Limits Allowed for Biological (Microbiological) Pollutants of Sewage Sludge Used for Agricultural Purposes

#	Pollutants	Maximum limits
1	Total Coliform	1000 bacilli per 1 g
2	Fecal Coliform	100 bacilli per 1 g
3	Salmonella	< 3 bacilli per 4 dry g
4	Viable Helminth Eggs	< 1 egg per 4 dry g
5	Enteric Viruses	< 1 (unit) per 4 dry g

Table C7.T5. Maximum Limits Allowed for Concentrations of Heavy Metals and Organic Compounds in the Dry Sludge Used in Non-Agricultural Lands

#	Pollutants	Mg/kg/DW
1	Zinc (Zn)	3600
2	Arsenic (AS)	36
3	Cadmium (Cd)	3100
4	Chromium (Cr)	380
5	Copper (Cu)	3300
6	Lead (Pb)	1600
7	Mercury (Hg)	30
8	Molybdenum (Mo)	230
9	Nickel (Ni)	990
10	Selenium (Se)	64
11	Chlordane	24
12	DDT/DDE/DDD	0.11
13	Toxaphene	0.79
14	Trichloroethylene	180
15	Aldrin/dieldrin	0.33
16	Lindane – insecticide	92
17	Heptachlor	1.5
18	Dimethyl nitrosamine	1.4
19	Hexachlorobenzene	2.8
20	Hexachlorobutadiene	6.8
21	Polychlorindated biphenyl	0.11
22	Benzo (a)pyrene	6.9

Table C7.T6. Maximum Limits Allowed for Concentrations of Heavy Metals and Organic Compounds in the Piled Sludge in Surface Landfill Sites.

#	Pollutants	Mg/kg/DW
1	Arsenic (AS)	36
2	Cadmium (Cd)	385
3	Copper (Cu)	3300.3
4	Lead (Pb)	1622
5	Mercury (Hg)	17
6	Nickel (Ni)	988
7	DDT/DDE/DDD	0.95
8	Lindane – insecticide	2.3
9	Toxaphene	0.5
10	Trichloroethylene	181
11	Chlordane	180
12	Dimethyl nitrosamine	1.4
13	Polychlorindated biphenyls	49
14	Benzene	15
15	Benzo(a)pyrene	99
16	Bis (2-ethylhexyl) phthalate	782

Table C7.T7. Maximum Limits Allowed for Concentrations of Pollutants in the Leachate (TCLP)

#	Pollutants	Leachate concentration, mg/l
1	Arsenic (As)	5
2	Barium (Ba)	10
3	Benzene	0.5
4	Cadmium (Cd)	1
5	Carbon Tetra Choldide (CCI4)	0.5
6	Cholorobenzene	100
7	Chloroform	6
8	Chromium (Cr)	5
9	Cresol	200
10	Para Cresol	200
11	1,4- Dichlorobenzene	7.5
12	1,2- Dichloroethene	10
13	1,1- Dichloroethylene	0.7
14	Dihexyl phthalate	10
15	2,4- Dinitrotoluene	0.13
16	Ethylbenzene	70
17	Hexachlorobenzene	0.13
18	Hexachlorobutadiene	0.5
19	Hexachloroethane	3
20	Iron (Fe)	5
21	Mercury (Hg)	0.2
22	Methyl Ethel Ketone	200
23	Nickel (Ni)	10
24	Nitrobenzene	2
25	Pentachlorophenol	100
26	Pyridine	5
27	Elime	1
28	Silver (Ag)	5
29	Stearine	10
30	Tetrachloridethelene	0.7
31	Toluene	10
32	Trichloroethylene	0.5
33	Tricholorinatedphenyl	400
34	Chlorinated phenyl	0.2
35	Xylene	70

C8. CHAPTER 8

MEDICAL WASTE MANAGEMENT

C8.1. SCOPE

This Chapter contains criteria for the management of medical waste at medical, dental, research and development, and veterinary facilities generated in the diagnosis, treatment, or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This waste also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

C8.2. DEFINITIONS

C8.2.1. Waste Tracking Form. A form that contains all the completed information and signed by the generator and the transporter and the disposal facility that accompanies infectious medical waste being transported from the waste generating facility to the final treatment facility. Military transportation vehicles will comply with unit hazardous material transportation requirements when transporting infectious medical waste on public roads.

C8.2.2. Facility. Any hospital, clinic, medical or veterinary center, pharmaceutical company, medical or pharmaceutical research institution, laboratory.

C8.2.3. Generator. Any person or military medical treatment facility, whose activities generate healthcare wastes.

C8.2.4. Healthcare Waste. Waste generated by facilities offering various types of healthcare, laboratories, facilities for the manufacture of drugs, pharmaceuticals and vaccines, veterinary institutions, research institutions. It consists of two types:

C8.2.5. General Healthcare Waste. Consists of all the wastes that are found in municipal wastes, and it is generated by administrative institutions and by the general cleaning activities in healthcare institutions. This constitutes the major part of healthcare wastes, and it is treated in the same way as municipal waste.

C8.2.6.. Hazardous Healthcare Waste. Consists of wastes generated by sources that are contaminated or potentially contaminated by infectious, chemical or radioactive agents. These constitute a minor percentage of the overall healthcare waste, and they pose a risk to individuals, the community and the environment during its generation, collection, treatment, storage, transport and disposal.

C8.2.7. Infectious Agent. Any organism (such as a virus or bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

C8.2.8. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitology laboratory.

C8.2.9. Infectious Medical Waste. Solid waste generated in the diagnosis, treatment, research, or immunization of human beings or animals which is capable of causing disease or which, if not handled properly, poses a risk to individuals or a community. This waste is also called "regulated medical waste," "biohazardous waste," or simply "infectious waste". Infectious waste is grouped by source:

C8.2.9.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration, are known to cause disease in humans.

C8.2.9.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Animal carcasses, body parts, blood, and bedding from infectious animals are also included.

C8.2.9.3. Human blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products, that are capable of releasing these materials during handling.

C8.2.9.4. Potentially infectious materials, including human body fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

C8.2.9.5. Sharps, including hypodermic needles, syringes, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious agents used in human or animal care.

C8.2.9.6. Infectious waste from isolation rooms, but only including those items that were contaminated or likely to have been contaminated with infectious agents or pathogens, including excretion exudates and discarded materials contaminated with blood.

C8.2.9.7. Pathological Waste. Consists of tissues, organs, body parts, fetal and placental tissues, blood and blood components, other body fluids and animal carcasses.

C8.2.9.8. Chemotherapy Waste. Consist of items such as needles, container and syringes, gowns, gloves, and tubing that contained chemotherapeutic pharmaceuticals or were exposed to chemotherapeutic pharmaceuticals during the treatment of patients. Also called genotoxic or cytotoxic waste.

C8.2.9.9. Pharmaceutical Waste (drugs). Consists of wastes resulting from the preparation of drugs and pharmaceutical substances, damaged, expired or contaminated pharmaceutical products, serums, and vaccines not eligible for the pharmaceutical return vendor program.

C8.2.9.10. Radioactive Waste. Includes all solid and liquid substances that has radioactivity, and which are used in medical examination, diagnosis and treatment, and all materials that have been contaminated by them (whether these materials are solid or liquid).

C8.2.10. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

C8.2.11. Hazardous Waste. Any waste defined in Chapter 6, "Hazardous Waste".

C8.2.12. Storage. Temporary storage of infectious waste in a specific collection area before it is taken off site for final treatment and/or disposal.

C8.2.13. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed or the environment.

C8.2.14. Waste Incineration. The process by which combustible solid, liquid and gaseous wastes are disposed of in high temperatures, such that the gases, substances or compounds that are produced as a result do not affect the environment, and the burnt materials do not contain hazardous substances.

C8.2.15. Waste Segregation. Separation of infectious waste (by the generator) starting from the point of generation and through the stages of collection, packaging, storage, and transport within the facility.

C8.3. CRITERIA

C8.3.1. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

C8.3.2. Infectious medical waste will be separated, if practical, from other solid waste at the point of generation. Hazardous healthcare wastes must be segregated as follows.

C8.3.2.1. Infectious waste.

C8.3.2.2. Pathological waste.

C8.3.2.3. Sharps waste.

C8.3.2.4. Pharmaceutical waste (drugs).

C8.3.2.5. Chemotherapy waste.

C8.3.2.6. Chemical waste.

C8.3.2.7. Radioactive waste.

C8.3.3. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M (Reference (j)) and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. The

Defense Logistics Agency Disposition Services has no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

C8.3.4. Solid waste that is classified as a hazardous waste in accordance with Appendix 1 will be managed in accordance with the criteria in Chapter 6, "Hazardous Waste."

C8.3.5. Mixtures of solid waste and infectious medical waste will be handled as infectious medical waste.

C8.3.6. Radioactive medical waste will be managed in accordance with Service Directives.

C8.3.7. Infectious medical waste will be segregated, transported, and stored in bags or receptacles a minimum of 3 mil thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use

C8.3.8. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and the Kingdom of Saudi Arabia language, and will include markings that identifies the generator, date of generation, and the contents.

C8.3.9. All anatomical pathology waste and animal carcasses must be placed in rigid or semi-rigid shipping containers lined with plastic bags that comply with paragraph C8.3.6., and may only be disposed of in a landfill or by burial after being treated by incineration or cremation.

C8.3.10. Sharps waste shall be collected in rigid containers that are puncture-proof and leak-proof. The container shall be clearly labeled with the words "Sharps Wastes" and the Biohazard Symbol. Remove and seal containers when they are either ¾ full or sharps reach the manufacturer indicated "full" line.

C8.3.11. Chemotherapy waste will be collected in ridged yellow containers that are puncture-proof and leak-proof. The containers shall be clearly labeled with the words "Chemotherapy Waste" and the Biohazard Symbol.

C8.3.12. Pharmaceutical waste (drugs): Drug residues or waste pharmaceuticals will be disposed of in yellow chemotherapy waste containers and marked with the words "Pharmaceutical Waste".

C8.3.13. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph C8.3.17. Containers holding sharps will not be compacted.

C8.3.14. Blood, blood products, and other liquid infectious wastes will be handled as follows:

C8.3.14.1. Bulk blood and blood products may be decanted into a sewer system connection (sinks, drains, etc.), unless pre-treatment is required. If pre-treatment is required, the methods contained in Table C8.T1., "Treatment and Disposal Methods for Infectious Medical Waste," will be employed prior to discharge to the sewer system. The emptied containers will continue to be managed as infectious medical waste.

C8.3.14.2. Suction canister waste from operating rooms will either be decanted into a clinical sink or will be sealed into leak-proof containers and incinerated.

C8.3.15. Labeling Requirements. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and the Kingdom of Saudi Arabia language.

C8.3.15.1. The generator of infectious waste shall print or put adhesive stickers on the waste containers and bags before transporting it to the storage area or the treatment unit. These adhesives shall contain the following information:

C8.3.15.1.1. Name of Waste,

C8.3.15.1.2. Name of generating location (the department or wing),
C8.3.15.1.3. The type of waste generated according to the categories in C8.3.1.

C8.3.15.1.4. The weight of waste stored inside the container or bag,

C8.3.15.1.5. The time and date removed from the generating location.

C8.3.16.. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

C8.3.17. Storage. If infectious medical waste cannot be treated on-site; it will be managed during storage as follows:

C8.3.17.1. Infectious medical waste will be maintained in a nonputrescent state. Refrigerate pathological waste until it is taken off site for waste treatment. Storage sites must be:

C8.3.17.2. Specifically designated;

C8.3.17.3. Constructed to prevent entry of insects, rodents, and other pests;

C8.3.17.4. Prevent access by unauthorized personnel; and

C8.3.17.5. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and the Kingdom of Saudi Arabia language.

C8.3.18. Treatment. Infectious medical waste must be treated in accordance with Table C8.T1., "Treatment and Disposal Methods for Infectious Medical Waste," and the following before disposal:

C8.3.18.1. Sterilizers must maintain the temperature at 121°C (250°F) for at least 30 minutes at 15 psi.

C8.3.18.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips or an equivalent biological performance test.

C8.3.18.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens, and must meet applicable criteria in Chapter 2, "Air Emissions.".

C8.3.18.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6, "Hazardous Waste." Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

C8.3.18.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

C8.3.19. Infectious medical waste generators will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

C8.3.20 Spills. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

C8.3.20.1. Response personnel must comply with paragraph C8.3.13.

C8.3.20.2. Blood, body fluid, and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste.

C8.3.20.3. Surfaces contacted by infectious medical chemically decontaminated in accordance with subparagraph C 8.3.18.5.

C8.3.21. Transportation requirements for collection and transportation inside the healthcare facility:

C8.3.21.1. Before the collection and transportation of infectious medical waste and chemotherapy waste containers and bags, it must be ensured that they are tightly sealed, and that they are marked with the type of waste they contain, and they shall have the Biohazard Symbol printed on them.

C8.3.21.2. The bags shall not be more than three-quarters full. They shall not be pressed, squeezed, held close to the body, or held by the bottom during transportation. Instead, they shall be held from the top during transportation.

C8.3.21.3. Infectious medical waste will be transported and stored to minimize human exposure, and will not be placed in chutes or dumbwaiters. Inside the healthcare facilities, the collection and transportation of infectious medical waste containers and bags require the use of carts or trolleys dedicated solely for that purpose, and handled by trained personnel in order to guarantee the highest levels of safety during the collection and transportation process, so that the contents of the containers or bags do not spill or leak.

C8.3.22. Off-site Transportation. The following procedures shall be followed by the infectious medical waste generator before transporting the waste outside the facility:

C8.3.22.1. Packaging the hazardous healthcare waste and putting adhesives on it appropriately as per paragraph C8.3.7.1.

C8.3.22.2. Infectious medical waste loads shall not be delivered for transport to an off-site location without a completed waste tracking form accompanying the load.

C8.3.22.3. For transportation to an off-site location, infectious medical waste transporters must comply with the following:

C8.3.22.4. Never transport any waste to a treatment unit that does not have a permit from the relevant authorities to dispose of infectious medical wastes.

C8.3.22.5. Never mix wastes that have different packaging specifications by putting them in a single container.

C8.3.22.6. Never accept any container or bag that does not have an adhesive indicating the information in C8.3.7.1.

C8.3.22.7. As required by local transportation laws, place placards on the vehicle indicating the type of substances being transported. The transporter shall be completely aware of the level of its hazardousness, and the necessary steps that should be taken in the event of an emergency during the transportation process.

C8.3.22.8. The transportation of infectious medical wastes across national boundaries must be done according to regional and international agreements, and according to the procedures of coordination between GCC countries with respect to the transportation of wastes across their boundaries (as approved by the GCC Heads of states), and in accordance with relevant national regulations.

C8.3.23. Treatment. Any person or facility that wishes to build and operate a unit for the treatment of hazardous healthcare wastes must comply with the following:

C8.3.23.1. Implement the guidelines presented in Table C2.T6. (See Chapter 2, Air Emissions).

C8.3.22.2. Prepare and implement a training program for the personnel working at the facility in the field of hazardous healthcare waste management.

C8.3.23.3. Never accept any hazardous healthcare waste that is not accompanied by a completed waste tracking form from the generator and the transporter.

C8.3.23.4. Never accept any waste that is not properly labeled in accordance with section C8.3.7.1.

C8.3.23.5. Ensure that every load of waste received at the treatment facility matches the specifications mentioned in the waste tracking form accompanying the load.

C8.3.23.6. Maintain an operating record that contains the following:

C8.3.23.6.1. A description of the type and quantity of each load received the name of the generator as written in the waste tracking form, the date of receipt and the date of treatment.

C8.3.23.6.2. The type and the results of the laboratory tests conducted on the residues resulting from the treatment process.

C8.3.23.6.3. The type and results of performance tests of the treatment equipment.

C8.3.23.6.4. Copies of transportation documents.

C8.3.23.6.5. Copies of all safety forms for each waste.

C8.3.23.6.6. The quantity of residues resulting from the treatment process, and the methods and location of its disposal.

C8.3.24. Waste Tracking Records. Installations Generators of infectious medical waste will keep records (i.e., waste tracking form) of the following information concerning infectious medical waste for at least five years after the date of disposal:

C8.3.24.1. Type of waste;

C8.3.24.2. Amount of waste (volume or weight);

C8.3.24.3. Treatment, if any, including date of treatment; and

C8.3.24.4. Disposition, including date of disposition, and if the waste was transferred to Host Nation facilities, and receipts acknowledging subparagraphs C8.3.20.1. – C8.3.20.3. for each transfer.

Table C8.T1. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	**Method of Treatment**	**Method of Disposal**
Microbiological	[1] Steam sterilization	[2] Municipal solid waste landfill (MSWLF)
	Chemical disinfection	MSWLF
	Incineration	MSWLF
Pathological	[3] Incineration	MSWLF
	[3] Cremation	Burial
	[4] Chemical Sterilization	[5] Domestic wastewater treatment plant (DWTP)
	[4] Steam sterilization	DWTP
	[6] Steam sterilization Chemical disinfection	DWTP
	[6] Incineration	MSWLF
	Steam sterilization	MSWLF
	Incineration	MSWLF

Notes:

1. Preferred method for cultures and stocks because they can be treated at point of generation
2. See Chapter 7, "Solid Waste," for criteria for solid waste landfills.
3. Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.
4. This only applies to placentas, small organs and small body parts that may be steam sterilized or chemically sterilized, ground, and discharged to a domestic wastewater treatment plant.
5. See Chapter 4, "Wastewater," for criteria for domestic wastewater treatment plants.
6. Bulk blood or suction canister waste known to be infectious must be treated by incineration or steam sterilization before disposal.

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C9. CHAPTER 9

PETROLEUM, OIL, AND LUBRICANTS

C9.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 18, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 17, "Spill Prevention and Response Planning."

C9.2. DEFINITIONS

C9.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

C9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs, that are exempt from all criteria in Chapter 18, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 18 are counted toward the aggregate thresholds in subparagraph C9.2.7.2. below.

C9.2.3. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

C9.2.4. Loading/ Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

C9.2.5. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

C9.2.6. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

C9.2.7. POL Facility. An installation with either:

C9.2.7.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

C9.2.7.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

C9.2.7.3. A pipeline facility as identified in paragraph C9.2.5.

C9.2.8. POL Storage Container. POL containers with capacities GREATER than 55 gallons (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 18 are EXCLUDED from the definition of POL storage containers.

C9.3. CRITERIA

C9.3.1. Applicability. The below criteria apply only at POL Facilities as defined in paragraph C9.2.7.

C9.3.2. General POL Storage Container Criteria

C9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

C9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criteria for below ground storage containers.

C9.3.2.3. Permeability. Permeability for containment areas will be a maximum of 10^{-7} cm/sec.

C9.3.2.4. Containment Area Drainage. Drainage of stormwater from containment areas will be controlled by a valve that is locked closed when not in active use. Stormwater will be inspected for petroleum sheen before being drained from containment areas. If a petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, "Hazardous Waste."

C9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

C9.3.3. Additional POL Storage Container Criteria

C9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

C9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

C9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

C9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

C9.3.4.1. POL container cleaning wastes (sludge and washwaters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

C9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

C9.3.5. General Transport and Distribution Criteria

C9.3.5.1. Loading/Unloading Racks and Areas

C9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

C9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

C9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

C9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and / or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL, which reasonably could be expected to cause a sheen on waters of the Kingdom of Saudi Arabia defined in Chapter 4, "Wastewater."

C9.3.5.2. POL Pipeline Facilities

C9.3.5.2.1. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

C9.3.5.2.1.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies.

C9.3.5.2.1.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

C9.3.5.2.1.3. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

C9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; and the applicable contents of the facility Spill Plan.

C10. CHAPTER 10

PESTICIDES

C10.1. SCOPE

This Chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

C10.2. DEFINITIONS

C10.2.1. Active Substance. The substance in a pesticide that is biologically active. Some pesticide products may contain more than one active substance.

C10.2.2. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides and have been formally certified in accordance with DoD 4150.7-M (Reference (m)) (which accepts Kingdom of Saudi Arabia certification in appropriate circumstances).

C10.2.3. Container. Device used to contain a quantity of a pesticide in its various forms; solid, liquid or gaseous.

C10.2.4. Integrated Pest Management (IPM). A planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods, including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control and, where necessary, the judicious use of least-hazardous pesticides.

C10.2.5. Labeling. All information written, printed and painted or attached to a pesticide package explaining its composition, characteristics, uses and the precautions to be taken to ensure safe use of each pesticide.

C10.2.6. Package. A defined amount of a pesticide filled in a container with a protective cover that is used to provide pesticides to their users through the channels of wholesale or retail distribution.

C10.2.7. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the well being of humans or animals; attack real property, supplies, equipment, or vegetation; or are otherwise undesirable.

C10.2.8. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities who provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

C10.2.9. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

C10.2.10. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

C10.2.10.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or Kingdom of Saudi Arabia authority;

C10.2.10.2. Any pesticide that does not meet specifications, is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

C10.2.10.3. Any material used to clean up a pesticide spill; or

C10.2.10.4. Any containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are NOT considered hazardous waste, and can be disposed of as normal solid waste.

C10.2.11. Registered Pesticide. A pesticide registered and approved for sale or use within the United States or the Kingdom of Saudi Arabia.

C10.3. CRITERIA

C10.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1, "Pest Management Maintenance Report," or a computer- generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910-M (Reference (f)).

C10.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

C10.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

C10.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

C10.3.3.2. Arthropod skin and clothing repellents; and

C10.3.3.3. Pesticides applied as part of an installation's self help program.

C10.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

C10.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed.

C10.3.6. Installations will only use registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan:

C10.3.7. Pesticides will be included in the installation spill contingency plan. (See Chapter 17, "Spill Prevention and Response Planning.")

C10.3.8. Pest management facilities, including mixing and storage areas, will comply with Military Handbook 1028/8A (Reference (n)).

C10.3.9. All pesticide applications will be in accordance with guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If foreign nationals will be using the pesticides, the precautionary messages and use instructions will be in English and in the prevalent local languages.

C10.3.10. MSDSs and labels for all pesticides will be available at the storage and holding facility.

C10.3.11. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

C10.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below:

C10.3.12.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6 of this FGS.

C10.3.12.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of this FGS.

C10.3.12.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through DLA DS, as a solid waste. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

C10.4. ADDITIONAL REQUIREMENTS

C10.4.1. Pesticides shall be transported inside the Kingdom of Saudi Arabia using transport methods in accordance with the pesticide label and warnings.

C10.4.2. Conditions that must be met for pesticides storage:

C10.4.2.1. Pesticide storage areas shall be secured against pedestrian entrance except through gates that are assigned for entering.

C10.4.2.2. A warning sign shall be mounted to indicate that the pesticide storage area contains dangerous materials. A tag shall be mounted at the external door or the storage entrance.

C10.4.2.3. Floor drains should be secured against pesticide leakage.

C10.4.2.4. Drinking water sources and networks should be protected from pesticide leakage.

C10.4.2.5. Pesticides storage shall have proper spill cleanup equipment to manage any leakage of pesticide concentrates in the storage areas.

C10.4.2.6. Opened or damaged pesticide cans or containers should be closed or refilled to prevent any release of odor or fumes.

C10.4.2.7. The floor of the pesticide storage shall be paved with a material that does not absorb spilled or leaked pesticides.

C10.4.2.8. Safety measures (fire extinguishers, water sources and hoses, and emergency exit doors), and emergency phone numbers for hospitals and fire services shall be readily available at an easily accessible location.

C10.4.2.9. Any persons responsible for storing pesticides shall be trained in initial spill response including use of safety and fire control equipment, and as allowed, spill clean-up.

C10.4.2.10. Based on the type of pesticides stored and per pesticide label, proper personal protective equipment shall be available for workers managing the storage of pesticides.

C10.4.2.11. Pesticides shall be stored and kept in their containers or cans in their original package; any pesticides transferred to other non-original containers must be labeled.

C10.4.3. Pesticide Can and Label Specifications

C10.4.3.1. The pesticide shall be contained in a durable, tightly closed, leak proof and non-transparent containers resistant to sunlight, and capaple of enduring transfer and storage.

C10.4.3.2. The container shall be made from a substance that does not react with its contents in a way that might change its nature or properties.

C10.4.3.3. The instruction label shall be well fixed in order not to be replaceable or changeable.

C10.4.3.4. Any modification or alteration of the pesticide label may not be done whether it is after importation or before exportation.

C10.4.4. The following are prohibited:

C10.4.4.1. Changing, destroying, or distorting the data recorded on the container, or a part thereof, before allowing it to be handled.

C10.4.4.2. Importing, manufacturing or handling a pesticide that is corrupted, adulterated or expired.

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C11. CHAPTER 11

HISTORIC AND CULTURAL RESOURCES

C11.1. SCOPE

This Chapter contains criteria for required plans and programs needed to ensure proper protection and management of historic and cultural resources, such as properties on the World Heritage List or the Kingdom of Saudi Arabia list equivalent to the U.S. National Register of Historic Places.

C11.2. DEFINITIONS

C11.2.1. Adverse Effect. Changes that diminish the quality or significant value of historic or cultural resources.

C11.2.2. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal remains, or any portion of any of the foregoing items.

C11.2.3. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

C11.2.3.1. Limiting the magnitude of the action;

C11.2.3.2. Relocating the action in whole or in part;

C11.2.3.3. Repairing, rehabilitating, or restoring the affected resources, affected property; and

C11.2.3.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered.

C11.2.4. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

C11.2.5. Historic or Cultural Resources. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national, or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object, and also includes natural resources (plants, animals, landscape features, etc.) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or the Kingdom of Saudi

Arabia equivalent of the National Register of Historic Places. Kingdom of Saudi Arabia lists of properties should be evaluated to determine if they are equivalent with the National Register of Historic Places prior to application.

C11.2.6. Inventory. To determine the location of historic and cultural resources that may have world, national, or local significance.

C11.2.7. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

C11.2.7.1. Surface or subsurface structures;

C11.2.7.2. Surface or subsurface artifact concentrations or scatters;

C11.2.7.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments;

C11.2.7.4. By-products, waste products, or debris resulting from manufacture or use;

C11.2.7.5. Organic waste;

C11.2.7.6. Human remains;

C11.2.7.7. Rock carvings, rock paintings, and intaglios;

C11.2.7.8. Rock shelters and caves;

C11.2.7.9. All portions of shipwrecks; or

C11.2.7.10. Any portion or piece of any of the foregoing.

C11.2.8. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

C11.2.9. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack, or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

C11.3. CRITERIA

C11.3.1. Installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on the Kingdom of Saudi Arabia's equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

C11.3.2. Installations shall have access to the World Heritage List and the Kingdom of Saudi Arabia equivalent of the National Register of Historic Places.

C11.3.3. Installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resources management.

C11.3.4. Installations shall, after coordination with the Kingdom of Saudi Arabia installation commander or similar appropriate Kingdom of Saudi Arabia authorities, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

C11.3.5. Installations shall, after coordination with the Kingdom of Saudi Arabia installation commander or similar appropriate Kingdom of Saudi Arabia authorities, and if financially and otherwise practical:

C11.3.5.1. Inventory historic and cultural resources in areas under DoD control. An inventory shall be developed from a records search and visual survey.

C11.3.5.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

C11.3.5.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed.

C11.3.6. Installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the Kingdom of Saudi Arabia.

C11.3.7. Installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

C11.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the Kingdom of Saudi Arabia installation commander or similar appropriate Kingdom of Saudi Arabia authorities.

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C12. CHAPTER 12

NATURAL RESOURCES AND ENDANGERED SPECIES

C12.1. SCOPE

This Chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the U.S. or the Kingdom of Saudi Arabia.

C12.2. DEFINITIONS

C12.2.1. Adverse Effect. Changes that diminish the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance, and fitness.

C12.2.2. Commission. The National Commission for the Protection and Development of Wildlife

C12.2.3. Competent Authority. Those assigned to the State Wildlife Conservation and Development.

C12.2.4. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

C12.2.5. Ground Water. Water existing underground.

C12.2.6. Kingdom of Saudi Arabia-Protected Species. Any species of flora or fauna listed or designated by the Kingdom of Saudi Arabia, because continued existence of the species is, or is likely to be, threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

C12.2.7. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

C12.2.8. Migratory Species. The entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries.

C12.2.9. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

C12.2.10. Natural Resources Management. Actions taken that combine science, economics, and policy, to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

C12.2.11. Person. Any natural or legal entity, including individuals and private establishments and companies.

C12.2.12. Protected Area. The region is determined by the competent authority for the purpose of protecting wildlife and development in the State.

C12.2.13. Public Agency. Any ministry, department or government agency.

C12.2.14. Range State. In relation to a particular migratory species means any State that exercises jurisdiction over any part of the range of that migratory species, or a State, flag vessels of which are engaged outside national jurisdictional limits in taking that migratory species.

C12.2.15. Significant Land or Water Area. Land or water area that is normally 500 or more acres outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

C12.2.16. Surface Water. All water existing on the surface of the earth, including sea, streams, dams (impounded water), spa and spring water.

C12.2.17. Threatened and Endangered Species. Any species of fauna or flora, listed in Table C12.T1., "Threatened and Endangered Flora," for the Kingdom of Saudi Arabia.

C12.3. CRITERIA

C12.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and Kingdom of Saudi Arabia protected species and their habitat.

C12.3.2. Installations shall maintain, or have access to, Table C12.T1., "Kingdome of Saudi Arabia Threatened and Endangered Fauna" as well as a current list of Kingdom of Saudi Arabia protected fauna and flora species.

C12.3.3. Installations with significant land or water areas shall, after coordination with the Kingdom of Saudi Arabia installation commander or similar appropriate Kingdom of Saudi Arabia authorities, develop natural resources management plans.

C12.3.4. Installations with natural resources management plans shall, after coordination with the Kingdom of Saudi Arabia installation commander or similar appropriate Kingdom of Saudi Arabia authorities, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

C12.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or Kingdom of Saudi Arabia-protected species, or support Kingdom of Saudi Arabia surveys.

C12.3.4.2. Implement natural resources management plans.

C12.3.5. The Kingdom of Saudi Arabia installation commander or, if there is no Kingdom of Saudi Arabia installation commander, the U.S. Ambassador will be notified of the discovery of any endangered or threatened species and Kingdom of Saudi Arabia-protected species not previously known to be present on the installation.

C12.3.6. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent Kingdom of Saudi Arabia facilities where practical.

C12.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, Kingdom of Saudi Arabia-protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

C12.3.8. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna.

C12.3.9. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

C12.3.10. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

C12.4. ADDITIONAL REQUIREMENTS

C12.4.1. Implement measures to use non-renewable natural resources conservatively and to cost-effectively develop renewable resources.

C12.4.1.1.2. Achieve balance between use and sustainability of natural resources.

C12.4.1.1.3. Apply recycling technologies and reuse of resources when practical.

C12.4.1.1.4. Implement measures to ensure development is compatible with local and regional environmental conditions.

C12.4.2. All persons engaged in production, servicing or other activities shall take the necessary precautions to achieve the following:

C12.4.1.2.1. Prevent direct or indirect contamination of surface, ground and coastal waters that may be caused by solid or liquid residues.

C12.4.1.2.2. Preserve the soil and land and prevent its deterioration or contamination.

C12.4.3. Conserve and, where feasible and appropriate, restore those habitats of migratory species and species that are in danger of extinction.

C12.4.3.1. Prevent, remove, or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species.

C12.4.3.2. To the extent feasible and appropriate, prevent, reduce or control conditions that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic or invasive species.

C12.4.4. Implement measures to monitor and control rates of annual consumption of natural resources so that these rates do not exceed the absorptive capacity of the biological organisms in those areas.

C12.4.5. For protected areas within the Kingdom of Saudi Arabia, the following measures need to be taken to ensure that the environment is not impacted. This includes:

C12.4.5.1. Fishing in all its forms.

C12.4.5.2. Grazing or agricultural activities.

C12.4.5.3. Harvesting or collection of plant material.

C12.4.5.4. Firewood collection or destruction of living trees.

C12.4.5.5. Collection of fungal organisms or their products.

C12.4.5.6. Establishment of recreational camps.

C12.4.5.7. Access by all types of vehicles.

C12.4.5.8. Prohibition of the introduction of any type of exotic animals (domesticated or wild) to the protected area.

C12.4.5.9. Any other activities that have a negative impact on the biology of the protected area.

Table C12.T1. Kingdom of Saudi Arabia Threatened and Endangered (T&E) Fauna

Common Name	Scientific Name	T&E Fauna Location
Gazelle, Arabian	Gazella gazella	Arabian Peninsula
Gazelle, sand	Gazella subgutturosa marica	Arabian Peninsula
Gazelle, Saudi Arabian	Gazella dorcas saudiya	Arabian Peninsula
Oryx, Arabian	Oryx leucoryx	Arabian Peninsula
Ostrich, Arabian	Struthio camelus syriacus	Saudi Arabia

C13. CHAPTER 13

POLYCHLORINATED BIPHENYLS

C13.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage, and disposal of polychlorinated biphenyls (PCB). These criteria include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers, and cables.

C13.2. DEFINITIONS

C13.2.1. Capacitor. A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

C13.2.2. Chemical Waste Landfill. A landfill at which a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.

C13.2.3. In or Near Commercial Buildings. Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters of a non-industrial, non-substation building.

C13.2.4. Incinerator. An engineered device using controlled-flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.

C13.2.5. Leak or Leaking. Any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

C13.2.6. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to this FGS.

C13.2.7. Marked. PCB items and PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

C13.2.8. Non-PCB Transformers. Any transformer that contains less than 50 ppm PCB.

C13.2.9. PCB Article. Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

C13.2.10. PCB Article Container. Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.

C13.2.11. PCB Container. Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.

C13.2.12. PCB-Contaminated Electrical Equipment. Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain 50 ppm or greater PCB, but less than 500 ppm PCB.

C13.2.13. PCB Equipment. Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

C13.2.14. PCB Item. Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of 50 ppm or greater.

C13.2.15. PCB Transformer. Any transformer that contains 500 ppm PCB or greater.

C13.2.16. Restricted Access Area. Areas where access by unauthorized personnel is controlled by fences, other man-made structures, or naturally occurring barriers such as mountains, cliffs, or rough terrain.

C13.2.17. Substantial Contact Area. An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

C13.2.18. PCB Large High Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at 2,000 volts (alternating current (ac) or direct current (dc)) or above.

C13.2.19. PCB Large Low Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates below 2,000 volts (ac or dc).

C13.3. CRITERIA

C13.3.1. General

C13.3.1.1. The installation spill contingency plan will address PCB items, including temporary storage items. Chapter 17, "Spill Prevention and Response Planning," provides criteria on how to prepare these plans.

C13.3.1.2. Spills of PCB liquids at concentrations of 50 ppm or greater will be responded to immediately upon discovery and cleaned up in accordance with the following:

C13.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms (μg) per 100 square centimeters (cm^2).

C13.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 μg per 100 cm^2.

C13.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing less than 1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling, and a reference to any reports documenting the site conditions.

C13.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 10 inches or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing less than 1 ppm PCBs.

C13.3.1.3. All PCB transformers, PCB large high voltage capacitors, PCB containers, and certain PCB items containing PCBs at concentrations 50 ppm or greater (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and the Kingdom of Saudi Arabia language. The marking must identify the item as containing PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criteria also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB large low voltage capacitors and equipment containing a PCB transformer or PCB large high voltage capacitor.

C13.3.1.4. Each installation having PCB items will maintain a written inventory that includes a current list by type of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of for that year. Inventory records should be maintained for a period of time at least 3 years after disposal of the last item on the list.

C13.3.1.5. Disposal of PCB items will only be through the servicing DLA DS in accordance with DoD 4160.21-M (Reference (j)) or paragraph C13.3.5. of this FGS.

C13.3.1.6. All periodic inspections as required in this Chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for three years after disposal of the transformer.

C13.3.2. <u>PCB transformers (500 ppm PCB or greater)</u>

C13.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

C13.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

C13.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

C13.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed one year.

C13.3.2.5. PCB transformers will be serviced as follows:

C13.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C13.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

C13.3.2.5.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of in accordance with paragraph C13.3.5.;

C13.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

C13.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing less than 500 ppm PCBs that are mixed with fluids containing 500 ppm or greater PCBs will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be greater than 500 ppm PCBs; and

C13.3.2.5.6. Dielectric fluids containing 500 ppm PCBs or greater will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

C13.3.2.6. All in-service PCB transformers (greater than 500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100 percent of dielectric fluid or PCB transformers tested and found to contain less than 60,000 ppm PCBs will be inspected at least every 12 months.

C13.3.2.7. If any PCB transformer is involved in a fire and was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and treated if required.

C13.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

C13.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

C13.3.3. Other PCB Items

C13.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

C13.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing less than 500 ppm PCB;

C13.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of 500 ppm or greater that requires the removal and rework of the internal components is prohibited;

C13.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

C13.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of 500 ppm or greater will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

C13.3.3.1.5. Dielectric fluids containing 500 ppm or greater will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

C13.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

C13.3.3.2.1. Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors that pose an exposure risk to food or feed is prohibited;

C13.3.3.2.2. Use of PCB large high-voltage and PCB large low-voltage capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have an adequate roof, walls, and floor to contain any release of PCBs; and

C13.3.3.3. Any PCB item removed from service will be marked with the date it is removed from service.

C13.3.4. Storage

C13.3.4.1. PCBs and PCB items at concentrations 50 ppm or greater that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

C13.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

C13.3.4.1.2. A containment berm, at least 6 inches high, sufficient to contain twice the internal volume of the largest PCB article, or 25 percent of the total internal volume of all PCB articles or containers stored, whichever is greater;

C13.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines, or other openings constructed to prevent any release from the bermed area;

C13.3.4.1.4. Continuous, smooth, and impervious flooring material; and

C13.3.4.1.5. To the maximum extent possible, a new PCB storage area will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where there is a high possibility of such risks, the installation spill prevention and control plan will address the risk.

C13.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

C13.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

C13.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

C13.3.4.2.3. PCB containers in which non-liquid PCBs have been placed; and

C13.3.4.2.4. PCB containers in which PCBs at a concentration between 50-499 ppm have been placed, and whose containers are marked to indicate there is less than 500 ppm PCB.

C13.3.4.3. Non-leaking and structurally undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting the criteria of paragraph C13.3.4. if they are inspected weekly.

C13.3.4.4. All other PCB storage areas will be inspected at least monthly.

C13.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing DLA DS.

C13.3.5. <u>Disposal</u>

C13.3.5.1. Installations that generate PCB waste of 50 ppm or greater PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, "Hazardous Waste." Installations will coordinate and obtain concurrence with the Kingdom of Saudi Arabia for in-country PCB disposal as for HW disposal.

C13.3.5.2. PCB-contaminated dielectric fluid with concentrations greater than 500 ppm will only be disposed in an incinerator with 99.9 percent combustion efficiency.

C13.3.5.3. PCB-contaminated dielectric fluid with concentrations 50 ppm or greater, but less than 500 ppm, will only be disposed as follows:

C13.3.5.3.1. In an incinerator with 99.9 percent combustion efficiency; or

C13.3.5.3.2. In a high-efficiency boiler that is rated at a minimum of 50 MBtu/hr and is fueled by natural gas, oil, or coal.

C13.3.5.4. Rags, soil, and other debris with PCBs at concentrations of 50 ppm or greater will be disposed of:

C13.3.5.4.1. In an incinerator with 99.9 percent combustion efficiency; or

C13.3.5.4.2. In a chemical waste landfill.

C13.3.5.5. PCB transformers will be disposed of:

C13.3.5.5.1. In an incinerator with 99.9 percent combustion efficiency; or

C13.3.5.5.2. In a chemical waste landfill, provided the transformers, and all their inner workings, are first drained of all free-flowing liquids.

C13.3.5.6. PCB capacitors will be disposed of as follows:

C13.3.5.6.1. PCB capacitors will be disposed of in an incinerator with 99.9 percent combustion efficiency, except,

C13.3.5.6.2. Intact non-leaking small PCB capacitors may be disposed of in a solid waste landfill unless large quantities (more than 100 pounds) are identified at the same time.

C13.3.5.7. PCB hydraulic machines containing PCBs may be disposed of as municipal solid waste if:

C13.3.5.7.1. The machines containing PCBs at concentrations of 50 ppm or greater are drained of all free-flowing liquid.

C13.3.5.7.2. The machines containing PCB liquid of 1,000 ppm or greater are flushed prior to disposal with a solvent containing less than 50 ppm PCB.

C13.3.5.8. PCB-contaminated electrical equipment, except capacitors, will be disposed of as municipal solid waste only after draining all free-flowing liquid.

C13.3.5.9. PCB articles, other than those already described, will be disposed of:

C13.3.5.9.1. In an incinerator with 99.9 percent combustion efficiency; or

C13.3.5.9.2. In a chemical waste landfill, provided the articles are first drained of all free-flowing liquids.

C13.3.5.10. PCB containers with concentrations of 500 ppm or greater may be disposed of:

C13.3.5.10.1. In an incinerator with 99.9 percent combustion efficiency; or

C13.3.5.10.2. In a chemical waste landfill, provided the containers are first drained of all free-flowing liquids.

C13.3.5.11. Where PCB fluids, items, or articles are disposed of in a high-temperature boiler, the following procedures will be followed:

C13.3.5.11.1. The boiler must be rated at a minimum of 50 million BTU hours;

C13.3.5.11.2. If the boiler uses natural gas or oil as the primary fuel, the carbon monoxide concentration in the stack must be 50 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C13.3.5.11.3. If the boiler uses coal as the primary fuel, the carbon monoxide concentration in the stack is 100 ppm or less and the excess oxygen is at least 3 percent when PCBs are being burned;

C13.3.5.11.4. The mineral oil dielectric fluid does not comprise more than 10 percent, by volume, of the total fuel feed rate;

C13.3.5.11.5. The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start up or shut down operations;

C13.3.5.11.6. The performance of the boiler is continuously monitored for carbon monoxide and excess oxygen percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning less than 112,500 liters (30,000 gallons) of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes;

C13.3.5.11.7. The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes; and

C13.3.5.11.8. The flow of mineral oil dielectric fluid is stopped if the criteria respecting carbon monoxide or excess oxygen are exceeded.

C13.3.5.12. Where PCB fluids, items or articles are disposed of in an incinerator, the following procedures will be followed:

C13.3.5.12.1. Combustion criteria shall maintain the introduced liquids for a 2-second dwell time at 1,200℃, plus or minus 100℃ (2,200℉ +/- 212℉), and 3-percent excess oxygen in the stack gas or maintenance of the introduced liquids for a 1-1/2 second dwell time at 1,600℃, plus or minus 100℃ (3,050℉ +/- 212℉) and 2-percent excess oxygen in the stack gas;

C13.3.5.12.2. Combustion efficiency, measured by the ratio of the concentration of carbon dioxide to the total concentration of both carbon dioxide and carbon monoxide, will be maintained at least 99.9 percent;

C13.3.5.12.3. The rate and quantity of PCBs that are fed to the combustion system shall be measured and recorded at regular intervals not greater than 15 minutes;

C13.3.5.12.4. The temperatures of the incineration process shall be continuously measured and recorded;

C13.3.5.12.5. The flow of PCBs to the incinerator shall stop automatically if temperature criteria are not met;

C13.3.5.12.6. Monitoring is conducted sufficient to determine that an incinerator to be used for disposal the first time will operate within the criteria above; and

C13.3.5.12.7. Continuous monitoring is conducted during incineration of PCBs for oxygen and carbon monoxide and periodic monitoring for carbon dioxide.

C13.3.5.13. PCB containers used to contain only PCBs at a concentration less than 500 ppm may be disposed of as municipal solid waste only after draining all free-flowing liquid.

C13.3.5.14. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the United States will be returned to the United States for delivery to a permitted disposal facility if host country or third country disposal is not possible, is prohibited, or would not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with criteria in subparagraph C 13.3.1.3.

C13.3.6. Elimination of PCB Products

C13.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

C13.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

C13.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs (less than 2 ppm) at the time of shipment.

C13.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

C14. CHAPTER 14

ASBESTOS

C14.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1 (Reference (o)) and DoDI 6055.5 (Reference (p)) and concomitant service instructions.

C14.2. DEFINITIONS

C14.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions coming from ACM are observed, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

C14.2.2. Asbestos. Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated and/or altered.

C14.2.3. Asbestos-Containing Material (ACM). Any material containing more than one percent asbestos by weight.

C14.2.4. Friable Asbestos. Any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

C14.2.5. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than one percent asbestos.

C14.2.6. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing more than one percent asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

C14.2.7. Regulated ACM. Means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

C14.3. CRITERIA

C14.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

C14.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

C14.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

C14.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

C14.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

C14.3.2.4. Work control/permit systems to control activities that might disturb ACM;

C14.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM;

C14.3.2.6. Record keeping to document O&M activities related to asbestos identification management and abatement;

C14.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

C14.3.2.8. Procedures to assess and prioritize identified hazards for abatement; and

C14.3.2.9. Procedures to prevent the use of ACM in new construction.

C14.3.3. Prior to demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

C14.3.4. Prior to demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

C14.3.5. Installations will remove friable ACM when the ACM poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

C14.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all regulated ACM.

C14.3.7. When disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leak-proof container, and properly dispose of it in an MSWLF as defined in Chapter 7, “Solid Waste.” Containers will be labeled in English and the Kingdom of Saudi Arabia language: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST - CANCER AND LUNG DISEASE HAZARD." Permanent records documenting the disposal action and site will be maintained.

C14.3.8. DoD schools will comply with applicable requirements of 15 U.S.C. 2643(l) (Reference (q)) and implementing regulations in 40 CFR Part 763, Subpart E (Reference (r)).

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C15. CHAPTER 15

GENERAL ENVIRONMENTAL STANDARDS

C15.1. SCOPE

This chapter contains general environmental standards for the Kingdom of Saudi Arabia that are not specific to any of the other chapters in this FGS.

C15.2. DEFINITIONS

C15.2.1. Competent Agency. Meteorology and Environmental protection Administration (MEPA)

C15.2.2. Licensing Institution. Any Institution In-charge of licensing projects with potential negative impacts on environment.

C15.2.3. Concerned Institution. The Government Institution In-charge of environment-related projects.

C15.2.4. Person. Any natural or legal entity, including individuals and private establishments and companies.

C15.2.5. Environment. All that surrounds man such as water, air, land and outer space and all the contents of these milieus such as inanimate objects, flora, fauna, various forms of energy, systems and natural processes and human activities.

C15.2.6. Environmental Protection. Preservation of the environment and prevention of its contamination and deterioration.

C15.2.7. Environmental Pollution. Presence of one or more materials or factors in quantities or quality for periods of time that directly or indirectly lead to harming public health, bio-organisms, natural resources, property or adversely affect quality of life and human welfare.

C15.2.8. Environmental Standards. Both environmental quality and source standards.

C15.2.9. Environmental Criteria. The environmental specifications and criteria to control pollution sources.

C15.2.10. Projects. Any facilities, installations or activities with potential impact on the environment.

C15.2.11. Major Change. Any expansion or change in design or operation of any existing project that might negatively affect the environment. For the purpose of this definition, any equivalent substitution of quality and capacity shall not be deemed a major change.

C15.3. CRITERIA

C15.3.1. The party executing new projects, making major modifications to existing projects, or owning projects whose specified terms of investment have expired must utilize the best possible and most suitable technologies for the local environment and use materials which introduce the lowest possible level of pollution to the environment.

C15.3.2. Each person responsible for designing or operating any project or activity shall ensure that such design and operation is in compliance with the applicable regulations and standards.

C15.3.3. The concerned agencies and persons shall be fully responsible, as part of their activities and projects, for incidents of environmental pollution with toxic, hazardous or radioactive wastes and materials during the stages of production, transportation, storage or recycling. The party that caused such incident shall bear all the costs of pollution control, abatement, treatment and remediation of the polluted environment.

C15.3.4. General Environmental Protection Standards for New Facilities.

C15.3.4.1. Each new major facility or major modification of an existing facility shall incorporate the best available technology for control of pollutant discharges and for the disposal of wastes resulting from the operation of the facility.

C15.3.4.2. All new facilities and modifications of an existing facility shall be designed and operated so as to avoid the discharge of any toxic substance, whether specifically regulated or not, in sufficient quantities to be harmful to public health.

C15.3.5. General Environmental Protection Standards Applicable to Existing Facilities.

C15.3.5.1. All existing facilities shall be operated and maintained so as to avoid the discharge of any toxic substance, whether specifically regulated or not, in quantities sufficient to be harmful to public health.

C15.3.5.2. When burning any kind of fuel or other substances for any purpose, the concerned agencies and persons shall employ the most appropriate means, technologies and suitable alternatives to minimize adverse environmental impacts to the lowest level.

C16 CHAPTER 16

LEAD-BASED PAINT

C16.1. SCOPE

This Chapter contains criteria to establish and implement a lead hazard management program to identify, control, or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from lead exposure, refer to DoDI 6055.1 (Reference (o)), DoDI 6055.5 (Reference (p)), and concomitant service instructions.

C16.2. DEFINITIONS

C16.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead-contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

C16.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

C16.2.3. Bare Soil. Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

C16.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least two different days within any week, provided that each days' visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.

C16.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exist in a facility frequented by children under the age of 6.

C16.2.6. Deteriorated Paint. Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking, or is otherwise damaged or separated from the substrate.

C16.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 ,g/dl (micrograms of lead per deciliter) for a single test, or 15-19 ,g/dl in two tests taken at least 3 months apart.

C16.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

C16.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

C16.2.10. Evaluation. A visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, lead-based paint, or a lead-based paint hazard.

C16.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

C16.2.12. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through various methods, including interim controls or abatement or a combination of the two.

C16.2.13. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

C16.2.14. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.

C16.2.15. Lead-Based Paint. Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per cm^2, or 0.5 percent by weight or 5,000 ppm by weight.

C16.2.16. Lead-based paint hazard includes paint-lead-hazard, dust-lead hazard or soil-lead hazard as identified below:

C16.2.16.1. Paint-lead hazard. A paint-lead hazard is any of the following:

C16.2.16.1.1. Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill, or floor) are equal to or greater than the dust-lead hazard levels identified in subparagraph C16.2.16.2.

C16.2.16.1.2. Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe).

C16.2.16.1.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

C16.2.16.1.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

C16.2.16.2. Dust-lead hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

C16.2.16.3. Soil-lead hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm (μg/g) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

C16.2.17. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint, and the provision of a report explaining the results of the investigation.

C16.2.18. Permanent. An expected design life of at least 20 years.

C16.2.19. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

C16.2.20. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

C16.2.21. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

C16.2.22. Risk Assessment Screen. A sampling protocol that is used in dwellings that are in relatively good condition and where the probability of finding lead-based hazards are low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.

C16.3. CRITERIA

C16.3.1. Installations will:

C16.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

C16.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement.

C16.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

C16.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 .g/ft^2 for floors, >125 .g/ft^2 for interior window sills, a lead-based paint risk assessment should be performed.

C16.3.1.3.2. Lead-based paint risk assessments.

C16.3.1.3.3. Routine facility inspection for fire and safety.

C16.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

C16.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

C16.3.1.3.6. Lead-based paint reevaluations.

C16.3.1.3.7. Review of construction, painting, and maintenance histories.

C16.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

C16.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-base paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

C16.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

C16.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, "Hazardous Waste," paragraph C6.2.5.

C17. CHAPTER 17

SPILL PREVENTION AND RESPONSE PLANNING

C17.1. SCOPE

This Chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8 (Reference (s)).

C17.2. DEFINITIONS

C17.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

C17.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

C17.2.3. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in Appendix 1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

C17.2.3.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

C17.2.3.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C17.2.4. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

C17.2.5. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

C17.2.6. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

C17.2.7. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

C17.2.8. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

C17.2.8.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

C17.2.8.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 400 liters (110 gallons);

C17.2.8.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

C17.2.8.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

C17.2.8.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

C17.2.9. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

C17.3. CRITERIA

C17.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT.

C17.3.1.1. The plan will be updated at least every 5 years or:

C17.3.1.1.1. Within 6 months of any significant changes to operations.

C17.3.1.1.2. When there have been two significant spills to navigable waters in any 12-month period;

C17.3.1.1.3. When there has been a spill of 1,000 gallons or greater.

C17.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification.

C17.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

C17.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate.

C17.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in subparagraph C17.3.2.3, critical water resources, land uses, and possible migration pathways.

C17.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure.

C17.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in subparagraph C 17.3.2.3.

C17.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of non-destructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

C17.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," subparagraph C9.3.2.5.

C17.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

C17.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

C17.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground storage tanks, pesticides, and PCBs provide specific criteria for containment structure requirements.

C17.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

C17.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

C17.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

C17.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

C17.3.2.14. Written procedures for:

C17.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

C17.3.2.14.2. Inspections; and

C17.3.2.14.3. Record keeping requirements.

C17.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

C17.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and to provide assistance to other agencies when requested. At a minimum, this section of the plan will contain:

C17.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills.

C17.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered.

C17.3.3.3. The responsibilities, composition, and training requirements of the FRT.

C17.3.3.4. The command structure that will be established to manage a worst case discharge. Include an organization chart and the responsibilities and composition of the organization.

C17.3.3.5. Procedures for FRT alert and response to include provisions for:

C17.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill.

C17.3.3.5.2. Public affairs involvement.

C17.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours.

C17.3.3.7. The plan will provide for notification of the FIC, installation commander, and local authorities in the event of hazard to human health or environment.

C17.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers.

C17.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills.

C 17.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill.

C17.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation.

C17.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation.

C17.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations.

C17.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions.

C17.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

C17.3.4. Reporting Section. The reporting section of the spill plan will address the following:

C17.3.4.1. Recordkeeping when emergency procedures are invoked.

C17.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill.

C17.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency and the LEC and submit a follow-up written report when:

C17.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

C17.3.4.3.2. The spill exceeds 400 liters (110 gallons) of POLs;

C17.3.4.3.3. A water resource has been polluted; or

C17.3.4.3.4. The FIC has determined that the spill is significant.

C17.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local Kingdom of Saudi Arabia drinking water resource, the appropriate in-theater component commander and/or Defense Agency, LEC, and Kingdom of Saudi Arabia authorities will be notified immediately.

C17.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in subparagraph C17.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

C17.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment.

C17.3.6. After completion of the initial response, any remaining free product and/or obviously contaminated soil will be appropriately removed and managed. Further action will be governed by Reference (s).

C18. CHAPTER 18

UNDERGROUND STORAGE TANKS

C18.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing hazardous wastes are covered in Chapter 6, “Hazardous Waste.” Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, “Petroleum, Oil, and Lubricants.”

C18.2. DEFINITIONS

C18.2.1. POL. Refined petroleum, oils, and lubricants.

C18.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, “Hazardous Material.” The term does not include:

C18.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

C18.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

C18.2.3. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

C18.2.4. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, larger than 416 liters (110 gallons) that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10 percent or more beneath the surface of the ground, but does not include:

C18.2.4.1. Tanks containing heating oil used for consumption on the premises where it is stored;

C18.2.4.2. Septic tanks;

C18.2.4.3. Stormwater or wastewater collection systems;

C18.2.4.4. Flow through process tanks;

C18.2.4.5. Surface impoundments, pits, ponds, or lagoons;

C18.2.4.6. Field constructed tanks;

C18.2.4.7. Hydrant fueling systems;

C18.2.4.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

C18.2.4.9. UST containing *de minimis* concentrations of regulated substances, except where subparagraph C 18.3.2.7. is applicable; and

C18.2.4.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

C18.2.5. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

C18.2.6. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

C18.2.6.1. A hydrant fuel distribution system; or

C 18.2.6.2. A field-constructed tank.

C18.3. CRITERIA

C18.3.1. All installations will maintain a UST inventory.

C18.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

C18.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

C18.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fillpipe. Overfill prevention will be provided by one of the following methods:

C18.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity).

C18.3.2.2.2. High level alarm (set at 90% of tank capacity).

C18.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or one percent of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

C18.3.2.3.1. USTs will use at least one of the following leak detection methods:

C18.3.2.3.1.1. Automatic tank gauging;

C18.3.2.3.1.2. Vapor monitoring;

C18.3.2.3.1.3. Groundwater monitoring; or

C18.3.2.3.1.4. Interstitial monitoring.

C18.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

C18.3.2.3.3. Suction piping will either have a line tightness test conducted every three years or use monthly monitoring.

C18.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

C18.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

C18.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.08 (Reference (s)). Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

C18.3.2.7. When a UST has not been used for one year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.3.

C18.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

C18.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

C18.3.2.9.1. Vent lines must be left open and functioning; and

C18.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

C18.3.3. <u>UST Recordkeeping.</u> Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

C18.3.4. <u>Hazardous material USTs</u>

C18.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults.

C18.3.4.2. <u>Leak Detection.</u> The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

C18.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in subparagraph C18.3.4.1. shall be immediately removed from service and upgraded or replaced as necessary.

C18.3.5. <u>Deferred USTs.</u> Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

AP1. APPENDIX 1

CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

AP1.1. CHARACTERISTICS OF HAZARDOUS WASTE

AP1.1.1. General

AP1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

AP1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

AP1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

AP1.1.2. Characteristic of Ignitability

AP1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

AP1.1.2.1.1. It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

AP1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

AP1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

AP1.1.2.1.4. It is an oxidizer.

AP1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

AP1.1.3. <u>Characteristic of Corrosivity</u>

AP1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

AP1.1.3.1.1. It is aqueous and has a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter.

AP1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

AP1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

AP1.1.4. <u>Characteristic of Reactivity</u>

AP1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

AP1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

AP1.1.4.1.2. It reacts violently with water.

AP1.1.4.1.3. It forms potentially explosive mixtures with water.

AP1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

AP1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

AP1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

AP1.1.4.1.8. It is a forbidden explosive.

AP1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

AP1.1.5. Toxicity Characteristic

AP1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste contains any of the contaminants listed in Table AP1.T1., "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section AP 1.1. at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself is considered to be the extract for the purpose of this section.

AP1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table AP1.T1 or section AP1.2., which corresponds to the toxic contaminant causing it to be hazardous.

AP1.2. LISTS OF HAZARDOUS WASTES

AP1.2.1. General

AP1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

AP1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

AP1.2.1.3. Each hazardous waste listed in section AP1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

AP1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table AP1.T3., "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

AP1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table AP1.T4., annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

AP1.2.4. <u>Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.</u>

AP1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel, or burned as a fuel.

AP1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

AP1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table AP1.T4., annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table AP1.T4., annotated "P" or "U" as the first character in the

USEPA ITW#, such waste will be listed in paragraph AP1.2.2. above or will be identified as a hazardous waste by the characteristics set forth in section AP1.1. of this Appendix.]

AP1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4., annotated "P" as the first character in the USEPA ITW# are hereby identified as acute hazardous waste (IT). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA ITW#s are listed in Table AP1.T4., annotated "P" as the first character in the USEPA ITW#.

AP1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table AP1.T4., subparagraphs AP1.2.4.1.1.1. through AP1.2.4.1.1.4. of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.]

Table AP1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

USEPA HW No.[1]	Contaminant	CAS No. [2]	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-2	1.0
D007	Chromium	7440-47-3	5.0
D016	2,4-D	94-75-7	10.0
D012	Endrin	72-20-8	0.02
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D010	Selenium	7782-49-2	1.0
D01 1	Silver	7440-22-4	5.0
D015	Toxaphene	8001-35-2	0.5
D017	2,4,5-TP (Silvex)	93-72-1	1.0

Table AP1.T2. Maximum Concentration of Contaminants for Non-Wastewater

USEPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/kg)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23 -5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1 ,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1 ,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D03 I	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
DO33	Hexachlorobutadiene	87-68-3	0.5
DO34	Hexachloroethane	67-72-1	3.0
DO35	Methyl Ethyl Ketone	78-93-3	200.0
DO36	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl Chloride	75-01-4	0.2

Notes:

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1 -trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spent halogenated solvents: tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1 -trichloroethane, chlorobenzene, 1,1 ,2-trichloro- 1 ,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1 ,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of 10% or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)[2]
F004	The following spent non-halogenated solvents: cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent	(T)
F005	The following spent non-halogenated solvents: toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Spent cyanide plating bath solutions from electroplating operations.	(R,T)
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F01 1	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	(T)
F0 19	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process.	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (this listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (this listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (this listing does not include wastewater, wastewater treatment sludges, spent catalysts, and wastes listed separately in this table or wastes listed in Table AP1.T4 and having a USEPA HW# beginning with "K").	(T)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (this listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027.	(T)

Table AP1.T3. Listed Hazardous Wastes from Non-Specific Sources (continued)

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F032	Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F035	Wastewater (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F037	Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling water segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K05 1 wastes are not included in this listing.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater and oily cooling wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in dissolved air flotation (DAF) units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste listed in Tables AP1.T3 or AP1.T4. (leachate resulting from the disposal of one or more of the following USEPA hazardous wastes and no other hazardous wastes retains its USEPA HW#(s): F020, F021, F022, F026, F027, and/or F028).	(T)

Notes:

1. USEPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table AP1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Acenaphthene	83329			100
Acenaphthylene	208968			5,000
Acetaldehyde (I)	75070		U001	1,000
Acetaldehyde, chloro-	107200		P023	1,000
Acetaldehyde, trichloro-	75876		U034	5,000
Acetamide	60355			100
Acetamide, N-(aminothioxomethyl)-	591082		P002	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442		U1 87	100
Acetamide, 2-fluoro-	640197		P057	100
Acetamide, N-9H-fluoren-2-yl-	53963		U005	1
Acetic acid	64197			5,000
Acetic acid (2,4-dichlorophenoxy)-salts and esters	94757		U240	100
Acetic acid, lead(2+) salt	301042		U144	10
Acetic acid, thallium(1+) salt	563688		U214	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765		U232	1,000
Acetic acid, ethyl ester (I)	141786		U1 12	5,000
Acetic acid, fluoro-, sodium salt	62748		P058	10
Acetic anhydride	108247			5,000
Acetone (I)	67641		U002	5,000
Acetone cyanohydrin	75865	1,000	P069	10
Acetone thiosemicarbazide	1752303	1,000/10,000		1
Acetonitrile (I,T)	75058		U003	5,000
Acetophenone	98862		U004	5,000
2-Acetylaminofluorene	53963		U005	1
Acetyl bromide	506967			5,000
Acetyl chloride (C,R,T)	75365		U006	5,000
1-Acetyl-2-thiourea	591082		P002	1
Acrolein	107028	500	P003	1
Acrylamide	79061	1,000/10,000	U007	5,000
Acrylic acid (I)	79107		U008	5,000
Acrylonitrile	107131	10,000	U009	100
Acrylyl chloride	814686	100		1
Adipic acid	124049			5,000
Adiponitrile	111693	1,000		1
Aldicarb	116063	100/10,000	P070	1
Aldrin	309002	500/10,000	P004	1
Allyl alcohol	107186	1,000	P005	100
Allylamine	107119	500		1
Allyl chloride	107051			1,000
Aluminum phosphide (R,T)	20859738	500	P006	100
Aluminum sulfate	10043013			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
4-Aminobiphenyl	92671			1
5-(Aminomethyl)-3-isoxazolol	2763964		P007	1,000
Aminopterin	54626	500/10,000		1
4-Aminopyridine	504245		P008	1,000
Amiton	78535	500		1
Amiton oxalate	3734972	100/10,000		1
Amitrole	61825		U011	10
Ammonia	7664417	500		100
Ammonium acetate	631618			5,000
Ammonium benzoate	1863634			5,000
Ammonium bicarbonate	1066337			5,000
Ammonium bichromate	7789095			10
Ammonium bifluoride	1341497			100
Ammonium bisulfite	10192300			5,000
Ammonium carbamate	1111780			5,000
Ammonium carbonate	506876			5,000
Ammonium chloride	12125029			5,000
Ammonium chromate	7788989			10
Ammonium citrate, dibasic	3012655			5,000
Ammonium fluoborate	13826830			5,000
Ammonium fluoride	12125018			100
Ammonium hydroxide	1336216			1,000
Ammonium oxalate	6009707 5972736 14258492			5,000
Ammonium picrate (R)	131748		P009	10
Ammonium silicofluoride	16919190			1,000
Ammonium sulfamate	7773060			5,000
Ammonium sulfide	12135761			100
Ammonium sulfite	10196040			5,000
Ammonium tartrate	14307438 3164292			5,000
Ammonium thiocyanate	1762954			5,000
Ammonium vanadate	7803556		P119	1,000
Amphetamlne	300629	1,000		1
Amyl acetate	628637			5,000
Iso-Amyl acetate	123922			
Sec-Amyl acetate	626380			
Tert-Amyl acetate	625161			
Aniline (I,T)	62533	1,000	U012	5,000
Aniline, 2,4,6- trimethyl	88051	500		1
o-Anisidine	90040			100
Anthracene	120127			5,000
Antimony++	7440360			5,000
Antimony pentachloride	7647189			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Antimony pentafluoride	7783702	500		1
Antimony potassium tartrate	28300745			100
Antimony tribromide	7789619			1,000
Antimony trichloride	10025919			1,000
Antimony trifluoride	7783564			1,000
Antimony trioxide	1309644			1,000
Antimycin A	1397940	1,000/10,000		1
ANTU (Thiourea 1-Naphthalenyl)	86884	500/10,000		100
Argentate(1-), bis(cyano-C)-, potassium	506616		P099	1
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
Aroclors	1336363			1
Arsenic++	7440382			1
Arsenic acid H_3AsO_4	1327522 7778394		P010	1
Arsenic disulfide	1303328			1
Arsenic oxide As_2O_3	1327533		P012	1
Arsenic oxide As_2O_5	1303282		P011	1
Arsenic pentoxide	1303282	100/10,000	P011	1
Arsenic trichloride	7784341			1
Arsenic trioxide	1327533		P012	1
Arsenic trisulfide	1303339			1
Arsenous oxide	1327533	100/10,000	P012	1
Arsenous trichloride	7784341	500		5,000
Arsine	7784421	100		1
Arsine, diethyl-	692422		P038	1
Arsinic acid, dimethyl-	75605		U136	1
Arsorous dichloride, phenyl-	696286		P036	1
Asbestos+++	1332214			1
Auramine	492808		U014	100
Azaserine	115026		U015	1
Aziridine	151564		P054	1
Azindine, 2-methyl-	75558		P067	1
Azirino[2',3',3,4]pyrrolo[1 ,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1 ,1 a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1 aS-(1 a-alpha, 8-beta, 8a-alpha, 8b-alpha)]-	50077		U010	10
Azinphos-ethyl	2642719	100/10,000		100
Azinphos-methyl	86500	10/10,000		1
Barium cyanide	542621		P013	10
Benz[j]aceanthrylene, 1 ,2-dihydro-3-methyl-	56495		U1 57	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Benz[c]acridine	225514		U016	100
Benzal chloride	98873	500	U017	5,000
Benzamide, 3,5-dichloro-N-(1 , 1 -dimethyl-2-propynyl)-	23950585		U1 92	5,000
Benz[a]anthracene	56553		U018	10
1 ,2-Benzanthracene	56553		U01 8	10
Benz[a]anthracene, 7,12-dimethyl-	57976		U094	1
Benzenamine (I,T)	62533		U012	5,000
Benzenamine, 3-(Trifluoromethyl)	98168	500		1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808		U014	100
Benzenamine, 4-chloro-	106478		P024	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933		U049	100
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117		U093	10
Benzenamine, 2-methyl-	95534		U328	100
Benzenamine, 4-methyl-	106490		U353	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		U1 58	10
Benzenamine, 2-methyl-, hydrochloride	636215		U222	100
Benzenamine, 2-methyl-5-nitro-	99558		U181	100
Benzenamine, 4-nitro-	100016		P077	5,000
Benzene (I,T)	71432		U109	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	500/10,000		1
Benzeneacetic acid, 4-chloro-alpha- (4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156		U038	10
Benzene, 1-bromo-4-phenoxy-	101553		U030	100
Benzenearsonic Acid	98055	10/10,000		1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033		U035	10
Benzene, chloro-	108907		U037	100
Benzene, chloromethyl-	100447		P028	100
Benzenediamin, ar-methyl-	25376458 95807 496720 823405		U221	10
1,2-Benzenedicarboxylic acid, dioctyl ester	117840		U107	5,000
1 ,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817		U028	100
1 ,2-Benzenedicarboxylic acid, dibutyl ester	84742		U069	10
1 ,2-Benzenedicarboxylic acid, diethyl ester	84662		U088	1,000
1 ,2-Benzenedicarboxylic acid, dimethyl ester	131113		U1 02	5,000
Benzene, 1,2-dichloro-	95501		U070	100
Benzene, 1 ,3-dichloro-	541731		U071	100
Benzene, 1 ,4-dichloro-	106467		U072	100
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548		U060	1
Benzene, dichloromethyl-	98873		U017	5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Benzene, 1 ,3-diisocyanotomethyl- (R,T)	584849 91087 264716254		U223	100
Benzene, dimethyl (I,T)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
1 ,3-Benzenediol	108463		U201	5,000
1 ,2-Benzenediol, 4-[1 -hydroxy-2-(methylamino)ethyl]- (R) -	51434		P042	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098		P046	5,000
Benzene, hexachloro-	118741		U127	10
Benzene, hexahydro- (I)	110827		U056	1,000
Benzene, hydroxy-	108952		U188	1,000
Benzene, methyl-	108883		U220	1,000
Benzene, 2-methyl-1 ,3-dinitro-	606202		U106	100
Benzene, 1-methyl-2,4-dinitro-	121142		U105	10
Benzene, 1-methylethyl- (I)	98828		U055	5,000
Benzene, nitro-	98953		U169	1,000
Benzene, pentachloro-	608935		U1 83	10
Benzene, pentachloronitro-	82688		U1 85	100
Benzenesulfonic acid chloride (C,R)	98099		U020	100
Benzenesulfonyl chloride	98099		U020	100
Benzene, 1 ,2,4,5-tetrachloro-	95943		U207	5,000
Benzenethiol	108985		P014	100
Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro-	50293		U061	1
Benzene, 1,1 '-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435		U247	1
Benzene, (trichloromethyl)-	98077		U023	10
Benzene, 1,3,5-trinitro-	99354		U234	10
Benzidine	92875		U021	1
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	500/1 0,000		1
1 ,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072		U202	100
Benzo[a]anthracene	56553		U018	10
Benzo[b]fluoranthene	205992			1
Benzo[k]fluoranthene	207089			5,000
Benzo[j,k]fluorene	206440		U120	100
1 ,3-Benzodioxole, 5-(1-propenyl)-	120581		U141	100
1 ,3-Benzodioxole, 5-(2-propenyl)-	94597		U203	100
1 ,3-Benzodioxole, 5-propyl-	94586		U090	10
Benzoic acid	65850			5,000
Benzonitrile	100470			5,000
Benzo[rst]pentaphene	189559		U064	10
Benzo[ghi]perylene	191242			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812		P001	100
Benzo[a]pyrene	50328		U022	1
3,4-Benzopyrene	50328		U022	1
p-Benzoquinone	106514		U197	10
Benzotrichloride (C,R,T)	98077	500	U023	10
Benzoyl chloride	98884			1,000
1,2-Benzphenanthrene	218019		U050	100
Benzyl chloride	100447	500	P028	100
Benzyl cyanide	140294	500		1
Beryllium++	7440417		P015	10
Beryllium chloride	7787475			1
Beryllium fluoride	7787497			1
Beryllium nitrate	13597994 7787555			1
alpha-BHC	319846			10
beta-BHC	319857			1
delta-BHC	319868			1
gamma-BHC	58899		U129	1
Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1 s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-	15271417	500/10,000		1
2,2'-Bioxirane	1464535		U085	10
Biphenyl	92524			100
(1,1 '-Biphenyl)-4,4'diamine	92875		U021	1
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941		U073	1
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904		U091	10
(1,1 '-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937		U095	10
Bis(chloromethyl) ketone	534076	10/10,000		1
Bis(2-chloroethyl)ether	111444		U025	10
Bis(2-chloroethoxy)methane	111911		U024	1,000
Bis(2-ethylhexyl)phthalate	117817		U028	100
Bitoscanate	4044659	500/10,000		1
Boron trichloride	10294345	500		1
Boron trifluoride	7637072	500		1
Boron trifluoride compound with methyl ether (1:1)	353424	1,000		1
Bromoacetone	598312		P017	1,000
Bromadiolone	28772567	100/10,000		1
Bromine	7726956	500		1
Bromoform	75252		U225	100
4-Bromophenyl phenyl ether	101553		U030	100
Brucine	357573		P018	100
1,3-Butadiene	106990			10
1,3-Butadiene, 1,1 ,2,3,4,4-hexachloro-	87683		U128	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**	**USEPA HW No.** [2]	**RQ (Pounds)**[3]
1-Butanamine, N-butyl-N-nitroso-	924163		U172	10
1-Butanol	71363		U031	5,000
2-Butanone	78933		U159	5,000
2-Butanone peroxide (R,T)	1338234		U160	10
2-Butanone, 3,3-dimethyl-1 -(methylthio)-, O[(methylamno)carbonyl] oxime	39196184		P045	100
2-Butenal	123739 4170303		U053	100
2-Butene, 1 ,4-dichloro- (I,T)	764410		U074	1
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1 -oxobutoxy] methyl] -2,3,5,7a-tetrahydro-1H-pyrrolizin-1 -yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]-	303344		U143	10
Butyl acetate	123864			5,000
iso-Butyl acetate	110190			
sec-Butyl acetate	105464			
tert-Butyl acetate	540885			
n-Butyl alcohol (I)	71363		U031	5,000
Butylamine	109739			1,000
iso-Butylamine	78819			
sec-Butylamine	513495			
tert-Butylamine	13952846 75649			
Butyl benzyl phthalate	85687			100
n-Butyl phthalate	84742		U069	10
Butyric acid	107926			5,000
iso-Butyric acid	79312			
Cacodylic acid	75605		U136	1
Cadmium++ (2+)	7440439			10
Cadmium acetate	543908			10
Cadmium bromide	7789426			10
Cadmium chloride	10108642			10
Cadmium oxide	1306190	100/10,000		1
Cadmium stearate	2223930	1,000/10,000		1
Calcium arsenate	7778441	500/10,000		1
Calcium arsenite	52740166			1
Calcium carbide	75207			10
Calcium chromate	13765190		U032	10
Calcium cyanamide	156627			1,000
Calcium cyanide Ca(CN)2	592018		P021	10
Calcium dodecylbenzenesulfonate	26264062			1,000
Calcium hypochlorite	7778543			10
Camphechlor	8001352	500/10,000		1
Camphene, octachloro-	8001352		P123	1
Cantharidin	56257	100/10,000		1
Carbachol chloride	51832	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Captan	133062			10
Carbamic acid, ethyl ester	51796		U238	100
Carbamic acid, methylnitroso-, ethyl ester	615532		U178	1
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	100/10,000		1
Carbamic chloride, dimethyl-	79447		U097	1
Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546		U1 14	5,000
Carbamothioic acid, bis(1 -methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164		U062	100
Carbaryl	63252			100
Carbofuran	1563662	10/10,000		10
Carbon disulfide	75150	10,000	P022	100
Carbon oxyfluoride (R,T)	353504		U033	1,000
Carbon tetrachloride	56235		U21 1	10
Carbonic acid, dithallium(1+) salt	6533739		U21 5	100
Carbonic dichloride	75445		P095	10
Carbonic difluoride	353504		U033	1,000
Carbonochloridic acid, methyl ester	79221		U1 56	1,000
Carbonyl Sulfide	463581			100
Carbophenothion	786196	500		1
Catechol	120809			100
Chloral	75876		U034	5,000
Chlorambem	133904			100
Chlorambucil	305033		U035	10
Chlordane	57749	1,000	U036	1
Chlordane, alpha & gamma isomers	57749		U036	1
Chlordane, technical	57749		U036	1
Chlorfenvinfos	470906	500		1
Chlorinated champhene (Campheclor)	8001352			1
Chlorine	7782505	100		10
Chlormephos	24934916	500		1
Chlormequat chloride	999815	100/10,000		1
Chlornaphazine	494031		U026	100
Choroacetaldehyde	107200		P023	1,000
Chloroacetophenone	532274			100
Chloroacetic acid	79118	100/10,000		100
p-Chloroaniline	106478		P024	1,000
Chlorobenzene	108907		U037	100
Chlorobenzilate	510156		U038	10
p-Chloro-m-cresol (4)	59507		U039	5,000
1-Chloro-2,3-epoxypropane	106898		U041	100
Chlorodibromomethane	124481			100
Chloroethane	75003			100
Chloroethanol	107073	500		1
Chloroethyl chlorofomate	627112	1,000		1
2-Chloroethyl vinyl ether	110758		U042	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Chloroform	67663	10,000	U044	10
Chloromethane	74873		U045	100
Chloromethyl ether	542881	100	P016	1
Chloromethyl methyl ether	107302	100	U046	10
beta-Chloronaphthalene	91587		U047	5,000
2-Chloronaphthalene	91587		U047	5,000
Chlorophacinone	3691358	100/10,000		1
o-Chlorophenol (2)	95578		U048	100
4-Chlorophenyl phenyl ether	7005723			5,000
1 -(o-Chlorophenyl)thiourea	5344821		P026	100
Chloroprene	126998			100
3-Chloropropionitrile	542767		P027	1,000
Chlorosulfonic acid	7790945			1,000
4-Chloro-o-toluidine, hydrochloride	3165933		U049	100
Chlorpyrifos	2921882			1
Chloroxuron	1982474	500/10,000		1
Chlorthiophos	21923239	500		1
Chromic acetate	1066304			1,000
Chromic acid	11115745 7738945			10
Chromic acid H_2CrO_4, calcium salt	13765190		U032	10
Chromic chloride (Chromium chloride)	10025737	1/10,000		1
Chromic sulfate	10101538			1,000
Chromium++	7440473			5,000
Chromous chloride	10049055			1,000
Chrysene	218019		U050	100
Cobalt, ((2,2'-(1 ,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-,	62207765	100/10,000		1
Cobaltous bromide	7789437			1,000
Cobalt carbonyl	10210681	10/10,000		1
Cobaltous formate	544183			1,000
Cobaltous sulfamate	14017415			1,000
Coke Oven Emissions	NA			1
Colchicine	64868	10/10,000		1
Copper++	7440508			5,000
Copper cyanide	544923		P029	10
Coumaphos	56724	100/10,000		10
Coumatetralyl	5836293	500/10,000		1
Creosote	8001589		U051	1
Cresol(s) (Phenol, Methyl)	1319773		U052	100
m-Cresol	108394	1,000/10,000		100
o-Cresol	95487			100
p-Cresol	106445			100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Cresylic acid	1319773		U052	100
m-Cresylic acid	108394			100
o-Cresylic acid	95487			100
p-Cresylic acid	106445			100
Crimidine	535897	100/10,000		1
Crotonaldehyde	123739 4170303	1,000 1,000	U053	100 100
Cumene (I)	98828		U055	5,000
Cupric acetate	142712			100
Cupric acetoarsenite	12002038			1
Cupric chloride	7447394			10
Cupric nitrate	3251238			100
Cupric oxalate	5893663			100
Cupric sulfate	7758987			10
Cupric sulfate, ammoniated	10380297			100
Cupric tartrate	815827			100
Cyanides (soluble salts and complexes) not otherwise specified	57125		P030	10
Cyanogen	460195		P031	100
Cyanogen bromide	506683	500/10,000	U246	1,000
Cyanogen chloride	506774		P033	10
Cyanogen iodide (Iodine cyanide)	506785	1,000/10,000		1
Cyanophos	2636262	1,000		1
Cyanuric fluoride	675149	100		1
2,5-Cyclohexadiene-1 ,4-dione	106514		U197	10
Cyclohexane (I)	110827		U056	1,000
Cyclohexane, 1 ,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)-	58899		U129	1
Cyclohexanone (I)	108941		U057	5,000
2-Cyclohexanone	131895		P034	100
Cycloheximide	66819	100/10,000		1
Cyclohexylamine	108918	10,000		1
1 ,3-Cyclopentadiene, 1 ,2,3,4,5,5-hexachloro-	77474		U1 30	10
Cyclophosphamide	50180		U058	10
2,4-D Acid	94757		U240	100
2,4-D Ester	94111 94791 94804 1320189 1928387 1928616 1929733 2971382 25168267 53467111			100
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757		U240	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Daunomycin	20830813		U059	10
Decarborane(14)	17702419	500/10,000		1
Demeton	8065483	500		1
Demeton-S-Methyl	919868	500		1
DDD, 4,4'DDD	72548		U060	1
DDE, 4,4'DDE	72559			1
DDT, 4,4'DDT	50293		U061	1
DEHP (Diethylhexyl phthalate)	117817		U028	100
Diallate	2303164		U062	100
Dialifor	10311849	100/10,000		1
Diazinon	333415			1
Diazomethane	334883			100
Dibenz[a,h]anthracene	53703		U063	1
1 ,2:5,6-Dibenzanthracene	53703		U063	1
Dibenzo[a,h]anthracene	53703		U063	1
Dibenzofuran	132649			100
Dibenz[a,i]pyrene	189559		U064	10
1 ,2-Dibromo-3-chloropropane	96128		U066	1
Dibromoethane	106934		U067	1
Diborane	19287457	100		1
Dibutyl phthalate	84742		U069	10
Di-n-butyl phthalate	84742		U069	10
Dicamba	1918009			1,000
Dichlobenil	1194656			100
Dichlone	117806			1
Dichlorobenzene	25321226			100
m-Dichlorobenzene (1,3)	541731		U071	100
o-Dichlorobenzene (1,2)	95501		U070	100
p-Dichlorobenzene (1,4)	106467		U072	100
3,3'-Dichlorobenzidine	91941		U073	1
Dichlorobromomethane	75274			5,000
1 ,4-Dichloro-2-butene (I,T)	764410		U074	1
Dichlorodifluoromethane	75718		U075	5,000
1,1 -Dichloroethane	75343		U076	1,000
1 ,2-Dichloroethane	107062		U077	100
1,1 -Dichloroethylene	75354		U078	100
1 ,2-Dichloroethylene	156605		U079	1,000
Dichloroethyl ether	11444	10,000	U025	10
Dichloroisopropyl ether	108601		U027	1,000
Dichloromethoxy ethane	111911		U024	1,000
Dichloromethyl ether	542881		P016	10
Dichloromethylphenylsilane	149746	1,000		1
2,4-Dichlorophenol	120832		U081	100
2,6-Dichlorophenol	87650		U082	100
Dichlorophenylarsine	696286		P036	1
Dichloropropane	26638197			1,000
1,1 -Dichloropropane	78999			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
1,3-Dichloropropane	142289			
1,2-Dichloropropane	78875		U083	1,000
Dichloropropane--Dichloropropene (mixture)	8003198			100
Dichloropropene	26952238			100
2,3-Dichloropropene	78886			
1,3-Dichloropropene	542756		U084	100
2,2-Dichloropropionic acid	75990			5,000
Dichlorvos	62737	1,000		10
Dicofol	115322			10
Dicrotophos	141662	100		1
Dieldrin	60571		P037	1
1,2:3,4-Diepoxybutane (I,T)	1464535	500	U085	10
Diethanolamine	111422			100
Diethyl chlorophosphate	814493	500		1
Diethylamine	109897			1,000
Diethylarsine	692422		P038	1
Diethylcarbmazine citrate	1642542	100/10,000		1
1,4-Diethylenedioxide	123911		U1 08	100
Diethylhexyl phthalate	117817		U028	100
N,N-Diethylaniline	91667			1,000
N,N'-Diethylhydrazine	1615801		U086	10
O,O-Diethyl S-methyl dithiophosphate	3288582		U087	5,000
Diethyl-p-nitrophenyl phosphate	311455		P041	100
Diethyl phthalate	84662		U088	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972		P040	100
Diethylstilbestrol	56531		U089	1
Diethyl sulfate	64675			10
Digitoxin	71636	100/10,000		1
Diglycidyl ether	2238075	1,000		1
Digoxin	20830755	10/10,000		1
Dihydrosafrole	94586		U090	10
Diisopropyfluorophosphate	55914		P043	100
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a-beta)-	309002		P004	1
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)-	465736		P060	1
2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)-	60571		P037	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3 ,4,5,6,9,9-hexachloro- 1 a,2,2a,3 ,6,6a,7,7a-octa-hydro-, (1a-alpha, 2-beta, 2a-beta, 3-alpha, 6-alpha, 6a-beta, 7-beta, 7a-alpha)-	72208		P051	1
Dimethoate	60515		P044	10
3,3'-Dimethoxybenzidine	119904		U091	10
Dimefox	115264	500		1
Dimethoate	60515	500/10,000		10
Dimethyl Phosphorochloridothioate	2524030	500		1
Dimethyl sulfate	77781	500		100
Dimethylamine (l)	124403		U092	1,000
p-Dimethylaminoazobenzene	60117		U093	10
7, 12-Dimethylbenz[a]anthracene	57976		U094	1
3,3'-Dimethylbenzidine	119937		U095	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159		U096	10
Dimethylcarbamoyl chloride	79447		U097	1
Dimethylformamide	68122			100
Dimethyldichlorosilane	75785	500		1
1,1 -Dimethylhydrazine	57147	1,000	U098	10
1 ,2-Dimethylhydrazine	540738		U099	1
alpha, alpha-Dimethylphenethylamine	122098		P046	5,000
Dimethyl-p-phenylenediamine	99989	10/10,000		1
2,4-Dimethylphenol	105679		U101	100
Dimethyl phthalate	131113		U102	5,000
Dimethyl sulfate	77781		U103	100
Dimetilan	644644	500/10,000		1
Dinitrobenzene (mixed)	25154545			100
m-Dinitrobenzene	99650			
o-Dinitrobenzene	528290			
p-Dinitrobenzene	100254			
4,6-Dinitro-o-cresol and salts	534521	10/10,000	P047	10
Dinitrophenol	25550587			10
2,5-Dinitrophenol	329715			
2,6-Dinitrophenol	573568			
2,4-Dinitrophenol	51285		P048	10
Dinitrotoluene	25321146			10
3,4-Dinitrotoluene	610399			
2,4-Dinitrotoluene	121142		U105	10
2,6-Dinitrotoluene	606202		U106	100
Dinoseb	88857	100/10,000	P020	1,000
Dinoterb	1420071	500/10,000		1
Di-n-octyl phthalate	117840		U107	5,000
1,4-Dioxane	123911		U108	100
Dioxathion	78342	500		1
Diphacinone	82666	10/10,000		1
1 ,2-Diphenylhydrazine	122667		U109	10
Diphosphoramide, octamethyl-	152169	100	P085	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Diphosphoric acid, tetraethyl ester	107493		P111	10
Dipropylamine	142847		U110	5,000
Di-n-propylnitrosamine	621647		U1 11	10
Diquat	85007 2764729			1,000
Disulfoton	298044	500	P039	1
Dithiazanine iodide	514738	500/10,000		1
Dithiobiuret	541537	100/10,000	P049	100
Diuron	330541			100
Dodecylbenzenesulfonic acid	27176870			1,000
Emetine, Dihydrochloride	316427	1/10,000		1
Endosulfan	115297	10/10,000	P050	1
alpha-Endosulfan	959988			1
beta-Endosulfan	33213659			1
Endosulfant sulfate	1031078			1
Endothall	145733		P088	1,000
Endothion	2778043	500/10,000		1
Endrin	72208	500/10,000	P051	1
Endrin aldehyde	7421934			1
Endrin & metabolites	72208		P051	1
Epichlorohydrin	106898	1,000	U041	100
Epinephrine	51434		P042	1,000
EPN	2104645	100/10,000		1
1,2-Epoxybutane	106887			100
Ergocalciferol	50146	1,000/10,000		1
Ergotamine tartrate	379793	500/10,000		1
Ethanal	75070		U001	1,000
Ethanamine, N-ethyl-N-nitroso-	55185		U174	1
1 ,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805		U1 55	5,000
Ethane, 1 ,2-dibromo-	106934		U067	1
Ethane, 1,1 -dichloro-	75343		U076	1,000
Ethane, 1 ,2-dichloro-	107062		U077	100
Ethanedinitrile	460195		P031	100
Ethane, hexachloro-	67721		U131	100
Ethane, 1,1 '-[methylenebis(oxy)]bis(2-chloro-	111911		U024	1,000
Ethane, 1,1'-oxybis-	60297		U117	100
Ethane, 1,1 '-oxybis(2-chloro-	111444		U025	10
Ethane, pentachloro-	76017		U1 84	10
Ethanesulfonyl chloride, 2-chloro	1622328	500		1
Ethane, 1,1,1 ,2-tetrachloro-	630206		U208	100
Ethane, 1,1 ,2,2-tetrachloro-	79345		U209	100
Ethanethioamide	62555		U218	10
Ethane, 1,1,1-trichloro-	71556		U226	1,000
Ethane, 1,1 ,2-trichloro-	79005		U227	100
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752775		P066	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Ethanol, 1 ,2-Dichloro-, acetate	10140871	1,000		1
Ethanol, 2-ethoxy-	110805		U359	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547		U173	1
Ethanone, 1-phenyl-	98862		U004	5,000
Ethene, chloro-	75014		U043	1
Ethene, 2-chloroethoxy-	110758		U042	1,000
Ethene, 1,1 -dichloro-	75354		U078	100
Ethene, 1 ,2-dichloro- (E)	156605		U079	1,000
Ethene, tetrachloro-	127184		U210	100
Ethene, trichloro-	79016		U228	100
Ethion	563122	1,000		10
Ethoprophos	13194484	1,000		1
Ethyl acetate (I)	141786		U1 12	5,000
Ethyl acrylate (I)	140885		U113	1,000
Ethylbenzene	100414			1,000
Ethylbis(2-Chloroethyl)amine	538078	500		1
Ethyl carbamate (urethane)	51796		U238	100
Ethyl chloride	75003			100
Ethyl cyanide	107120		P101	10
Ethylenebisdithiocarbamic acid, salts & esters	111546		U1 14	5,000
Ethylenediamine	107153			5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004			5,000
Ethylene dibromide	106934		U067	1
Ethylene dichloride	107062		U077	100
Ethylene fluorohydrin	371620	10		1
Ethylene glycol	107211			5,000
Ethylene glycol monoethyl ether	110805		U359	1,000
Ethylene oxide (1,T)	75218	1,000	U115	10
Ethylenediamine	107153	10,000		5,000
Ethylenethiourea	96457		U1 16	10
Ethyleneimine	151564	500	P054	1
Ethyl ether (I)	60297		U1 17	100
Ethylthiocyanate	542905	10,000		1
Ethylidene dichloride	75343		U076	1,000
Ethyl methacrylate	97632		U1 18	1,000
Ethyl methanesulfonate	62500		U1 19	1
Famphur	52857		P097	1,000
Fenamlphos	22224926	10/1 0,000		1
Fenltrothion	122145	500		1
Fensulfothion	115902	500		1
Ferric ammonium citrate	1185575			1,000
Ferric ammonium oxalate	2944674 55488874			1,000
Ferric chloride	7705080			1,000
Ferric fluoride	7783508			100
Ferric nitrate	10421484			1,000
Ferric sulfate	10028225			1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Ferrous ammonium sulfate	10045893			1,000
Ferrous chloride	7758943			100
Ferrous sulfate	7720787 7782630			1,000
Fluenetil	4301502	100/10,000		1
Fluoranthene	206440		U120	100
Fluorene	86737			5,000
Fluorine	7782414	500	P056	10
Fluoroacetamide	640197	100/10,000	P057	100
Fluoracetic acid	144490	10/10,000		1
Fluoroacetic acid, sodium salt	62786		P058	10
Fluoroacetyl chloride	359068	10		1
Fluorouracil	51218	500/10,000		1
Fonofos	944229	500		1
Formaldehyde	50000	500	U122	100
Formaldehyde cyanohydrin	107164	1,000		1
Formetanate hydrochloride	23422539	500/10,000		1
Formothion	2540821	100		1
Formparanate	17702577	100/10,000		1
Formic acid (C,T)	64186		U123	5,000
Fosthletan	21548323	500		1
Fubendazole	3878191	100/10,000		1
Fulminic acid, mercury(2') salt (R,T)	628864		P065	10
Fumaric acid	110178			5,000
Furan (I)	110009	500	U124	100
Furan, tetrahydro- (I)	109999		U213	1,000
2-Furancarboxaldehyde (I)	98011		U125	5,000
2,5-Furandione	108316		U147	5,000
Furfural (I)	98011		U125	5,000
Furfuran (I)	110009		U124	100
Gallium trichloride	13450903	500/10,000		1
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664		U206	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664		U206	1
Glycidylaldehyde	765344		U126	10
Glycol ethers[4]				**
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257		U1 63	10
Guthion	86500			1
Heptachlor	76448		P059	1
Heptachlor epoxide	1024573			1
Hexachlorobenzene	118741		U127	10
Hexachlorobutadiene	87683		U128	1
Hexachlorocyclohexane (gamma isomer)	58899		U129	1
Hexachlorocyclopentadiene	77474	100	U130	10
Hexachloroethane	67721		U131	100
Hexachlorophene	70304		U132	100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Hexachloropropene	1888717		U243	1,000
Hexaethyl tetraphosphate	757584		P062	100
Hexamethylene-1, 6-diisocyanate	822060			100
Hexamethylphosphoramide	680319			1
Hexamethylenediamine, N,N'-Dibutyl	4835114	500		1
Hexane	110543			5,000
Hexone (Methyl isobutyl ketone)	108101		U161	5,000
Hydrazine (R,T)	302012	1,000	U133	1
Hydrazine, 1,2-diethyl-	1615801		U086	10
Hydrazine, 1, 1-dimethyl-	57147		U098	10
Hydrazine, 1 ,2-dimethyl-	540738		U099	1
Hydrazine, 1 ,2-diphenyl-	122667		U1 09	10
Hydrazine, methyl-	60344		P068	10
Hydrazinecarbothioamide	79196		P116	100
Hydrochloric acid	7647010			5,000
Hydrocyanic acid	74908	100	P063	10
Hydrofluoric acid	7664393		U134	100
Hydrogen chloride (gas only)	7647010	500		5,000
Hydrogen cyanide	74908		P063	10
Hydrogen fluoride	7664393	100	U134	100
Hydrogen peroxide (Conc. >52%)	7722841	1,000		1
Hydrogen phosphide	7803512		P096	100
Hydrogen selenide	7783075	10		1
Hydrogen sulfide	7783064	500	U135	100
Hydroperoxide, 1-methyl-1 -phenylethyl-	80159		U096	10
Hydroquinone	123319	500/1 0,000		100
2-Imidazolidinethione	96457		U1 16	10
Indeno(1 ,2,3-cd)pyrene	193395		U1 37	100
Iodomethane	74884		U138	100
Iron, Pentacarbonyl-	13463406	100		1
Isobenzan	297789	100/10,000		1
1 ,3-Isobenzofurandione	85449		U1 90	5,000
Isobutyronitrile	78820	1,000		1
Isobutyl alcohol (1,T)	78831		U140	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	500/10,000		1
Isodrin	465736	100/1 0,000	P060	1
Isofluorphate	55914	100		100
Isophorone	78591			5,000
Isophorone Diisocyanate	4098719	500		1
Isoprene	78795			100
Isopropanolamine dodecylbenzene sulfonate	42504461			1,000
Isopropyl chloroformate	108236	1,000		1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	500		1
Isosafrole	120581		U141	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964		P007	1,000
Kepone	143500		U142	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Lactonitrile	78977	1,000		1
Lasiocarpine	303344		U143	10
Lead acetate	301042		U144	#
Lead arsenate	7784409 7645252 10102484			1
Lead, bis(acetato-O)tetrahydroxytri	1335326		U146	10
Lead chloride	7758954			10
Lead fluoborate	13814965			10
Lead fluoride	7783462			10
Lead iodide	10101630			10
Lead nitrate	10099748			10
Lead phosphate	7446277		U145	10
Lead stearate	7428480 1072351 52652592 56189094			10
Lead subacetate	1335326		U146	10
Lead sulfate	15739807 7446142			10
Lead sulfide	1314870			10
Lead thiocyanate	592870			10
Leptophos	21609905	500/10,000		1
Lewisite	541253	10		1
Lindane	58899	1,000/10,000	U129	1
Lithium chromate	14307358			10
Lithium hydride	7580678	100		1
Malathion	121755			100
Maleic acid	110167			5,000
Maleic anhydride	108316		U147	5,000
Maleic hydrazide	123331		U148	5,000
Malononitrile	109773	500/10,000	U149	1,000
Manganese, tricarbonyl methylcyclopentadienyl	12108133	100		1
MDI (Methylene diphenyl diisocyanate)	101688			5,000
Mechlorethamine	51752	10		1
MEK (Methyl ethyl ketone)	78933		U1 59	5,000
Melphalan	148823		U150	1
Mephosfolan	950107	500		1
Mercaptodimethur	2032657			10
Mercuric acetate	1600277	500/10,000		1
Mercuric chloride	7487947	500/10,000		1
Mercuric cyanide	592041			1
Mercuric nitrate	10045940			10
Mercuric oxide	21908532	500/10,000		1
Mercuric sulfate	7783359			10
Mercuric thiocyanate	592858			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Mercurous nitrate	10415755 7782867			10
Mercury	7439976		U151	1
Mercury (acetate-O)phenyl-	62384		P092	100
Mercury fulminate	628864		P065	10
Methacrolein diacetate	10476956	1,000		1
Methacrylic anhydride	760930	500		1
Methacrylonitrile (I,T)	126987	500	U1 52	1,000
Methacryloyl chloride	920467	100		1
Methacryloyloxyethyl isocyanate	30674807	100		1
Methamidophos	10265926	100/10,000		1
Methanamine, N-methyl-	124403		U092	1,000
Methanamine, N-methyl-N-nitroso-	62759		P082	10
Methane, bromo-	74839		U029	1,000
Methane, chloro- (I,T)	74873		U045	100
Methane, chloromethoxy-	107302		U046	10
Methane, dibromo-	74953		U068	1,000
Methane, dichloro-	75092		U080	1,000
Methane, dichlorodifluoro-	75718		U075	5,000
Methane, iodo-	74884		U138	100
Methane, isocyanato-	624839		P064	10
Methane, oxybis(chloro-	542881		P016	10
Methanesulfenyl chloride, trichloro-	594423		P118	100
Methanesulfonyl fluoride	558258	1,000		1
Methanesulfonic acid, ethyl ester	62500		U1 19	1
Methane, tetrachloro-	56235		U21 1	10
Methane, tetranitro- (R)	509148		P112	10
Methane, tribromo-	75252		U225	100
Methane, trichloro-	67663		U044	10
Methane, trichlorofluoro-	75694		U121	5,000
Methanethiol (I,T)	74931		U1 53	100
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1 ,5,5a,6,9,9a-hexahydro-, 3-oxide	115297		P050	1
1 ,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one, 1,1 a,3 ,3a,4,5,5a,5b,6-decachloroctahydro-	143500		U142	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro-	76448		P059	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro-	57749		U036	1
Methanol (I)	67561		U1 54	5,000
Methapyrilene	91805		U155	5,000
Methidathion	950378	500/10,000		1
Methiocarb	2032657	500/10,000	P199	10
Methomyl	16752775	500/10,000	P066	100
Methoxychlor	72435		U247	1
Methoxyethylmercuric acetate	151382	500/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Methyl alcohol (I)	67561		U1 54	5,000
Methyl aziridine	75558		P067	1
Methyl bromide	74839	1,000	U029	1,000
1 -Methylbutadiene (I)	504609		U1 86	100
Methyl chloride (I,T)	74873		U045	100
Methyl 2-chloroacrylate	80637	500		1
Methyl chlorocarbonate (I,T)	79221		U1 56	1,000
Methyl chloroform	71556		U226	1,000
Methyl chloroformate	79221	500	U1 56	1,000
3-Methylcholanthrene	56495		U1 57	10
4,4'-Methylenebis(2-chloroaniline)	101144		U1 58	10
Methylene bromide	74953		U068	1,000
Methylene chloride	75092		U080	1,000
4,4'-Methylenedianiline	101779			10
Methylene diphenyl diisocyanate (MDI)	101688			5,000
Methyl ethyl ketone (MEK) (I,T)	78933		U1 59	5,000
Methyl ethyl ketone peroxide (R,T)	1338234		U160	10
Methyl hydrazine	60344	500	P068	10
Methyl iodide	74884		U138	100
Methyl isobutyl ketone	108101		U161	5,000
Methyl isocyanate	624839	500	P064	10
Methyl isothiocyanate	556616	500		1
2-Methyllactonitrile	75865		P069	10
Methyl mercaptan	74931	500	U153	100
Methyl methacrylate (I,T)	80626		U1 62	1,000
Methyl parathion	298000		P071	100
Methyl phenkapton	3735237	500		1
Methyl phosphonic dichloride	676971	100		1
4-Methyl-2-pentanone (I)	108101		U161	5,000
Methyl tert-butyl ether	1634044			1,000
Methyl thiocyanate	556649	10,000		1
Methylthiouracil	56042		U164	10
Methyl vinyl ketone	78944	10		1
Methylmercuric dicyanamide	502396	500/10,000		1
Methyltrichlorosilane	75796	500		1
Metolcarb	1129415	100/10,000		1
Mevinphos	7786347	500		10
Mexacarbate	315184	500/10,000		1,000
Mitomycin C	50077	500/10,000	U010	10
MNNG	70257		U163	10
Monocrotophos	6923224	10/10,000		1
Monoethylamine	75047			100
Monomethylamine	74895			100
Muscimol	2763964	500/1 0,000	P007	1,000
Mustard gas	505602	500		1
Naled	300765			10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
5, 12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9, 10-tetrahydro-6,8,11 -trihydroxy-1 -methoxy-, (8S-cis)-	20830813		U059	10
1-Naphthalenamine	134327		U167	100
2-Naphthalenamine (beta-Naphthylamine)	91598		U168	1
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031		U026	100
Naphthalene	91203		U165	100
Naphthalene, 2-chloro-	91587		U047	5,000
1 ,4-Naphthalenedione	130154		U1 66	5,000
2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1 , 1 '-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-tetrasodium salt	72571		U236	10
Naphthenic acid	1338245			100
1 ,4-Naphthoquinone	130154		U166	5,000
alpha-Naphthylamine	134327		U167	100
beta-Naphthylamine (2-Naphthalenamine)	91598		U168	1
alpha-Naphthylthiourea	86884		P072	100
Nickel++	7440020			100
Nickel ammonium sulfate	15699180			100
Nickel carbonyl	13463393	1	P073	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393		P073	10
Nickel chloride	7718549 37211055			100
Nickel cyanide	557197		P074	10
Nickel hydroxide	12054487			10
Nickel nitrate	14216752			100
Nickel sulfate	7786814			100
Nicotine & salts	54115	100	P075	100
Nicotine sulfate	65305	100/10,000		1
Nitric acid	7697372	1,000		1,000
Nitric acid, thallium(1+) salt	10102451		U217	100
Nitric oxide	10102439	100	P076	10
p-Nitroaniline	100016		P077	5,000
Nitrobenzene (1,T)	98953	10,000	U169	1,000
4-Nitrobiphenyl	92933			10
Nitrocyclohexane	1122607	500		1
Nitrogen dioxide	10102440 10544726	100	P078	10
Nitrogen oxide	10102439		P076	10
Nitroglycerine	55630		P081	10
Nitrophenol (mixed)	25154556			100
m-Nitrophenol	554847			100
o-Nitrophenol (2)	88755			100
p-Nitrophenol (4)	100027		U170	100
2-Nitropropane (I,T)	79469		U171	10
N-Nitrosodi-n-butylamine	924163		U1 72	10

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
N-Nitrosodiethanolamine	1116547		U173	1
N-Nitrosodiethylamine	55185		U174	1
N-Nitrosodimethylamine	62759	1,000	P082	10
N-Nitrosodiphenylamine	86306			100
N-Nitroso-N-ethylurea	759739		U176	1
N-Nitroso-N-methylurea	684935		U177	1
N-Nitroso-N-methylurethane	615532		U178	1
N-Nitrosomethylvinylamine	4549400		P084	10
N-Nitrosomorpholine	59892			1
N-Nitrosopiperidine	100754		U179	10
N-Nitrosopyrrolidine	930552		U180	1
Nitrotoluene	1321126			1,000
m-Nitrotoluene	99081			
o-Nitrotoluene	88722			
p-Nitrotoluene	99990			
5-Nitro-o-toluidine	99558		U181	100
Norbromide	991424	100/10,000		1
Octamethylpyrophosphoramide	152169		P085	100
Organorhodium complex (PMN-82-147)	0	10/10,000		1
Osmium tetroxide	20816120		P087	1,000
Ouabain	630604	100/10,000		1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733		P088	1,000
Oxamyl	23135220	100/10,000	P194	1
1 ,2-Oxathiolane, 2,2-dioxide	1120714		U193	10
2H-1 ,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180		U058	10
Oxetane, 3,3-bis(chloromethyl)-	78717	500		1
Oxirane (1,T)	75218		U115	10
Oxiranecarboxyaldehyde	765344		U126	10
Oxirane, (chloromethyl)-	106898		U041	100
Oxydisulfoton	2497076	500		1
Ozone	10028156	100		1
Paraformaldehyde	30525894			1,000
Paraldehyde	123637		U182	1,000
Paraquat	1910425	10/10,000		1
Paraquat methosulfate	2074502	10/10,000		1
Parathion	56382	100	P089	10
Parathion-methyl	298000	100/10,000		100
Paris green	12002038	500/10,000		100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
PCBs	1336363			
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
PCNB (Pentachloronitrobenzene)	82688		U1 85	100
Pentaborane	19624227	500		1
Pentachlorobenzene	608935		U1 83	10
Pentachloroethane	76017		U1 84	10
Pentachlorophenol	87865		U242	10
Pentachloronitrobenzene (PCNB)	82688		U1 85	100
Pentadecylamine	2570265	100/10,000		1
Paracetic acid	79210	500		1
1 ,3-Pentadiene (1)	504609		U1 86	100
Perachloroethylene	127184		U210	100
Perchloromethylmercaptan	594423	500		100
Phenacetin	62442		U187	100
Phenanthrene	85018			5,000
Phenol	108952	500/10,000	U188	1,000
Phenol, 2-chloro-	95578		U048	100
Phenol, 4-chloro-3-methyl-	59507		U039	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895		P034	100
Phenol, 2,4-dichloro-	120832		U081	100
Phenol, 2,6-dichloro-	87650		U082	100
Phenol, 4,4'-(1 ,2-diethyl-1 ,2-ethenediyl)bis-, (E)	56531		U089	1
Phenol, 2,4-dimethyl-	105679		U101	100
Phenol, 2,4-dinitro-	51285		P048	10
Phenol, methyl-	1319773		U052	1,000
m-Cresol	108394			
o-Cresol	95487			
p-Cresol	106445			
Phenol, 2-methyl-4,6-dinitro-and salts	534521		P047	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304		U132	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	100/10,000		1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857		P020	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	500/10,000		1
Phenol, 4-nitro-	100027		U170	100
Phenol, pentachloro-	87865		U242	10
Phenol, 2,3,4,6-tetrachloro-	58902		U212	10
Phenol, 2,4,5-trichloro-	95954		U230	10
Phenol, 2,4,6-trichloro-	88062		U23 1	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748		P009	10
Phenoxarsine, 10,1 0'-oxydi-	58366	500/1 0,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823		U150	1
Phenyl dichloroarsine	696286	500		1
1,1 0-(1 ,2-Phenylene)pyrene	193395		U1 37	100
p-Phenylenediamine	106503			5,000
Phenylhydrazine hydrochloride	59881	1,000/10,000		1
Phenylmercury acetate	62384	500/10,000	P092	100
Phenylsilatrane	2097190	100/10,000		1
Phenylthiourea	103855	100/10,000	P093	100
Phorate	298022	10	P094	10
Phosacetim	4104147	100/10,000		1
Phosfolan	947024	100/10,000		1
Phosgene	75445	10	P095	10
Phosmet	732116	10/10,000		1
Phosphamidon	13171216	100		1
Phosphine	7803512	500		100
Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester	2587908	500		1
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	500		1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	100		1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	500		1
Phosphoric acid	7664382			5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455		P041	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	500		1
Phosphoric acid, lead(2+) salt (2:3)	7446277	500	U145	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044		P039	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022		P094	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582		U087	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515		P044	10
Phosphorofluondic acid, bis(1-methylethyl) ester	55914		P043	100
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382		P089	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857		P097	1,000
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000		P071	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972		P040	100
Phosphorus	7723140	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Phosphorus oxychloride	10025873	500		1,000
Phosphorous pentachloride	10026138	500		1
Phosphorus pentasulfide (R)	1314803		U189	100
Phosphorus pentoxide	1314563	10		1
Phosphorus trichloride	7719122	1,000		1,000
Phthalic anhydride	85449		U190	5,000
Physostigmine	57476	100/10,000	P204	1
Phosostigmine, salicylate (1:1)	57647	100/10,000		1
2-Picoline	109068		U191	5,000
Picotoxin	124878	500/10,000		1
Piperidine	110894	1,000		1
Piperidine, 1-nitroso-	100754		U179	10
Pirimifos-ethyl	23505411	1,000		1
Plumbane, tetraethyl-	78002		P110	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363			1
Potassium arsenate	7784410			1
Potassium arsenite	10124502	500/10,000		1
Potassium bichromate	7778509			10
Potassium chromate	7789006			10
Potassium cyanide	151508	100	P098	10
Potassium hydroxide	1310583			1,000
Potassium permanganate	7722647			100
Potassium silver cyanide	506616	500	P099	1
Promecarb	2631370	500/10,000		1
Pronamide	23950585		U192	5,000
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063		P070	1
1-Propanamine (I,T)	107108		U194	5,000
1-Propanamine, N-propyl-	142847		U1 10	5,000
1-Propanamine, N-nitroso-N-propyl-	621647		U1 11	10
Propane, 1 ,2-dibromo-3-chloro	96128		U066	1
Propane, 2-nitro- (I,T)	79469		U171	10
1,3-Propane sultone	1120714		U193	10
Propane 1 ,2-dichloro-	78875		U083	1,000
Propanedinitrile	109773		U149	1,000
Propanenitrile	107120		P101	10
Propanenitrile, 3-chloro-	542767		P027	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865		P069	10
Propane, 2,2'-oxybis[2-chloro-	108601		U027	1,000
1 ,2,3-Propanetnol, trinitrate- (R)	55630		P081	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		U235	10
1-Propanol, 2-methyl- (I,T)	78831		U140	5,000
2-Propanone (I)	67641		U002	5,000
2-Propanone, 1 -bromo-	598312		P017	1,000
Propargite	2312358			10
Propargyl alcohol	107197		P102	1,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Propargyl bromide	106967	10		1
2-Propenal	107028		P003	1
2-Propenamide	79061		U007	5,000
1-Propene, 1,1 ,2,3,3,3-hexachloro-	1888717		U243	1,000
1-Propene, 1 ,3-dichloro-	542756		U084	100
2-Propenenitrile	107131		U009	100
2-Propenenitrile, 2-methyl- (I,T)	126987		U1 52	1,000
2-Propenoic acid (I)	79107		U008	5,000
2-Prepenoic acid, ethyl ester (I)	140885		U1 13	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632		U1 18	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626		U1 62	1,000
2-Propen-1-o1	107186		P005	100
Propiolactone, beta-	57578	500		1
Propionaldehyde	123386			1,000
Propionic acid	79094			5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721		U233	100
Propionic anhydride	123626			5,000
Propoxor (Baygon)	114261		U411	100
Propionitrile	107120	500		10
Propionitrile, 3-chloro-	542767	1,000		1,000
Propiophenone, 1, 4-amino phenyl	70699	100/10,000		1
n-Propylamine	107108		U194	5,000
Propyl chloroformate	109615	500		1
Propylene dichloride	78875		U083	1,000
Propylene oxide	75569	10,000		100
1,2-Propylenimine	75558	10,000	P067	1
2-Propyn-1-o1	107197		P102	1,000
Prothoate	2275185	100/1 0,000		1
Pyrene	129000	1,000/1 0,000		5,000
Pyrethrins	121299 121211 8003347			1
3,6-Pyridazinedione, 1 ,2-dihydro-	123331		U148	5,000
4-Pyridinamine	504245		P008	1,000
Pyridine	110861		U196	1,000
Pyridine, 2-methyl-	109068		U191	5,000
Pyridine, 2-methyl-5-vinyl-	140761	500		1
Pyridine, 4-amino-	504245	500/10,000		1,000
Pyridine, 4-nitro-, 1-oxide	1124330	500/10,000		1
Pyridine, 3-(1 -methyl-2-pyrrolidinyl)-, (S)	54115		P075	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751		U237	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042		U164	10
Pyriminil	53558251	100/10,000		1
Pyrrolidine, 1 -nitroso-	930552		U1 80	1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Quinoline	91225			5,000
Quinone (p-Benzoquinone)	106514		U197	10
Quintobenzene	82688		U185	100
Reserpine	50555		U200	5,000
Resorcinol	108463		U201	5,000
Saccharin and salts	81072		U202	100
Salcomine	14167181	500/10,000		1
Sarin	107448	10		1
Safrole	94597		U203	100
Selenious acid	7783008	1,000/10,000	U204	10
Selenious acid, dithallium (1+) salt	12039520		P114	1,000
Selenium ++	7782492			100
Selenium dioxide	7446084		U204	10
Selenium oxychloride	7791233	500		1
Selenium sulfide (R,T)	7488564		U205	10
Selenourea	630104		P103	1,000
Semicarbazide hydrochloride	563417	1,000/10,000		1
L-Serine, diazoacetate (ester)	115026		U01 5	1
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1,000		1
Silver ++	7440224			1,000
Silver cyanide	506649		P104	1
Silver nitrate	7761888			1
Silvex (2,4,5-TP)	93721		U233	100
Sodium	7440235			10
Sodium arsenate	7631892	1,000/10,000		1
Sodium arsenite	7784465	500/10,000		1
Sodium azide	26628228	500	P105	1,000
Sodium bichromate	10588019			10
Sodium bifluoride	1333831			100
Sodium bisulfite	7631905			5,000
Sodium cacodylate	124652	100/10,000		1
Sodium chromate	7775113			10
Sodium cyanide	143339	100	P106	10
Sodium dodecylbenzenesulfonate	25155300			1,000
Sodium fluoride	7681494			1,000
Sodium fluoroacetate	62748	10/10,000		10
Sodium hydrosulfide	16721805			5,000
Sodium hydroxide	1310732			1,000
Sodium hypochlorite	7681529 10022705			100
Sodium methylate	124414			1,000
Sodium nitrite	7632000			100
Sodium prentachlorophenate	131522	100/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Sodium phosphate, dibasic	7558794 10039324 10140655			5,000
Sodium phosphate, tribasic	7601549 7758294 7785844 10101890 10124568 10361894			5,000
Sodium selenate	13410010	100/10,000		1
Sodium selenite	10102188 7782823	100/10,000		100
Sodium tellurite	10102202	500/10,000		1
Stannane, acetoxytriphenyl	900958	500/10,000		1
Streptozotocin	18883664		U206	1
Strontium chromate	7789062			10
Strychnidin-10-one	57249		P108	10
Strychnidin-1 0-one, 2,3-dimethoxy-	357573		P018	100
Strychnine, & salts	572494	100/10,000	P108	10
Strychnine sulfate	60413	100/10,000		1
Styrene	100425			1,000
Styrene oxide	96093			100
Sulfotep	3689245	500		100
Sulfoxide, 3-chloropropyl octyl	3569571	500		1
Sulfur monochloride	12771083			1,000
Sulfur dioxide	7446095	500		1
Sulfur phosphide (R)	1314803		U189	100
Sulfur tetrafluoride	7783600	100		1
Sulfur trioxide	7446119	100		1
Sulfuric acid	7664939 8014957	1,000		1,000
Sulfuric acid, dithallium (1+) salt	7446186 10031591		P115	100
Sulfuric acid, dimethyl ester	77781		U103	100
Tabun	77816	10		1
2,4,5-T acid	93765		U232	1,000
2,4,5-T amines	2008460 1319728 3813147 6369966 6369977			5,000
Tellurium	13494809	500/10,000		1
Tellurium hexafluoride	7783804	100		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
2,4,5-T esters	93798 1928478 2545597 25168154 61792072			1,000
2,4,5-T salts	13560991			1,000
2,4,5-T	93765		U232	1,000
TDE (Dichloro diphenyl dichloroethane)	72548		U060	1
TEPP (Tetraethyl ester diphosphoric acid)	107493	100		10
Terbufos	13071799	100		1
I ,2,4,5-Tetrachlorobenzene	95943		U207	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016			1
1,1,1 ,2-Tetrachloroethane	630206		U208	100
1,1 ,2,2-Tetrachloroethane	79345		U209	100
Tetrachloroethene	127184		U21 0	100
Tetrachloroethylene	127184		U21 0	100
2,3,4,6-Tetrachlorophenol	58902		U212	10
Tetraethyl lead	78002	100	P110	10
Tetraethyl pyrophosphate	107493		P111	10
Tetraethyldithiopyrophosphate	3689245		P109	100
Tetraethyltin	597648	100		1
Tetramethyllead	75741	100		1
Tetrahydrofuran (I)	109999		U21 3	1,000
Tetranitromethane (R)	509148	500	P112	10
Tetraphosphoric acid, hexaethyl ester	757584		P062	100
Thallic oxide	1314325		P113	100
Thallium ++	7440280			1,000
Thallium acetate	563688		U214	100
Thallium carbonate	6533739		U21 5	100
Thallium chloride	7791120		U216	100
Thallium nitrate	10102451		U217	100
Thallium oxide	1314325		P113	100
Thallium selenite	12039520		P114	1,000
Thallium sulfate	7446186 10031591	100/10,000	P115	100
Thallous carbonate (Thallium (I) carbonate)	6533739	100/10,000	U215	100
Thallous chloride (Thallium (I) chloride)	7791120	100/10,000	U216	100
Thallous malonate (Thallium (I) malonate)	2757188	100/10,000		1
Thallous sulfate (Thallium (I) sulfate)	7446186	100/10,000	P115	100
Thioacetamide	62555		U218	10
Thiocarbazide	2231574	1,000/10,000		1
Thiodiphosphoric acid, tetraethyl ester	3689245		P109	100
Thiofanox	39196184	100/10,000	P045	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537		P049	100
Thiomethanol (I,T)	74931		U1 53	100
Thionazin	297972	500		100

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl-	137268		U244	10
Thiophenol	108985	500	P104	100
Thiosemicarbazide	79196	100/10,000	P116	100
Thiourea	62566		U219	10
Thiourea, (2-chlorophenyl)-	5344821	100/10,000	P026	100
Thiourea, (2-methylphenyl)-	614788	500/10,000		1
Thiourea, 1 -naphthalenyl-	86884		P072	100
Thiourea, phenyl-	103855		P093	100
Thiram	137268		U244	10
Titanium tetrachloride	7550450	100		1,000
Toluene	108883		U220	1,000
Toluenediamine	95807 496720 823405 25376458		U221	10
Toluene diisocyanate (R,T)	584849 91087 26471625	500 100	U223	100 100
o-Toluidine	95534		U328	100
p-Toluidine	106490		U353	100
o-Toluidine hydrochloride	636215		U222	100
Toxaphene	8001352		P123	1
2,4,5-TP acid	93721		U233	100
2,4,5-TP acid esters	32534955			100
1H-1 ,2,4-Triazol-3 -amine	61825		U01 1	10
Trans-1 ,4-dichlorobutene	110576	500		1
Triamiphos	1031476	500/10,000		1
Triazofos	24017478	500		1
Trichloroacetyl chloride	76028	500		1
Trichlorfon	52686			100
1,2,4-Trichlorobenzene	120821			100
1,1,1-Trichloroethane	71556		U226	1,000
1,1 ,2-Trichloroethane	79005		U227	100
Trichloroethene	79016		U228	100
Trichloroethylene	79016		U228	100
Trichloroethylsilane	115219	500		1
Trichloronate	327980	500		1
Trichloromethanesulfenyl chloride	594423		P118	100
Trichloromonofluoromethane	75694		U121	5,000
Trichlorophenol	21567822			10
2,3,4-Trichlorophenol	15950660			
2,3,5-Trichlorophenol	933788			
2,3,6-Trichlorophenol	933755			
2,4,5-Trichlorophenol	95954		U230	10
2,4,6-Trichlorophenol	88062		U231	10
3 ,4,5-Trichlorophenol	609198			

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**	**USEPA HW No.** [2]	**RQ (Pounds)**[3]
Trichlorophenylsilane	98135	500		1
Trichloro(chloromethyl)silane	1558254	100		1
Trichloro(dichlorophenyl)silane	27137855	500		1
Triethanolamine dodecylbenzene-sulfonate	27323417			1,000
Triethoxysilane	998301	500		1
Trifluralin	1582098			10
Triethylamine	121448			5,000
Trimethylamine	75503			100
Trimethylchlorsilane	75774	1,000		1
2,2,4-Trimethylpentane	540841			1,000
Trimethylolpropane phosphite	824113	100/10,000		1
Trimethyiltin chloride	1066451	500/10,000		1
1 ,3,5-Trinitrobenzene (R,T)	99354		U234	10
1 ,3,5-Trioxane, 2,4,6-trimethyl-	123637		U1 82	1,000
Triphenyltin chloride	639587	500/10,000		1
Tris(2-chloroethyl)amine	555771	100		1
Tris(2,3-dibromopropyl) phosphate	126727		U235	10
Trypan blue	72571		U236	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA		D001	100
Unlisted Hazardous Wastes Characteristic of **Corrosivity**	NA		D002	100
Unlisted Hazardous Wastes Characteristic of **Reactivity**	NA		D003	100
Unlisted Hazardous Wastes Characteristic of **Toxicity**				

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
Arsenic			D004	1
Barium			D005	1,000
Benzene			D018	10
Cadmium			D006	10
Carbon Tetrachloride			D019	10
Chlordane			D020	1
Chlorobenzene			D021	100
Chloroform			D022	10
Chromium			D007	10
o-Cresol			D023	100
m-Cresol			D024	100
p-Cresol			D025	100
Cresol			D026	100
2,4-D (Dichlorophenoxyacetic acid)			D016	100
1 ,4-Dichlorobenzene			D027	100
1 ,2-Dichloroethane			D028	100
1,1 -Dichloroethylene			D029	100
2,4-Dinitrotoluene			D030	10
Endrin			D012	1
Heptachlor (and epoxide)			D03 1	1
Hexachlorobenzene			D032	10
Hexachlorobutadiene			D033	1
Hexachloroethane			D034	100
Lead			D008	10
Lindane			D013	1
Mercury			D009	1
Methoxychlor			D014	1
Methyl ethyl ketone			D035	5,000
Nitrobenzene			D036	1,000
Pentachlorophenol			D037	10
Pyridine			D038	1,000
Selenium			D010	10
Silver			D011	1
Tetrachloroethylene			D039	100
Toxaphene			D015	1
Trichloroethylene			D040	100
2,4,5 Trichlorophenol			D041	10
2,4,5-TP			D017	100
Vinyl chloride			D043	1
Uracil mustard	66751		U237	10
Uranyl acetate	541093			100
Uranyl nitrate	10102064 36478769			100
Urea, N-ethyl-N-nitroso	759739		U176	1
Urea, N-methyl-N-nitroso	684935		U177	1
Urethane (Carbamic acid ethyl ester)	51796		U238	100
Valinomycin	2001958	1,000/10,000		1

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**	**USEPA HW No.**[2]	**RQ (Pounds)**[3]
Vanadic acid, ammonium salt	7803556		P119	1,000
Vanadic oxide V_2O_5	1314621		P120	1,000
Vanadic pentoxide	1314621		P120	1,000
Vanadium pentoxide	1314621	100/10,000		1,000
Vanadyl sulfate	27774136			1,000
Vinyl chloride	75014		U043	1
Vinyl acetate	108054			5,000
Vinyl acetate monomer	108054	1,000		5,000
Vinylamine, N-methyl-N-nitroso-	4549400		P084	10
Vinyl bromide	593602			100
Vinylidene chloride	75354		U078	100
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	500/10,000	P001	100
Warfarin sodium	129066	100/10,000		100
Xylene (mixed)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
Xylenol	1300716			1,000
Xylylene dichloride	28347139	100/10,000		1
Yohimban-16-carboxylic acid, 11,17 dimethoxy-1 8-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,1 7-alpha, 1 8-beta,20-alpha)-	50555		U200	5,000
Zinc ++	7440666			1,000
Zinc acetate	557346			1,000
Zinc ammonium chloride	52628258 14639975 14639986			1,000
Zinc borate	1332076			1,000
Zinc bromide	7699458			1,000
Zinc carbonate	3486359			1,000
Zinc chloride	7646857			1,000
Zinc cyanide	557211		P121	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	100/10,000		1
Zinc fluoride	7783495			1,000
Zinc formate	557415			1,000
Zinc hydrosulfite	7779864			1,000
Zinc nitrate	7779886			1,000
Zinc phenosulfonate	127822			5,000
Zinc phosphide	1314847	500	P122	100
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847		P122	100
Zinc silicofluoride	16871719			5,000
Zinc sulfate	7733020			1,000
Zirconium nitrate	13746899			5,000

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)**	**USEPA HW No. [2]**	**RQ (Pounds)[3]**
Zirconium potassium fluoride	16923958			1,000
Zirconium sulfate	14644612			5,000
Zirconium tetrachloride	10026116			5,000
F001			**F001**	**10**
The following spent halogenated solvents used in degreasing: all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Trichloroethylene	79016		U228	100
(c) Methylene chloride	75092		U080	1,000
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Carbon tetrachloride	56235		U211	10
(f) Chlorinated fluorocarbons	NA			5,000
F002			**F002**	**10**
The following spent halogenated solvents: All spent solvent mixtures/blends containing, before use, a total of 10% or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Methylene chloride	75092		U080	1,000
(c) Trichloroethylene	79016		U228	100
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Chlorobenzene	108907		U037	100
(f) 1,1 ,2-Trichloro-1 ,2,2 trifluoroethane	76131			5,000
(g) o-Dischlorobenzene	95501		U070	100
(h) Trichlorofluoromethane	75694		U121	5,000
(i) 1,1 ,2-Trichloroethane	79005		U227	100
F003			**F003**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Xylene	1330207			1,000
(b) Acetone	67641			5,000
(c) Ethyl acetate	141786			5,000
(d) Ethylbenzene	100414			1,000
(e) Ethyl ether	60297			100
(f) Methyl isobutyl ketone	108101			5,000
(g) n-Butyl alcohol	71363			5,000
(h) Cyclohexanone	108941			5,000
(i) Methanol	67561			5,000
F004			**F004**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319773		U052	100
(b) Nitrobenzene	98953		U169	1,000
F005			**F005**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a)	Toluene		108883	U220
(b)	Methyl ethyl ketone		78933	U159
(c)	Carbon disulfide		75150	P022
(d)	Isobutanol		78831	U140
(e)	Pyndine		110861	U196

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
F006 Wastewater treatment sludges from electroplating operations, except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.			**F006**	**10**
F007 Spent cyanide plating bath solutions from electroplating operations.			**F007**	**10**
F008 Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.			**F008**	**10**
F009 Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.			**F009**	**10**
F010 Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.			**F010**	**10**
F011 Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.			**F011**	**10**
F012 Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.			**F012**	**10**
F019 Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process.			**F019**	**10**
F020 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)			**F020**	**1**
F021 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.			**F021**	**1**
F022 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.			**F022**	**1**
F023 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.)			**F023**	**1**
F024 Wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent desicants, wastewater treatment sludges, spent catalysts, and wastes listed in separately in Table AP1.T3 or wastes listed in Table AP1.T4 and having a USEPA HW No. beginning with "K.")			**F024**	**1**
F025 Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.			**F025**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
F026 Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions.			**F026**	**1**
F027 Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.)			**F027**	**1**
F028 Residues resulting from the incineration or thermal treatment of soil contaminated with USEPA HW#s F020, F021, F022, F023, F026, and F027.			**K028**	**1**
F032 Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator has cleaned or replaced all process equipment that may have come into contact with chlorophenolic formulations or constituents thereof, and does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**F032**	**1**
F034 Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**F034**	**1**
F035 Wastewater (except that which has not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**F035**	**1**
F037 Petroleum refinery primary oil/water/solids separation sludge: Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewater and oily cooling wastewater from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling water, sludges generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and K05 1 wastes are not included in this listing.			**F037**	**1**
F038 Petroleum refinery secondary (emulsified) oil/water/solids separation sludge: Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewater from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow; sludges generated from once-through non-contact cooling water segregated from treatment from other process or oil cooling wastes, ; sludges and floats generated in activated sludge, trickling filter, rotating biological contactor, or high-rate aeration biological treatment units (including sludges and floats generated in one or more additional units after wastewater has been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.			**F038**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K001 Bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.			**K001**	**1**
K002 Wastewater treatment sludge from the production of chrome yellow and orange pigments.			**K002**	**10**
K003 Wastewater treatment sludge from the production of molyodate orange pigments.			**K003**	**10**
K004 Wastewater treatment sludge from the production of zinc yellow pigments.			**K004**	**10**
K005 Wastewater treatment sludge from the production of chrome green pigments.			**K005**	**10**
K006 Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).			**K006**	**10**
K007 Wastewater treatment sludge from the production of iron blue pigments.			**K007**	**10**
K008 Oven residue from the production of chrome oxide green pigments.			**K008**	**10**
K009 Distillation bottoms from the production of acetaldehyde from ethylene.			**K009**	**10**
K010 Distillation side cuts from the production of acetaldehyde from ethylene.			**K010**	**10**
K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.			**K011**	**10**
K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.			**K013**	**10**
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile.			**K014**	**5,000**
K015 Still bottoms from the distillation of benzyl chloride.			**K015**	**10**
K016 Heavy ends or distillation residues from the production of carbon tetrachloride.			**K016**	**1**
K017 Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.			**K017**	**10**
K018 Heavy ends from the fractionation column in ethyl chloride production.			**K018**	**1**
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride			**K019**	**1**
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer			**K020**	**1**
K021 Aqueous spent antimony catalyst waste from fluoromethanes production.			**K021**	**10**
K022 Distillation bottom tars from the production of phenol/acetone from cumene.			**K022**	**1**
K023 Distillation light ends from the production of ophthalic anhydride from naphthalene.			**K023**	**5,000**
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene.			**K024**	**5,000**
K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene.			**K025**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K026 Stripping still tails from the production of methyl ethyl pyridines.			**K026**	**1,000**
K027 Centrifuge and distillation residues from toluene diisocyanate production.			**K027**	**10**
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1, 1-trichloroethane.			**K028**	**1**
K029 Waste from the product steam stripper in the production of 1,1,1 -trichloroethane.			**K029**	**1**
K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.			**K030**	**1**
K031 By-product salts generated in the production of MSMA and cacodylic acid.			**K031**	**1**
K032 Wastewater treatment sludge from the production of chlordane.			**K032**	**10**
K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.			**K033**	**10**
K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.			**K034**	**10**
K035 Wastewater treatment sludges generated in the production of creosote.			**K035**	**1**
K036 Still bottoms from toluene reclamation distillation in the production of disulfoton.			**K036**	**1**
K037 Wastewater treatment sludges from the production of disulfoton.			**K037**	**1**
K038 Wastewater from the washing and stripping of phorate production.			**K038**	**10**
K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.			**K039**	**10**
K040 Wastewater treatment sludge from the production of phorate.			**K040**	**10**
K041 Wastewater treatment sludge from the production of toxaphene.			**K041**	**1**
K042 Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.			**K042**	**10**
K043 2,6-Dichlorophenol waste from the production of 2,4-D.			**K043**	**10**
K044 Wastewater treatment sludges from the manufacturing and processing of explosives.			**K044**	**10**
K045 Spent carbon from the treatment of wastewater containing explosives.			**K045**	**10**
K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.			**K046**	**10**
K047 Pink/red water from TNT operations.			**K047**	**10**
K048 Dissolved air flotation (DAF) float from the petroleum refining industry.			**K048**	**10**
K049 Slop oil emulsion solids from the petroleum refining industry.			**K049**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry.			**K050**	**10**
K051 API separator sludge from the petroleum refining industry.			**K051**	**10**
K052 Tank bottoms (leaded) from the petroleum refining industry.			**K052**	**10**
K060 Ammonia still lime sludge from coking operations.			**K060**	**1**
K061 Emission control dust/sludge from the primary production of steel in electric furnaces.			**K061**	**10**
K062 Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).			**K062**	**10**
K064 Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.			**K064**	**10**
K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting			**K065**	**10**
K066 Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.			**K066**	**10**
K069 Emission control dust/sludge from secondary lead smelting.			**K069**	**10**
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.			**K071**	**1**
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.			**K073**	**10**
K083 Distillation bottoms from aniline extraction.			**K083**	**100**
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K084**	**1**
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.			**K085**	**10**
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.			**K086**	**10**
K087 Decanter tank tar sludge from coking operations.			**K087**	**100**
K088 Spent potliners from primary aluminum reduction.			**K088**	**10**
K090 Emission control dust or sludge from ferrochromiumsilicon production.			**K090**	**10**
K091 Emission control dust or sludge from ferrochromium production.			**K091**	**10**
K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.			**K093**	**5,000**
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.			**K094**	**5,000**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K095 Distillation bottoms from the production of 1,1,1 -trichloroethane.			**K095**	**100**
K096 Heavy ends from the heavy ends column from the production of 1,1,1 -trichloroethane.			**K096**	**100**
K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.			**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.			**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.			**K099**	**10**
K100 Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.			**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.			**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.			**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.			**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.			**K105**	**10**
K106 Wastewater treatment sludge from the mercury cell process in chlorine production.			**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1 -dimethylhydrazine (unsymmetrical dimethylhydrazine [UDMH]) from carboxylic acid hydrazines.			**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K109**	**10**
K110 Condensed column overheads from intermediate separation from the production of 1,1 -dimethylhydrazine (UDMH) from carboxylic acid hydrazides.			**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.			**K111**	**10**
K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K114**	**10**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.			**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.			**K116**	**10**
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.			**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.			**K118**	**1**
K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.			**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.			**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.			**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.			**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.			**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.			**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.			**K136**	**1**
K141 Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).			**K141**	**1**
K142 Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal.			**K142**	**1**
K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.			**K143**	**1**
K144 Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.			**K144**	**1**
K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.			**K145**	**1**
K147 Tar storage tank residues from coal tar refining.			**K147**	**1**
K148 Residues from coal tar distillation, including, but not limited to, still bottoms.			**K148**	**1**

Table AP1.T4. List of Hazardous Waste/Substances/Materials (continued)
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)	USEPA HW No. [2]	RQ (Pounds)[3]
K149 Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. (This waste does not include still bottoms from the distillation of benzyl chloride.)			**K149**	10
K150 Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.			**K150**	10
K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.			**K151**	10
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.)			**K157**	++
K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.			**K158**	++
K159 Organics from the treatment of thiocarbamate wastes.			**K159**	++
K160 Solids (including filter wastes, separation solids, and spent catalysts) from the production of thio-carbamates and solids from the treatment of thiocarbamate wastes.			**K160**	++
K161 Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)			**K161**	++

Notes:

1 Chemical Abstract Service (CAS) Registry Number.
2 USEPA Hazardous Waste Number.
3 Reportable quantity release that requires notification. (See Chapter 17, "Spill Prevention and Response Planning").
4 Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR'. Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.
++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).
+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.
# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.
The statutory RQ for this hazardous substance may be adjusted in a future rulemaking; until then the statutory RQ applies.
1* Indicates that the 1-pound RQ is a statutory RQ.
** Indicates that no RQ is being assigned to the generic or broad class.
(1+) Indicates that the statutory source for designation of this hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is Clean Water Act (CWA) Section 31 1(b)(4).
(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 3071 1(a)(4).
(3+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA section 112.
(4+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is Resource Conservation and Recovery Act, Section 3001.

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AP2. APPENDIX 2

DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

AP2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

AP2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

AP2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

AP2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

AP2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

AP2.4. For installations with POL Storage Containers:

AP2.4.1. Single POL Storage Container Facilities. For facilities containing only one above-ground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

AP2.4.2. Multiple POL Storage Container Facilities

AP2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

AP2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single above ground oil or hazardous substance storage container.

AP2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

AP2.4.2.3.1. The total capacity of the above ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

AP2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

AP2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.

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UNITED ARAB EMIRATES FINAL GOVERNING STANDARDS

14 March 2012

Prepared by
U.S. Navy Central Command
United States Central Command

On behalf of
United States Central Command (USCENTCOM)

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FORWARD

This Department of Defense (DoD) Publication is issued under the authority and requirements of DoD Instruction (DoDI) 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996. This Final Governing Standard (FGS) provides criteria, standards, and management practices for environmental compliance at DoD installations in the United Arab Emirates (UAE). The FGS is derived from DoD 4715.05-G, "Overseas Environmental Baseline Guidance Document," dated May 2007.

To produce the FGS for the United Arab Emirates (UAE), a comprehensive review of the host nation's environmental regulations was conducted. A review was also conducted of Gulf Cooperation Council (GCC) environmental requirements of which the UAE is a party. Furthermore, any treaty, convention, protocols, etc., of which the UAE may be a party to, were also reviewed. The regulatory analysis consisted of reviewing each regulation that included an environmental requirement, per the scope of the OEBGD. Thus, the occupational or industrial health and safety regulations for the UAE were not addressed as they are not part of the 16 OEBGD chapters. Local regulations were not included as part of the regulatory review.

This FGS applies to the Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Command, the Inspector General of the Department of Defense, the Defense Agencies, the DoD Field Activities, and all other organizational entities within the Department of Defense (hereafter referred to collectively as the "DoD Components") operating in the UAE.

This FGS is effective immediately and its use is mandatory by the DoD Components, pursuant to DoDI 4715.5. The Heads of the DoD Components may only issue supplementary instructions when deemed necessary to provide for unique requirements within their organizations.

FOR THE COMMANDER:

Karl R Horst

KARL R. HORST
Major General, U.S. Army
Chief of Staff

METHODOLOGY

Chapters 2-19 of the FGS include scope, definitions and criteria. Appendices and tables are also presented. The applicable UAE environmental regulations were compared to the May 2007 Overseas Environmental Baseline Guidance Document (OEBGD), and determinations were made as to whether an environmental regulation of the UAE was more or less stringent, equivalent to, or in addition to, the OEBGD standard. The more restrictive regulation and additional requirements were adopted in this FGS.

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APPENDICES

TABLES

REFERENCES

Department of Defense

(a) DoD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," April 22, 1996
(b) Executive Order 12344, "Naval Nuclear Propulsion Program," February 1, 1982
(c) Section 7158 of title 42, United States Code
(d) Executive Order 12114, "Environmental Effects Abroad of Major Federal Actions," January 4, 1979
(e) DoD Instruction 4715.4, "Pollution Prevention," June 18, 1996
(f) DoD 8910.1-M, "DoD Procedures for Management of Information Requirements," June 30, 1998
(g) DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program," August 15, 2006
(h) Defense Logistics Agency Instruction 4145.11, Army Technical Manual 38-410, Naval Supply Publication 573, Air Force Joint Manual 23-209, and Marine Corps Order 4450.12A, "Storage and Handling of Hazardous Materials," January 13, 1999
(i) Air Force Interservice Manual 24-204(I), Army Technical Order 3 8-250, Naval Supply Publication 505, Marine Corps Order P4030.19I, and Defense Logistics Agency Instruction 4145.3, Defense Contract Management Agency D1, Ch3.4 (HM24), "Preparing Hazardous Materials for Military Air Shipments," 15 April 2007, Incorporating Change 1, 4 May 2007.
(j) DoD 4160.21 -M, "Defense Materiel Disposition Manual," August 18, 1997, authorized by DoD 4140.1-R, "Department of Defense Materiel Management Regulation," January 25, 1993
(k) DoD Directive 4001.1, "Installation Management," September 4, 1986
(l) Naval Facility Manual of Operation-213, Air Force Regulation 9 1-8, and Army Technical Manual 5-634, "Solid Waste Management," May 1990
(m) DoD 4150.7-M, "DoD Pest Management Training and Certification," April 24, 1997
(n) Military Handbook 1 028/8A, "Design of Pest Management Facilities," November 1, 1991
(o) DoD Instruction 6055.1, "DoD Safety and Occupational Health (SOH) Program," August 19, 1998
(p) DoD Instruction 6055.5, "Industrial Hygiene and Occupational Health," January 10, 1989
(q) Section 2643 of title 15, United States Code
(r) Title 40, Code of Federal Regulations, Part 763, Subpart E, "Asbestos-Containing Materials in Schools," current edition
(s) DoD Instruction 4715.8, "Environmental Remediation for DoD Activities Overseas," February 2, 1998

CHAPTER 1

OVERVIEW

1.1. PURPOSE.

1.1.1. The primary purpose of these Final Governing Standards (FGS) is to provide environmental compliance criteria at United States (U.S.) Department of Defense (DOD) installations in United Arab Emirates (UAE). This document implements DOD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations," dated 22 April 1996, and is based upon DOD 4715.05-G, "Overseas Environmental Baseline Guidance Document" (OEBGD), dated 1 May 2007.

1.2 APPLICABILITY.

1.2.1. These FGS provide environmental compliance criteria applicable to actions for DOD Components at installations located in the UAE.

1.2.2. These FGS represent minimum criteria; DOD Components may impose additional criteria provided those policies and directives do not conflict with these FGS.

1.2.3. Activities and installations shall notify the Environmental Executive Agent (EEA), United States Central Command (CENTCOM), via the Lead Environmental Component (LEC), Commander Navy Region Europe Africa Southwest Asia (CNREURAFSWA), of any conflicting DOD Component policies or directives they discover prior to imposing criteria more protective than provided in these FGS.

1.2.4. DOD Components shall not enter into agreements with UAE authorities at any level that establishes a criterion for environmental compliance that contradicts those provided in these FGS without the prior written approval of the LEC.

1.3. EXEMPTIONS.

These FGS do not apply to:

1.3.1. DOD installations that do not have more than *de minimis* potential to affect the natural environment (e.g., offices whose operations are primarily administrative, including defense attaché offices, security assistance offices, foreign buying offices, and other similar organizations), or for which the DOD Components exercise control only on a temporary or intermittent basis.

1.3.2. Leased, joint use, and similar facilities to the extent that the DOD does not control the instrumentality or operation that a criterion seeks to regulate.

1.3.3. Operations of U.S. military vessels or the operations of U.S. military aircraft, or off installation operational and training deployments. Off-installation operational deployments include cases of hostilities, contingency operations in hazardous areas, and when U.S. forces are operating as part of a multi-national force not under full control of the United States. Such excepted operations and deployments shall be conducted in accordance with applicable international agreements, other DOD Directives (DODDs) and DOD Instructions (DODIs), and environmental annexes incorporated into operation plans or operation orders. However, these FGS apply to support functions for U.S. military vessels and U.S. military aircraft provided by the DOD Components, including management or disposal of off-loaded waste or material.

1.3.4. Facilities and activities associated with the Naval Nuclear Propulsion Program, which are covered under Executive Order (E.O.) 12344 "Naval Nuclear Propulsion Program," and conducted pursuant to 42 United States Code (U.S.C.) 7158.

1.3.5. The determination or conduct of remediation to correct environmental problems caused by the Department of Defense's past activities, conducted in accordance with DOD Instruction (DODI) 4715.8, "Environmental Remediation for DOD Activities Overseas."

1.3.6. Environmental analyses conducted under E.O. 12114, "Environmental Effects Abroad of Major Federal Actions."

1.4. DEFINITIONS.

For purposes of these FGS, unless otherwise indicated, the following definitions apply:

1.4.1. Criteria and Management Practices. Particular substantive provisions of the OEBGD that are used by the EEA to develop these FGS.

1.4.2. Existing Facility. Any facility and/or building, source, or project in use or under construction before 1 October 1994, unless it is subsequently substantially modified.

1.4.3. Final Governing Standards. A comprehensive set of country-specific substantive provisions, typically technical limitations on effluent, discharges, etc., or a specific management practice.

1.4.4. New Facility. Any facility and/or building, source, or projects with a construction start date on or after 1 October 1994, or a pre-existing facility that has been substantially modified since 1 October 1994.

1.4.5. Substantial Modification. Any modification to a facility and/or building the cost of which exceeds $1 million, regardless of funding source.

1.5. ADDITIONAL INFORMATION.

1.5.1. The DOD Components shall establish and implement an environmental audit program to ensure that overseas installations assess compliance with these FGS at least once every 3 years at all major installations.

1.5.2. DODI 4715.4, "Pollution Prevention," implements policy, assigns responsibility, and prescribes procedures for implementation of pollution prevention programs throughout the DOD. As a matter of DOD policy, DODI 4715.4 should be consulted for particular requirements that apply to activities outside the United States. Pollution prevention should be considered in developing the criteria and management practices for these FGS. Where economically advantageous and consistent with mission requirements, pollution prevention shall be the preferred means for attaining compliance with these FGS.

1.5.3. Laboratory analyses necessary to implement these FGS would normally be conducted in a laboratory that has been certified by a U.S. or UAE regulatory authority for the applicable test method. In the absence of a certified laboratory, analyses may also be conducted at a laboratory that has an established reliable record of QA compliance with standards for the applicable test method that are generally recognized by appropriate industry or scientific organizations, such as ISO 17025.

1.5.4. These FGS do not create any rights or obligations enforceable against the United States, the DOD, or any of its components, nor does it create any standard of care or practice for individuals. Although these FGS refer to other DODDs and DODIs, it is intended only to coordinate the requirements of those directives as required to implement the policies found in DODI 4715.5. These FGS do not change other DOD or service directives or instructions, or alter DOD or service policies.

1.6. WAIVERS. If compliance with the FGS at particular installations or facilities would seriously impair operations, adversely affect relations with UAE authorities, or require substantial expenditure of funds at an installation that has been identified for closure or at an installation that has been identified for a realignment that would remove the requirement, a DOD Component may ask the EEA, via the LEC, to waive the particular standard. See DOD Instruction 4715.5, "Management of Environmental Compliance at Overseas Installations", and USCENTCOM Regulation 200-1, "Protection and Enhancement of Environmental Assets," for complete waiver procedures.

1.7. APPROVALS.

1.7.1. Approval may be required to engage in activities that have the potential to affect the environment in the UAE. Generally, activities that occur within the confines of the installation and do not affect the environment outside of the installation do not require approval. DoD Components shall not apply for approval directly from UAE authorities. DoD Components shall contact the LEC to determine approval requirements and coordinate with UAE representatives regarding activities that may require approval as indicated in these FGS. If the installation has a UAE Installation Commander (UIC), the U.S. Installation Commander or designated representative shall inform the UIC of activities that may require approval, keeping the LEC informed. If the UIC declines to engage UAE authorities regarding an approval, DOD Components shall contact the LEC to determine approval requirements.

1.7.2. If UAE approval specifies a more protective standard than prescribed in the FGS, the standard in the approval shall be the compliance standard. However, if an approval allows a less protective standard, then the FGS will be the compliance standard unless a waiver is obtained (see 1.6).

1.7.3. Contractors performing work for DOD on DOD installations must comply with all UAE laws and regulations including obtaining all necessary licenses and approvals. Contracting services does not absolve DOD Components from compliance with these FGS unless exempted under section 1.3, Exemptions.

1.7.4. Certificates obtained from appropriate UAE authorities (e.g., tank tightness testing) do not fall within the definition of an approval process requiring the LEC. Request for services (e.g., inspections) shall be forwarded directly to the appropriate organizations without involving the LEC.

1.8. WORKING WITH THE LEC

1.8.1. DOD Components shall consult with the LEC when specified in these FGS and when:

1.8.1.1. Significant exceedances of FGS or approval criteria occur

1.8.1.2. UAE enforcement action is initiated

1.8.1.3. An issue is raised that has the potential to affect multiple installations or military services

1.8.2. DOD Components shall notify the LEC when specified in these FGS and when:

1.8.2.1. Information is provided to UIC for activities requiring approval governed by these FGS.

1.8.2.2. UIC or other UAE official requests information.

1.8.2.3. Any UAE official requests access to an installation in order to conduct an environmental inspection.

1.8.3. The LEC, working with the notifying DOD Component, may determine that notification specified in these FGS is no longer required on a case-by-case basis.

1.9. ACCESS TO INSTALLATIONS & INFORMATION BY UAE AUTHORITIES.

Inspections and non-routine requests for information by UAE authorities shall be coordinated with the UIC (if designated for a facility) or the LEC and reported to the EEA via the Component chain-of-command. To the maximum extent possible, U.S. military personnel, rather than civilian personnel, shall lead the review of DOD Component activities by UAE authorities during the inspection.

1.10. LEAD ENVIRONMENTAL COMPONENT.

The LEC for these FGS is the Commander, Navy Region Europe Africa Southwest Asia. Any questions or comments pertaining to these FGS shall be sent to:

Commander, Navy Region Europe Africa Southwest Asia
PSC 817 Box 108
FPO AE 09622
DSN Voice (314) 626-2886
DSN FAX (314) 626-4341
Commercial +39 081-568-2886

Or to the Environmental LEC representative in Bahrain at:

Commander Navy Region Europe Africa Southwest Asia
Detachment Bahrain
Environmental Program
PSC 451 BOX 850
FPO AE 09834-2800
DSN Voice (318) 439-4603
DSN FAX (318) 439-3028
Commercial +973-1-785-4603
Mobile +973-3-946-3697
Email : awni.almasri@me.navy.mil

Chapter 2

Air Emissions

2.1. SCOPE

This Chapter contains standards for air emissions sources. Criteria addressing open burning of solid waste are contained in Chapter 7, "Solid Waste." Criteria addressing asbestos are contained in Chapter 15, "Asbestos."

2.2. DEFINITIONS

2.2.1. Coal Refuse. Waste products from coal mining, cleaning, and coal preparation operations (e.g., culm and gob) contain coal, matrix material, clay, and other organic and inorganic material.

2.2.2. Cold Cleaning Machine. Any device or piece of equipment that contains and/or uses liquid solvent, into which parts are placed to remove soil and other contaminants from the surfaces of the parts or to dry the parts. Cleaning machines that contain and use heated, non-boiling solvent to clean the parts are classified as cold cleaning machines.

2.2.3. Commercial and Industrial Solid Waste Incinerator (CISWI) Units. Any combustion device that combusts commercial and industrial waste in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility (including field-erected, modular, and custom incineration units operating with starved or excess air). CISWI units do NOT include Municipal Waste Combustor Units, Sewage Sludge Incinerators, Medical Waste Incinerators, and Hazardous Waste Combustion Units.

2.2.4. Fossil Fuel. Natural gas, petroleum, coal, and any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

2.2.5. Freeboard Ratio. The ratio of the solvent cleaning machine freeboard height to the smaller interior dimension (length, width, or diameter) of the solvent cleaning machine.

2.2.6. Hydrofluorocarbon (HFC). A compound consisting of hydrogen, fluorine, and carbon often used as a replacement for Ozone-Depleting Substances (ODS).

2.2.7. Incinerator. Any furnace used in the process of burning solid or liquid waste for the purpose of reducing the volume of the waste by removing combustible matter, including equipment with heat recovery systems for either hot water or steam generation.

2.2.8. Motor Vehicle. Any commercially available vehicle that is not adapted to military use which is self-propelled and designed for transporting persons or property on a street or highway, including but not limited to, passenger cars, light duty vehicles, and heavy duty vehicles.

2.2.9. Municipal Waste Combustion (MWC) Units. Any equipment that combusts solid, liquid, or gasified municipal solid waste (MSW) including, but not limited to, field-erected MWC units (with or without heat recovery), modular MWC units (starved-air or excess-air), boilers (for example, steam generating units), furnaces (whether suspension-fired, grate-fired, mass-fired, air curtain incinerators, or fluidized bed-fired), and pyrolysis/combustion units. Municipal waste combustion units do NOT include pyrolysis or MWC units located at a plastics or rubber recycling unit, cement kilns that combust MSW, internal combustion engines, gas turbines, or other combustion devices that combust landfill gases collected by landfill gas collection systems.

2.2.10. Municipal Solid Waste (MSW). Any household, commercial/retail, or institutional waste. Household waste includes material discarded from residential dwellings, hotels, motels, and other similar permanent or temporary housing. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes materials discarded by schools, hospitals (nonmedical), nonmanufacturing activities at prisons and government facilities, and other similar establishments or facilities. Household, commercial/retail, and institutional waste does include yard waste and refuse-derived fuel. Household, commercial/retail, and institutional waste does not include used oil; sewage sludge; wood pallets; construction, renovation, and demolition wastes (which include railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff).

2.2.11. Ozone-Depleting Substances (ODS). Those substances listed in Tables 2.10 and 2.11.

2.2.12. Pathological Waste. Waste material consisting of only human or animal remains, anatomical parts, and/or tissue, the bags/containers used to collect and transport the waste material, and animal bedding (if applicable).

2.2.13. Perfluorocarbon (PFC). A compound consisting solely of carbon and fluorine often used as a replacement for ODS.

2.2.14. Process Heater. A device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

C2.2.15. Pyrolysis. The endothermic gasification of hospital waste and/or medical/infectious waste using external energy.

2.2.16. Stack. Any point in a source covered by criteria contained in 2.3.1., 2.3.2., 2.3.3., 2.3.4., or 2.3.5. designed to emit pollutants.

2.2.17. Steam/Hot Water Generating Unit. A device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This definition does not include nuclear steam generators or process heaters.

2.2.18. Substantially-Modified. Any modification to a facility/building, the cost of which exceeds 3.6M Dirham (AED) ($1 million), regardless of funding source.

2.2.19. Vapor Cleaning Machine. A batch or in-line solvent cleaning machine that boils liquid solvent which generates solvent vapor that is used as a part of the cleaning or drying cycle.

2.2.20. Wood Residue. Bark, sawdust, slabs, chips, shavings, mill trim, and other wood products derived from wood processing and forest management operations.

2.3. CRITERIA

2.3.1. Combustion Units

2.3.1.1. The following criteria apply to all combustion units except for steam/hot water generating units:

2.3.1.1.1. Installations, except those in Dubai and Jebel Ali, shall comply with the emission limits of Table 2.1.

2.3.1.1.2. Dubai and Jebel Ali. Installations in Dubai and Jebel Ali shall comply with the emission limits of Table 2.2.

2.3.1.2. Steam/ Hot Water Generating Units. The following standards apply to units that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994.

2.3.1.2.1. Air Emission Standards. The following criteria apply to units with a maximum design heat input capacity ≥ 3 MW (10 million Btu/hr).

2.3.1.2.1.1. Steam/hot water generating units and associated emissions controls, if applicable, must be designed to meet the emission standards shown in Table 2.3 and Table 2.4.

2.3.1.2.1.1.1. Jebel Ali. Additionally, boilers and furnaces of units 30 – 70 MW (approximately 100 million Btu/hr – 1,290 million Btu/hr) at installations in Jebel Ali shall maintain an efflux velocity of 15 m/s of emitted gases, measured at a maximum continuous rating.

2.3.1.2.1.2. For units combusting liquid or solid fossil fuels, fuel sulfur content (weight %) and higher heating value will be measured and recorded for each new shipment of fuel. Use these data to calculate sulfur dioxide (SO_2) emissions and document compliance with the SO_2 limit of 250 mg/Nm^3 (approximately 0.43lb/MMBtu) for hydrocarbon using the following equation: SO_2 emissions (lb/ million BTU) = 0.02 X content of fuel (%) / heat content of fuel (HHV, million BTU/lb fuel) [e.g., for fuel oil with 0.5%, SO_2 = 0.02 X 0.5 / 0.019 = 0.53 lb/million BTU]. Alternatively, install a properly calibrated and maintained continuous emissions monitoring system to measure the flue gas for SO_2 and either oxygen (O_2) or carbon dioxide (CO_2). Gas oil (diesel) with sulfur content more than 0.05% by weight is strictly prohibited in existing boilers and furnaces.

2.3.1.2.2. Air Emissions Monitoring. Steam/hot water generating units subject to opacity or nitrogen oxides (NO_x) standards in Table 2.3 and Table 2.4 must have a properly calibrated and maintained continuous emissions monitoring system (CEMS) to measure the flue gas as follows:

2.3.1.2.2.1. In all emirates excluding Jebel Ali area, measure opacity for units with a maximum design heat input capacity >9 MW (30 million Btu/hr), except that CEMS is not required where gaseous or distillate fuels are the only fuels combusted.

2.3.1.2.2.2. For fossil fuel fired units with a maximum design heat input capacity > 30 MW (100 million Btu/hr): NO_x and either O_2 or CO_2.

2.3.1.2.2.3. Additional requirements in Jebel Ali. The following additional criteria apply in Jebel Ali:

2.3.1.2.2.3.1. Sampling ports and ladder/flanges facilities must be made available for monitoring.

2.3.1.2.2.3.2. Emissions shall be displayed on a meter visible to operating staff.

2.3.1.2.2.3.3. PM emissions monitoring shall be conducted by optical density measurements for fine particles and by a gravimetric method for coarse particles.

2.3.1.2.2.3.4. Calibration checks on monitoring instruments are also required to be conducted in accordance with British Standard (BS) 3405:1983.

2.3.1.2.2.4. See 2.3.10. for additional emissions monitoring requirements.

2.3.2. Incinerators. The following requirements do not apply to incinerators combusting hazardous waste or munitions. Refer to Chapter 6, "Hazardous Waste," for information regarding hazardous waste disposal and incineration. The monitoring requirements for emission sources (see 2.3.10.) shall apply for all incinerators.

2.3.2.1. Installations shall take precautions to minimize the quantity of pollutants arising from incineration products including:

2.3.2.1.1. Using equipment and instruments that adopt best practice and pollution prevention and control technologies to control air pollution.

2.3.2.1.2. Continuously or periodically measuring dust, grit and smoke and recording these measurements.

2.3.2.2. Commercial and Industrial Solid Waste Incinerators (CISWI). All CISWI units must comply with the applicable emission standards in Tables 2.5 and 2.6 (Dubai) and operating limits in Table 2.7. and as outlined below:

2.3.2.2.1. The incineration plant shall be designed to include two incineration chambers.

2.3.2.2.2. The plant shall be located at least 5,000 meters (3.1 miles) from the nearest residential, commercial, industrial or agricultural area or water body.

2.3.2.2.3. The temperature at the incinerator shall be ≥ 900°C (1,652°F).

2.3.2.2.4. Waste shall not be exposed to incineration for a period < 3 seconds at 900°C (1652°F) inside the incineration chamber and the incinerator capacity shall be sufficient to incinerate solid waste within a 24-hour period.

2.3.2.2.5. In addition, the following wastes shall be restricted from incinerators:

2.3.2.2.5.1. Waste resulting from radioactive materials

2.3.2.2.5.2. Compressed packages

2.3.2.2.5.3. Plastic and rubber waste and materials with the exception of those used in medical treatment and as medical waste containers and except where the incinerator is designed for such waste

2.3.2.2.5.4. Waste with high metal contents (lead, cadmium, mercury, and other similar toxic heavy metals)

2.3.2.2.5.5. Silver salts and waste generated from photographic activities

2.3.2.2.6. Installations shall contact the LEC regarding solid waste incinerator approvals.

2.3.2.3. Municipal Waste Combustion (MWC) Units. Each MWC unit must comply with the applicable emission standards in Tables 2.5 and 2.6 and operating limits in Table 2.7.

2.3.2.4. Sewage Sludge Incinerators. All sewage sludge incinerators that commenced construction on or after 1 October 1994 or that were substantially modified since 1 October 1994 and that burn more than 1 ton per day (tpd) of sewage sludge or more than 10% sewage sludge, must also be designed to meet a particulate emission limit of 0.65 g/kg dry sludge (1.30 lb/ton dry sludge) and an opacity limit of 20% at all times, except during periods of startup, shut down, malfunction, or when emergency conditions exist.

2.3.2.5. Medical Waste Incinerators (MWI). The following standards apply to all units. These requirements do not apply to any portable units (field deployable), pyrolysis units, or units that burn only pathological, low-level radioactive waste, or chemotherapeutic waste. Refer to Chapter 8, "Medical Waste Management," for other requirements pertaining to medical waste management.

2.3.2.5.1. All MWI must be designed and operated according to the following good combustion practices (GCP):

2.3.2.5.1.1. Unit design: dual chamber with each chamber spacious enough to burn waste within a 24-hour period.

2.3.2.5.1.2. Minimum temperature in both primary and secondary chamber: 1,200°C (2,192°F).

2.3.2.5.1.3. Waste shall be burned within a 24-hour period with a minimum residence time in the secondary chamber of 2 seconds.

2.3.2.5.1.4. Incinerator operators must be trained in accordance with applicable Service requirements.

2.3.2.5.2. MWI units shall comply with the applicable emission standards in Table 2.9.

2.3.3. Perchloroethylene (PCE) Dry Cleaning Machines. The following requirements apply to all dry cleaning machines. Only chemicals with negligible ozone-depleting potential shall be used in dry cleaning and vapor degreasing activities.

2.3.3.1. Emissions from PCE dry cleaning machines installed before 1 October 1994 that use more than 7,571 liters (2,000 gallons) per year of PCE (installation wide) in dry cleaning operations, must be controlled with a refrigerated condenser, unless a carbon absorber was already installed. The temperature of the refrigerated condenser must be maintained at 7.2°C (45°F) or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

2.3.3.2. All PCE dry cleaning systems installed on or after 1 October 1994 must be of the dry-to-dry design with emissions controlled by a refrigerated condenser. The temperature of the refrigerated condenser must be maintained at 7.2°C (45°F) or less. Dry cleaning machines and control devices must be operated according to manufacturer recommendations.

2.3.4. Chromium Electroplating and Chromium Anodizing Tanks. Electroplating and anodizing tanks must comply with one of the three methods below for controlling chromium emissions. Implement one of the following methods that are most appropriate to suit local conditions:

2.3.4.1. Option 1: Limit chromium emissions in the ventilation exhaust to 0.015 milligrams per dry standard cubic meter (mg/dscm) (0.016 mg/Nm^3). Control devices/methods must be operated according to manufacturer recommendations.

2.3.4.2. Option 2: Use chemical tank additives to prevent surface tension of the electroplating or anodizing bath from exceeding 45 dynes per centimeter (cm) as measured by a stalagmometer or 35 dynes/cm as measured by a tensiometer. Measure the surface tension prior to the first initiation of electric current on a given day and every 4 hours thereafter.

2.3.4.3. Option 3: Limit chromium emissions to the maximum allowable mass emission rate (MAMER) calculated using the following equation: MAMER = ETSA x K x 0.015 mg/dscm, where: MAMER = the alternative emission rate for enclosed hard chromium electroplating tanks in mg/hr; ETSA = the hard chromium electroplating tank surface area in square feet (ft^2); K = a conversion factor, 425 dscm/(ft^2-hr). Option 3 is ONLY applicable to hard chrome electroplating tanks equipped with an enclosing hood and ventilated at half the rate or less than that of an open surface tank of the same surface area.

2.3.4.4. Sharjah. The following additional operational control requirements for electroplating processes are applicable in Sharjah:

2.3.4.4.1. Acid mists and vapors shall be scrubbed with water prior to venting.

2.3.4.4.2. Exhaust streams, especially volatile organic compounds (VOCs) and heavy metals, shall be treated prior to release into external environment.

2.3.4.4.3. VOCs shall be reduced in some installations through the use of carbon filters.

2.3.5. Halogenated Solvent Cleaning Machines. These requirements apply to all solvent cleaning machines that use solvent which contains more than 5 % by weight: methylene chloride (CAS No. 75-09-2), perchloroethylene (CAS No. 127-18-4), trichloroethylene (CAS No. 79-01-6), 1,1,1-trichloroethane (CAS No. 71-55-6), carbon tetrachloride (CAS No. 56-23-5), chloroform (CAS No. 67-66-3), or any combination of these halogenated solvents.

2.3.5.1. All cold cleaning machines (remote reservoir and immersion tanks) must be covered when not in use. Additionally, immersion type cold cleaning machines must have either a 2.54 cm (1-inch) water layer or a freeboard ratio of at least 0.75.

2.3.5.2. All vapor cleaning machines (vapor degreasers) must incorporate design and work practices which minimize the direct release of halogenated solvent to the atmosphere.

2.3.6. Units Containing ODS. The following criteria apply to direct atmospheric emissions of ODS, hydrofluorocarbons (HFC), and perfluorocarbons (PFC) from refrigeration equipment and ODS from fire suppression equipment. New air-conditioning and refrigeration equipment and fire protection systems are prohibited from using the controlled substances listed in Table 2.10. Alternative substances with zero or low ozone-depleting potential shall be used instead. Existing equipment containing prohibited controlled substances shall comply with the gradual phase-out schedule for the substances. All existing equipment and systems utilizing controlled substances shall be supplied with substances from recognized suppliers or recycled sources. Contact the LEC regarding the phase-out schedule and the purchase of laboratory and medical equipment utilizing controlled substances.

2.3.6.1. Refrigerant Recovery/Recycling. Recovery, recycling and re-use of controlled substances (Table 2.10) shall take place at all times during the repair and maintenance of existing equipment containing these substances. All repairs, including leak repairs or services to appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners, must be performed using commercially available refrigerant recovery/recycling equipment operated by trained personnel. Refrigerant technicians shall be trained in proper recovery/recycling procedures, leak detection, safety, shipping, and disposal in accordance with recognized industry standards or UAE equivalent.

2.3.6.2. Refrigerant Venting Prohibition. Any class I or class II ODS, HFC, and PFC refrigerant listed in Table 2.10 and Table 2.11 shall not be intentionally released in the course of maintaining, servicing, repairing, or disposing of appliances, industrial process refrigeration units, air conditioning units, or motor vehicle air conditioners. De minimis releases associated with good faith attempts to recycle or recover ODS, HFC, and PFC refrigerants listed in Table 2.11 are not subject to this prohibition.

2.3.6.3. Refrigerant Leak Monitoring and Repair. All existing equipment or appliances utilizing controlled substances (Table 2.10) shall be maintained leak-free at all times. For equipment containing other ODS (Table 2.11), monitor and repair refrigeration equipment for ODS leakage in accordance with the following criteria and repair, if found to be leaking.

2.3.6.3.1. Commercial Refrigeration Equipment. Commercial refrigeration equipment normally containing > 22.7 kg (50 pounds) of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 % of the total charge during a 12-month period.

2.3.6.3.2. Industrial Process Refrigeration Equipment. Industrial process refrigeration equipment normally containing > 22.7 kg (50 pounds) of refrigerant must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 35 % of the total charge during a 12-month period.

2.3.6.3.3. Comfort Cooling Appliances. Comfort cooling appliances normally containing > 22.7 kg (50 pounds) of refrigerant and not covered by subparagraphs C2.3.6.3.1. or C2.3.6.3.2. of this chapter must have leaks repaired if the appliance is leaking at a rate such that the loss of refrigerant will exceed 15 % of the total charge during a 12-month period.

2.3.6.4. ODS Fire Suppression Agent (Halon) Venting Prohibition. Halons listed in Tables 2.10 and 2.11 shall not be intentionally released into the environment while testing, maintaining, servicing, repairing, or disposing of Halon-containing equipment or using such equipment for technician training. This venting prohibition does NOT apply to the following types of releases of halons listed in Table 2.11:

2.3.6.4.1. De minimis releases associated with good faith attempts to recycle or recover halons (i.e., release of residual halon contained in fully discharged total flooding fire extinguishing systems).

2.3.6.4.2. Emergency releases for the legitimate purpose of fire extinguishing, explosion inertion, or other emergency applications for which the equipment or systems were designed.

2.3.6.4.3. Releases during the testing of fire extinguishing systems if each of the following is true: systems or equipment employing suitable alternative fire extinguishing agents are not available; release of extinguishing agent is essential to demonstrate equipment functionality; failure of system or equipment would pose great risk to human safety or the environment; and a simulant agent cannot be used.

2.3.6.4.4. In addition, existing halon fire extinguisher/protection systems containing controlled substances (Table 2.10) shall be properly maintained in accordance with the following requirements:

2.3.6.4.4.1. Recovery, reclamation, recycling and re-use shall be a mandatory practice at all stages in fire protection. Facilities utilizing controlled substances shall install equipment to recover, recycle and reuse halons.

2.3.6.4.4.2. All portable halon filled cartridges or cylinders for fire extinguishers shall be periodically serviced only by qualified companies with halon recovery equipment.

2.3.6.4.4.3. The systems shall be periodically maintained by qualified companies to prevent leakage.

2.3.7. Motor Vehicles. This criterion applies to DoD-owned motor vehicles as defined in paragraph 2.2.8.

2.3.7.1. All vehicles shall be inspected every two years, to ensure that no tampering with factory-installed emission control equipment has occurred.

2.3.7.2. If available on the local economy, use only unleaded gasoline in vehicles that are designed for this fuel.

2.3.7.3. The following criteria also apply for gasoline powered vehicles using unleaded fuel:

2.3.7.3.1. The volume of gaseous pollutants collected over a period of 13 minutes during vehicle testing shall not exceed the limits listed in Table 2.12.

2.3.7.3.2. The mass of the fuel vapors (hydrocarbons) emitted from the fuel system shall not exceed 6.0 grams (0.21 ounces) per test.

2.3.7.3.3. There shall be no emission from the crankcase of the vehicle to the atmosphere.

2.3.7.3.4. Vehicles shall be tested every two years.

2.3.7.4. The following criteria apply for light-duty (< 3,500kg (< 7,716 lbs.)) diesel powered vehicles:

2.3.7.4.1. Emission limits for light duty diesel-powered vehicles shall not exceed those listed on Table 2.13.

2.3.7.4.2. The light absorption coefficient of exhaust gases when testing the light-duty diesel-engine vehicles shall not exceed its respective limits in Table 2.14.

2.3.7.4.3. Vehicles shall be tested every two years.

2.3.8. Stack Heights. H_g is the good engineering practice stack height necessary to minimize downwash of stack emissions due to aerodynamic influences from nearby structures.

2.3.8.1. Stacks shall be designed and constructed to heights at least equal to the largest H_g calculated from either of the following two criteria:

2.3.8.1.1. $H_g = H + 1.5L$, where H is the height of the nearby structure measured from the ground level elevation at the base of the stack, and L is the lesser of height or projected width of the nearby structure(s). A structure is determined to be nearby when the stack is located within 5L of the structure envelope but not > 0.8 km (0.5 mile). This calculation shall be performed for each structure nearby the stack being studied to determine the greatest H_g.

2.3.8.1.2. H_g is the height demonstrated by a fluid model or a field study, which ensures that the emissions from a stack do not result in maximum ground-level concentrations of any air pollutant as a result of atmospheric downwash, wakes, or eddy effects created by the source itself, nearby structures, or nearby terrain features at least 40 % in excess of the maximum ground-level concentrations of any air pollutant experienced in the absence of such atmospheric downwash, wakes, or eddy effects. For purposes of this paragraph, "nearby" means not > 0.8 km (0.5 mile), except that the portion of a terrain feature may be considered to be nearby which falls within a distance of up to 10 times the maximum height (H_t) of the feature, not to exceed 3.2 km (2 miles) if such feature achieves a height (H_t) 0.8 km from the stack that is at least 40 % of the good engineering practice stack height determined by the formulae provided in C2.3.8.1.1. of this part or 26 meters (85 feet), whichever is greater, as measured from the ground-level elevation at the base of the stack. The height of the structure or terrain feature is measured from the ground-level elevation at the base of the stack.

2.3.8.2. Dubai. Stacks shall be designed and installed in accordance with the following criteria:

2.3.8.2.1. Chimneys shall be designed so that moisture will not condense in them during colder months.

2.3.8.2.2. All waste discharges emitted into the air shall have an unimpeded vertical discharge. Any weather protection cowls shall be designed so that they do not obstruct the vertical free flow of gases, fumes or dust. Installation of conical weather caps and the like shall be avoided (see Table 2.18).

2.3.8.2.3. Installations emitting toxic and hazardous substances shall consult the LEC to determine the appropriate control technologies.

2.3.8.2.4. In developed areas, stacks shall be located away from and above public access areas and clear of any air conditioning intakes, vents or operable windows.

2.3.8.2.5. For sources emitting combustion gases and particles consisting of more than 100 kg/day of nitrogen oxides, sulfur dioxide or particles, chimney height shall be based on dispersion calculation to satisfy the air quality objectives at ground level.

2.3.8.3. Jebel Ali. The following design requirements for stacks shall apply:

2.3.8.3.1. A maximum chimney velocity of 9 m/s is required for wet waste gases and gases which have been in contact with liquids.

2.3.8.3.2. Installations may require approval for stack air emissions testing for all their emission sources. Consult the LEC prior to obtaining approval.

2.3.9. Ambient Air Quality Standards. Activities or installations that have continuous or intermittent emissions shall consult the LEC to determine if air dispersion modeling assessments are required.

2.3.9.1. Impacts to air quality shall be measured against the ambient air quality standards included in Tables 2.15, 2.16, and 2.17.

2.3.10. Emissions Monitoring. The following monitoring requirements shall apply to all sources of emission, including steam/ hot water generating units and incinerators:

2.3.10.1. Installations which emit air pollutants shall maintain logbooks of quantity of emitted air pollutants for 5 years from the date of each analysis.

2.3.10.2. Installations shall complete and submit air emissions monitoring reports to the LEC.

2.3.10.3. Dubai. Monitoring requirements specific for the Dubai emirate are as follows:

2.3.10.3.1. Installations shall provide access for the Competent Authority to conduct monitoring of the premises. Inspection requests shall be coordinated through the LEC. Access by UAE authorities shall be IAW 1.9.

2.3.10.3.2. Best practice measures shall be utilized for the periodic or continuous monitoring of dust and grit when burning waste.

2.3.10.3.3. Emissions monitoring data shall typically be submitted to the LEC on a quarterly basis.

2.3.10.3.4. Installations which require air monitoring shall maintain a maintenance and inspection register for air quality monitoring equipment. These shall be provided to inspectors from the Competent Authority upon request. Register requests shall be coordinated through the LEC.

2.3.10.4. Jebel Ali. Monitoring requirements specific for Jebel Ali are as follows:

2.3.10.4.1. Continuous emission monitoring equipment shall be installed wherever practical.

2.3.10.4.2. Compliance testing shall be conducted by the facility according to the following schedule. Parameters could include, SO_2, O_2, NO_2, NOx and CO or any other parameters required by the LEC.

Jebel Ali Emissions Testing Schedule

Emission Source Type	Frequency of Compliance Testing
Process equipment (other than for fuel burning)	Quarterly
Facilities with fuel burning equipment utilizing fuel with a sulfur content of > 0.05% (500 ppm); by the start of 2010 – fuel with a sulfur content of > 0.005% (50 ppm)	Monthly
Facilities with fuel burning equipment utilizing fuel with a sulfur content of < 0.05% (500 ppm); by the start of 2010 – fuel with a sulfur content of < 0.005% (50 ppm)	Annually

Table 2.1. Maximum Allowable Emission Limits for Hydrocarbon Sources in the UAE

Substance	Sources	Max. Allowable Limit (mg/Nm^3)
Visible Emissions	All sources	250
Nitrogen Oxides (NO_x) (expressed as Nitrogen Dioxide (NO_2))	Fuel combustion units - gas fuel - liquid fuel	 350 500
Sulfur Dioxide (SO_2)	All sources	500
Total Suspended Particles (TSP)	All sources	250
Carbon Monoxide (CO)	All sources	500

Note:
Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).

Table 2.2. Maximum Allowable Emission Limits for Stationary Hydrocarbon Sources in Dubai

Substance	Sources	Max. Allowable Emission Limits (mg/Nm^3)[1]	Notes
Visible Emissions	Combustion sources	Ringlemann 1 or 20% opacity ($250mg/m^3$ for Jebel Ali)	Does not apply to water vapor emissions and a reasonable period for cold start-up, shutdown or emergency operation
Total Particulate Matter	All combustion sources	250	Gas volumes calculated to 12% CO_2
Sulfur Dioxide (SO_2)	All combustion sources	500	
Oxides of Nitrogen (NO_x)	Fuel burning units having a gross heat input above 100,000 MJ, excluding glass furnaces	350 (for gas fuels) 500 (for liquid fuels)	At 7% O_2 reference
	Gas turbines for power generation	70 (for gas fuels)	Not applicable to small units < 30 MW and at 15% O_2 reference
	Power generation by other fuels	150	

Note:
Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).

Table 2.3. UAE Emission Standards for Steam Generating Units

Substance	Emission Limits (mg/Nm^3)
For Units with size > 100 MMBtu/hr	
Visible Emissions[1]	250 (for all fuel types)
Nitrogen Oxides (NO_x) (expressed as Nitrogen Dioxide (NO_2))	256 (for gas fuels)[2] 350 (for coal-derived gas fuels)[3] 388 (for liquid fuels)[2] 852 (for solid fuels)[2]
Sulfur Dioxide (SO_2)	500 (for all fuel types)
Total Suspended Particles (TSP)	129 (for liquid fuels) 122 (for solid fuels)
Opacity	20% (for liquid, solid and other solid fuels)[4]
For Units with size 10 – 100 MMBtu/hr	
Visible Emissions[1]	250 (for all fuel types)
Nitrogen Oxides (NO_x) (expressed as Nitrogen Dioxide (NO_2))	350 (for gas fuels)[3] 500 (for liquid fuels)[3]
Sulfur Dioxide (SO_2)	500 (for all fuel types)
Total Suspended Particles (TSP)	122 (for solid fuels)
Opacity	20% (for liquid, solid and other solid fuels)[4]

Notes:

[1] The limit of "Visible Emissions" does not apply to emission of water vapor and a reasonable period for cold start-up, shutdown or emergency operation.

[2] Emission limitations for NO_X are based on a 30-day rolling average. NO_X standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.

[3] The "NO_x" emission limit of any existing turbine units operated by gas fuel, prior to the issuance and adoption of this regulation will be 125 mg/Nm^3.

[4] The opacity standards do not apply to units < 30 million BTU/hr. The 20% standard applies to the average opacity over a six-minute period. A 30% opacity value is allowed for one six-minute period per hour.

Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).

Table 2.4. Dubai and Jebel Ali Emission Standards for Steam Generating Units

Substance	Emission Limits (mg/Nm^3)
For Units with size > 100 MMBtu/hr	
Visible Emissions	Ringlemann 1 (250mg/m^3 for Jebel Ali)
Nitrogen Oxides (NO_x) (expressed as Nitrogen Dioxide (NO_2))	256 (for gas fuels) [1] 388 (for liquid fuels) [1] 70 (for gas fuels used in gas turbines) 150 (for other fuels used in power generation) 852 (for solid fuels) [2]
Sulfur Dioxide (SO_2)	500 (for all fuel types)
Total Suspended Particles (TSP)	129 (for liquid fuels) 122 (for solid fuels)
Carbon Monoxide (CO)	500 (for all fuel types)
Opacity	20% (for liquid, solid and other solid fuels)
For Units with size 10 – 100 MMBtu/hr	
Visible Emissions	250 (for all fuel types)
Nitrogen Oxides (NO_x) (expressed as Nitrogen Dioxide (NO_2))	350 (for gas fuels) 500 (for liquid fuels) 70 (for gas fuels used in gas turbines) 150 (for other fuels used in power generation)
Sulfur Dioxide (SO_2)	500 (for all fuel types)
Total Suspended Particles (TSP)	122 (for solid fuels)
Opacity [2]	20% (for liquid, solid and other solid fuels)

Notes:

[1]. Installations with Steam Generating Units shall contact the LEC to determine if air quality mathematical modeling is required.

[2] Emission limitations for NO_X are based on a 30-day rolling average. NO_X standard does not apply when a fossil fuel containing at least 25% by weight of coal refuse is burned in combination with gaseous, liquid, or other solid fossil fuel.

[3] The opacity standards do not apply to units < 30 million BTU/hr. The 20% standard applies to the average opacity over a six-minute period. A 30% opacity value is allowed for one six-minute period per hour.

Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).

Table 2.5. UAE Emission Standards for Incinerators

Pollutant	Emission Standards[1]					
Incinerator Type	Existing MWC units[2]		MWC units that begin new construction or undergo substantial modification[2]		CISWI units	
Rated Capacity	35-250 tpd	>250 tpd	35-250 tpd	>250tpd	< 3 tons/hr	3 tons/hr
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm or 76 mg/Nm^3	30 mg/Nm^3
Opacity	10%		10%		10%	
NO_x	N/A	See Note 3	500 ppmv	150 ppmv	350 mg/Nm^3	300 mg/Nm^3
SO_2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv or 52 mg/Nm^3	
Dioxins/furans	125 ng/dscm	See Note 4	13 ng/dscm		[5] 0.1 ng TEQ/m^3	
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm (0.004 mg/Nm^3)	
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm (0.04 mg/Nm^3)	
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.2 mg/Nm^3	0.1 mg/Nm^3
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	30 mg/Nm^3	20 mg/Nm^3
Fugitive ash	5% of hourly observation period		5% of hourly observation period		N/A	
Chromium (Cr) and its compounds (expressed as Cr)[1]	-		-		5 mg/Nm^3	1 mg/Nm^3
Copper (Cu) and its compounds (expressed as Cu)	-		-		5 mg/Nm^3	1 mg/Nm^3
Manganese (Mn) and its compounds (expressed as Mn)	-		-		5 mg/Nm^3	1 mg/Nm^3
Hydrogen Fluoride (HF)	-		-		4 mg/Nm^3	2 mg/Nm^3
Total Volatile Organic Compounds (VOC) (expressed as Total Organic Carbon (TOC))	-		-		20 mg/Nm^3	20 mg/Nm^3
Nickel (Ni) and its compounds (expressed as Ni)					1 mg/Nm^3	1 mg/Nm^3
Arsenic (As) and its compounds (expressed as As)					1 mg/Nm^3	1 mg/Nm^3

Notes:

Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).

1 Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.

2 Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

3 NO_x limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.

4 Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.

5 The emission limit value refers to the total concentration of dioxins and furans are calculated using the concept of toxic equivalence in accordance with Table 2.8.

Table 2.6. Emission Standards for Incinerators in Dubai

Pollutant	Emission Standards[1]					
Incinerator Type	Existing MWC units[2]		MWC units that begin new construction or undergo substantial modification[2]		CISWI units	
Rated Capacity	35-250 tpd	>250 tpd	35-250 tpd	>250tpd	< 3 tons/hr	3 tons/hr
Particulate	70 mg/dscm	27 mg/dscm	24 mg/dscm		70 mg/dscm 76mg/Nm^3	30 mg/Nm^3
Opacity	10%		10%		10%	
NO_x	N/A	See Note 3	500 ppmv	150 ppmv	200 mg/Nm^3	
SO_2	50% reduction or 77 ppmv	75% reduction or 29 ppmv	80% reduction or 30 ppmv		20 ppmv or 52 mg/Nm^3	
Dioxins/furans	125 ng/dscm	See Note 4	13 ng/dscm		0.1 (ng TEQ/m^3) [5]	
Cadmium	0.10 mg/dscm	0.040 mg/dscm	0.020 mg/dscm		0.004 mg/dscm	
Lead	1.6 mg/dscm	0.44 mg/dscm	0.20 mg/dscm		0.04 mg/dscm	
Mercury	85% reduction or 0.080 mg/dscm		85% reduction or 0.080 mg/dscm		0.2 mg/Nm^3	0.1 mg/Nm^3
HCl	50% reduction or 250 ppmv	95% reduction or 29 ppmv	80% reduction or 30 ppmv	95% reduction or 25 ppmv	30 mg/Nm^3	20 mg/Nm^3
Fugitive ash	5% of hourly observation period		5% of hourly observation period		N/A	
Chromium (Cr) and its compounds (expressed as Cr)	-		-		5 mg/Nm^3	1 mg/Nm^3
Copper (Cu) and its compounds (expressed as Cu)	-		-		5 mg/Nm^3	1 mg/Nm^3
Manganese (Mn) and its compounds (expressed as Mn)	-		-		5 mg/Nm^3	1 mg/Nm^3
Total Volatile Organic Compounds (VOC) (expressed as Total Organic Carbon (TOC))	-		-		20 mg/Nm^3	20 mg/Nm^3
Nickel (Ni) and its compounds (expressed as Ni)	-		-		1 mg/Nm^3	1 mg/Nm^3

Pollutant	Emission Standards[1]					
Incinerator Type	Existing MWC units[2]		MWC units that begin new construction or undergo substantial modification[2]		CISWI units	
Rated Capacity	35-250 tpd	>250 tpd	35-250 tpd	>250tpd	< 3 tons/hr	3 tons/hr
Arsenic (As) and its compounds (expressed as As)	-		-		1 mg/Nm^3	1 mg/Nm^3

Notes:
'Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).
1 Emission standard concentrations (mg/dscm, ppmv) are corrected to 7% oxygen, dry basis at standard conditions. mg/dscm = milligram per dry standard cubic meter, ng = nanogram, ppm = parts per million.
2 Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.
3 NO_x limits for units rated > 250 tons/day (tpd) capacity: mass burn refractory-no limit; mass burn waterwall-205 ppmv; mass burn rotary waterwall: 250 ppmv; refuse-derived fuel combustor-250 ppmv; fluidized bed combustor-180 ppmv.
4 Dioxins/furans limits for units rated >250 tpd capacity: MWC with electrostatic precipitator (ESP)-60 ng/dscm; MWC with non-ESP-30 ng/dscm.
5 The emission limit value refers to the total concentration of dioxins and furans are calculated using the concept of toxic equivalence in accordance with Table 2.8.

Table 2.7. Carbon Monoxide Operating Limits for Incinerators[1]

Incinerator Type	Existing MWC units[2]		MWC units that begin new construction or undergo substantial modification[2]		CISWI units
Rated Capacity	35-250 tpd	>250 tpd	35-250 tpd	>250tpd	All units
Fluidized bed	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		100 mg/Nm^3
Fluidized bed, mixed fuel (wood/refuse-derived fuel)	200 ppmv (24-hr avg)		200 ppmv (24-hr avg)	100 ppmv (4-hr avg)	
Mass burn rotary refractory	100 ppmv (4-hr avg)		100 ppmv (24-hr avg)		
Mass burn rotary waterfall	250 ppmv (24-hr avg)		100 ppmv (24-hr avg)		
Mass burn waterfall and refractory	100 ppmv (4-hr avg)		100 ppmv (4-hr avg)		
Mixed fuel-fired (pulverized coal/refuse-derived fuel)	150 ppmv (4-hr avg)		150 ppmv (4-hr avg)		
Modular starved-air and excess air	50 ppmv (4-hr avg)		50 ppmv (4-hr avg)		
Spreader stoker, mixed fuel-fired (coal/refuse-derived fuel)	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		
Stoker, refuse-derived fuel	200 ppmv (24-hr avg)		150 ppmv (24-hr avg)		

Notes:

1. Compliance is determined by continuous emission monitoring systems.
2. Construction or modifications that were undertaken pursuant to existing (or previous) FGS are not subject to these requirements. These criteria are not intended to require retrofitting of MWC units.

Table 2.8. Dioxin and Furan Limits in the UAE

Dioxin/Furan	TEF
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.5
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.1
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.01
Octachlorodibenzo-p-dioxin (OCDD)	0.001
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.1
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.05
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.5
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.1
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.1
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.01
Octachlorodibenzofuran (OCDF)	0.001

Notes:

1. Dioxins and Furans mean polychlorinated dibenzo-p-dioxins (PoCDD) and polychlorinated dibenzofurans (PoCDF), being tricyclic and aromatic compounds formed by 2 benzene rings which are connected by 2 oxygen atoms in PoCDD and by one oxygen atom in PoCDF and the hydrogen atoms of which may be replaced by up to 8 chlorine atoms.
2. TEF stands for Toxic Equivalency Factor (Toxicology).
3. TEQ means Total Equivalency Quantity (Toxic Equivalent), being the sum total of the concentrations of each of the dioxin and furan compounds specified in the first column of this table multiplied by their corresponding TEF specified in the second column. TEQ = Σ (TEF x Concentration) for each type of Dioxin/Furan.

Table 2.9. Maximum Allowable Emission Limits of Air Pollutants Emitted from Medical Waste Incinerators in the UAE

Substance	Max. Allowable Emission Limits (mg/Nm^3)
Total Suspended Particles (TSP)	10 (daily average) 30 (half-hourly average)
Carbon Monoxide (CO)	50 (daily average) 100 (half-hourly average)
Nitrogen Oxides (NOx) (expressed as Nitrogen Dioxide (NO_2))	200 (daily average) 400 (half-hourly average)
Sulfur Dioxide (SO_2)	50 (daily average) 200 (half-hourly average)
Hydrogen Chloride (HCl)	10 (daily average) 60 (half-hourly average)
Hydrogen Fluoride (HF)	1 (daily average) 4 (half-hourly average)
Total Volatile Organic Compounds (VOC) (expressed as Total Organic Carbon (TOC))	10 (daily average) 20 (half-hourly average)
Cadmium and its compounds (expressed as Cd)	Total (0.1)
Thallium and its compounds (expressed as Tl)	
Mercury and its compounds (expressed as Hg)	0.1
Lead and its compounds (expressed as Pb)	Total (1)
Chrome and its compounds (expressed as Cr)	
Copper and its compounds (expressed as Cu)	
Manganese and its compounds (expressed as Mn)	
Mercury and its compounds (expressed as Hg)	
Cobalt and its compounds (expressed as Co)	
Antimony and its compounds (expressed as Sb)	
Arsenic and its compounds (expressed as As)	
Tin and its compounds (expressed as Sn)	
Vanadium and its compounds (expressed as V)	
Dioxins and Furans	0.1 (ng TEQ/m^3)

Notes:

1. The concentration of any substance specified in the first column emitted from the incinerator shall not at any point, before admixture with air, smoke or other gases, exceed the specified limits.
2. Nm^3 means normal cubic meter, being that amount of gas which when dry, occupies a cubic meter at a temperature of 25 degrees Centigrade and at an absolute pressure of 760 millimeters of mercury (1 atm).
3. mg means milligram.
4. ng means nanogram.
5. The emission limits for Cd, Tl, Hg, Sb, As, Cr, Co, Cu, Pb, Mn, Ni, Sn and V are conducted as average values over the sample period of a minimum 4 hours and a maximum of 8 hours.
6. Dioxins and Furans: Average values shall be measured over a sample period of a minimum of 6 hours and a maximum of 8 hours. The emission limit value refers to the total concentration of dioxins and furans are calculated using the concept of toxic equivalence in accordance with Table 2.8.

Table 2.10. Controlled ODS in UAE

Groups	Common Product Name	Chemical Formula	Chemical Name Description
Annex A Group I (CFCs)	CFC-11 (R11)	$CFCl_3$	Trichlorofluoromethane
	CFC-12 (R12)	CF_2Cl_2	Dichlorodifluoromethane
	CFC-113	$C_2F_3Cl_3$	Trichlorotrifluoroethane
	CFC-114	$C_2F_4Cl_2$	Dichlorotetrafluoroethane
	CFC-115	C_2F_5Cl	Cloropentafluoroethane
	R-500		
	R-502		
Annex A Group II (Halons)	Halon 1211	CF_2BrCl	Bromochlorodifluoromethane
	Halon 1301	CF_3Br	Bromotrifluoromethane
	Halon 2402	$C_2F_4Br_2$	Dibromotetrafluoroethane

Table 2.11. Additional Ozone Depleting Substances Controlled on DoD Installations

Class I			
CFC - 13	CFC - 211	CFC - 215	Carbon Tetrachloride
CFC - 111	CFC - 212	CFC - 216	Methyl Chloroform
CFC - 112	CFC - 213	CFC - 217	Methyl Bromide
CHFBr2	CFC - 214	C3HF6Br	C3H3F4Br
HBFC-2201 (CHF2Br)	C2H2F3Br	C3H2FBr5	C3H4FBr3
CH2FBr	C2H3FBr2	C3H2F2Br4	C3H4F2Br2
C2HFBr4	C2H3F2Br	C3H2F3Br3	C3H4F3Br
C2HF2Br3	C2H4FBr	C3H2F4Br2	C3H5FBr2
C2HF3Br2	C3HFBr6	C3H2F5Br	C3H5F2Br
C2HF4Br	C3HF2Br5	C3H3FBr4	C3H6FBr
C2H2FBr3	C3HF3Br4	C3H3F2Br3	Chlorobromomethane
C2H2F2Br2	C3HF4Br3	C3H3F3Br2	
	C3HF5Br2		
Class II			
HCFC – 21	HCFC – 133a	HCFC – 225cb	HCFC – 243
HCFC – 22	HCFC – 141b	HCFC – 226	HCFC – 244
HCFC – 31	HCFC – 142b	HCFC – 231	HCFC – 251
HCFC – 121	HCFC – 151	HCFC – 232	HCFC – 252
HCFC – 122	HCFC – 221	HCFC - 233	HCFC – 253
HCFC – 123	HCFC – 222	HCFC – 234	HCFC – 261
HCFC – 124	HCFC – 223	HCFC – 235	HCFC – 262
HCFC – 131	HCFC – 224	HCFC – 241	HCFC – 271
HCFC – 132b	HCFC – 225ca	HCFC – 242	

Table 2.12. Maximum Allowable Emission Limits of Air Pollutants Emitted from Gasoline – Powered Vehicles

Reference Weight of Vehicle (rw) (kg)	Mass of Carbon Monoxide (CO) (g/test)		Mass of Hydrocarbons (g/test)		Mass of Nitrogen Oxides (expressed as NO_2) (g/test)	
	Type Test	Acceptance Test	Type Test	Acceptance Test	Type Test	Acceptance Test
rw ≤ 750	65	78	6.0	7.8	8.5	10.2
750 < rw ≤ 850	71	85	6.3	8.2	8.5	10.2
850 < rw ≤ 1020	76	91	6.5	8.5	8.5	10.2
1020 < rw ≤ 1250	87	104	7.1	9.2	10.2	12.2
1250 < rw ≤ 1470	99	119	7.6	9.9	11.9	14.3
1470 < rw ≤ 1700	110	132	8.1	10.5	12.3	18.8
1700 < rw ≤ 1930	121	145	8.6	11.2	12.8	15.4
1930 < rw ≤ 2150	132	158	9.1	11.8	13.2	15.8
2150 < rw ≤ 3500	143	172	9.6	12.5	13.6	16.3

Table 2.13. Maximum Allowable Emission Limits of Air Pollutants Emitted from Light-Duty Diesel–Powered Vehicles

Reference Weight of Vehicle (rw) (kg)	Mass of Carbon Monoxide (CO)		Combined Mass of Hydrocarbons and Nitrogen Oxides (NO_x) (g/test)	
	Type Test	Acceptance Test	Type Test	Acceptance Test
rw ≤ 1020	58	70	19	23.8
1020 < rw ≤ 1250	67	80	20.5	25.6
1250 < rw ≤ 1470	76	91	22	27.5
1470 < rw ≤ 1700	84	101	23.5	29.4
1700 < rw ≤ 1930	93	112	25	31.3
1930 < rw ≤ 2150	101	121	26.5	33.1
2150 < rw ≤ 3500	110	132	28	35

Table 2.14. Exhaust Gas Flow and Absorption Co-Efficient

Nominal Flow (liters/second)	Absorption Co-efficient (m^{-1})
≤ 42	2.26
45	2.19
50	2.08
55	1.985
60	1.90
65	1.84
70	1.775
75	1.72
80	1.665
85	1.62
90	1.575
95	1.535
100	1.495
105	1.465
110	1.425
115	1.395
120	1.37
125	1.345
130	1.32
135	1.30
140	1.27
145	1.25
150	1.225
155	1.205
160	1.19
165	1.17
170	1.155
175	1.14
180	1.125
185	1.11
190	1.095
195	1.08
≥ 200	1.065

Table 2.15. UAE Ambient Air Quality Standards

Pollutant	1-hour Average	8-hour Average	24-hour Average	Annual Average
Sulfur Dioxide (SO_2)	350 µg/m^3	-	150 µg/m^3	60 µg/m^3 (0.03 ppm) at any location
Ozone (O_3)	200 µg/m^3	120 µg/m^3	-	-
Nitrogen Dioxide (NO_2)	400 µg/m^3	-	150	-
Carbon Monoxide (CO)	30 mg/m^3	10 mg/m^3	-	-
Lead (Pb)	-	-	-	1 µg/m^3
Total Suspended Particles (TSP)	-	-	230 µg/m^3	90 µg/m^3
Particulate Matter (with 10 microns or less in diameter)	-	-	150 µg/m^3	-

Table 2.16. Dubai Ambient Air Quality Standards

Pollutant	Averaging Time	Emission Limits	
		ppb	µg/Nm^3
Sulfur Dioxide (SO_2)	1 Hour	130	350
	12 Months	20	50
Oxidants, as Ozone (O_3)	1 Hour	80	160
Nitrogen Dioxide (NO_2)	1 Hour	150	290
	24 Hours	60	110
Carbon Monoxide (CO)	1 Hour	20 x 10^3	23 x 10^3
Lead (Pb)	3 Months	-	1.0
Benzene (C_6H_6)	1 Hour	20	50
Respirable Dust (PM_{10})	1 Hour	-	300
	24 Hours	-	150
Fluoride as hydrogen fluoride (HF)	24 Hours	3.5	3
	3 Months	0.6	0.5

Table 2.17. Jebel Ali Ambient Air Quality Standards

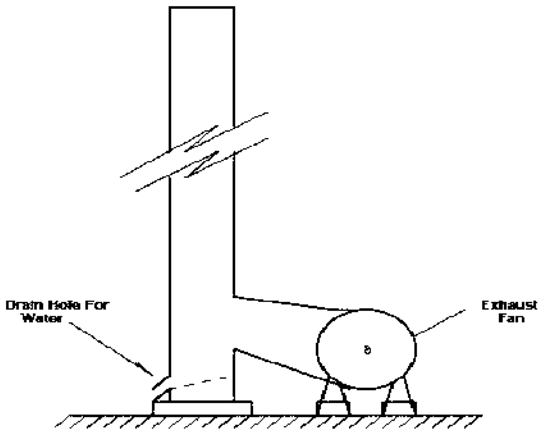
Pollutant	Averaging Time	Emission Limit
Carbon Monoxide (CO)	1 Hour	23 mg/Nm^3
	8 Hour	10 mg/Nm^3
Particulate Matter ($PM_{2.5}$)	Annual	15.0 $\mu g/Nm^3$
	24 Hour	35 $\mu g/Nm^3$
PM_{10}	1 Hour	300 $\mu g/Nm^3$
	24 Hour	50 $\mu g/Nm^3$
Nitrogen Dioxide (NO_2)	1 Hour	200 $\mu g/Nm^3$
	24 Hour	100 $\mu g/Nm^3$
Sulfur Dioxide (SO_2)[1]	1 Hour	350 $\mu g/Nm^3$
	24 Hour	120 $\mu g/Nm^3$
	Annual	50 $\mu g/Nm^3$
Ozone (O_3)	1 hour	150 $\mu g/Nm^3$
	8 Hour	100 $\mu g/Nm^3$
Hydrogen Sulfide (H_2S)[2]	1 Hour	7 $\mu g/Nm^3$
Lead (Pb)	3 Month (moving average, calculated monthly)	0.2 $\mu g/Nm^3$
	Annual	0.5 $\mu g/Nm^3$
Sulfur Oxides (SO_x)	24 Hour	0.14 ppm
	Annual	0.03 ppm
Benzene (C_6H_6)	1 Hour	50 $\mu g/Nm^3$
	Annual	5 $\mu g/Nm^3$
Fluoride	24 Hour	3 $\mu g/Nm^3$
	3 Months	0.5 $\mu g/Nm^3$
Total Suspended Particles (TSP)	24 Hour	230 $\mu g/Nm^3$
	Annual	90 $\mu g/Nm^3$
1, 3 Butadiene	Annual	2.4 $\mu g/Nm^3$
Formaldehyde	30 Minutes	100 $\mu g/Nm^3$
Acetaldehyde	Annual	30 $\mu g/Nm^3$
Benzo(a)pyrene	Annual	0.0003 $\mu g/Nm^3$
Mercury (inorganic)	Annual	0.33 $\mu g/Nm^3$
Mercury (organic)	Annual	0.13 $\mu g/Nm^3$
Chromium VI[3]	Annual	0.0011 $\mu g/Nm^3$
Chromium Metal and Chromium III[3]	Annual	0.11 $\mu g/Nm^3$
Arsenic (inorganic)	Annual	0.0055 $\mu g/Nm^3$
Arsine	Annual	0.055 $\mu g/Nm^3$

Notes:
1. Sulfur dioxide guidelines do not apply for sulfuric acid mist.
2. Hydrogen sulfide value is based on odor nuisance and may be unsuitable for use in geothermal areas

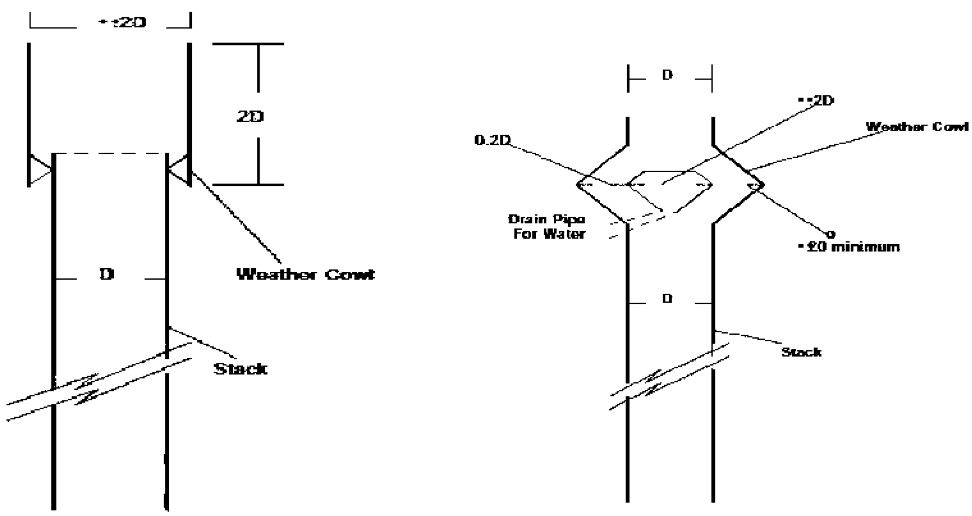
Table 2.18. Dubai - Designs for Free Vertical Discharges of Air Emission

If the gas velocity in the chimney is > 10 m/sec rain water is not likely to enter the chimney.

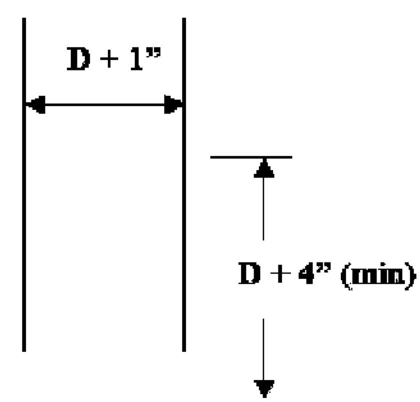
Offset Chimney



Weather Cowl



Wet Weather Cowl Type



CHAPTER 3

DRINKING WATER

3.1. SCOPE

This Chapter contains criteria for providing potable water.

3.2. DEFINITIONS

3.2.1. Action Level. The concentration of a substance in water that establishes appropriate treatment for a water system.

3.2.2. Appropriate DoD Medical Authority. The medical professional designated by the in-theater DoD Component commander to be responsible for resolving medical issues necessary to provide safe drinking water at the DoD Component's installations.

3.2.3. Concentration/Time (CT). The product of residual disinfectant concentration, C, in milligrams per liter (mg/L) determined before or at the first customer, and the corresponding disinfectant contact time, T, in minutes. CT values appear in Tables 3.22 through 3.35.

3.2.4. Conventional Treatment. Water treatment, including chemical coagulation, flocculation, sedimentation, and filtration.

3.2.5. Diatomaceous Earth Filtration. A water treatment process of passing water through a precoat of diatomaceous earth deposited onto a support membrane while additional diatomaceous earth is continuously added to the feed water to maintain the permeability of the precoat, resulting in substantial particulate removal from the water.

3.2.6. Direct Filtration. Water treatment, including chemical coagulation, possibly flocculation, and filtration, but not sedimentation.

3.2.7. Disinfectant. Any oxidant, including but not limited to, chlorine, chlorine dioxide, chloramines, and ozone, intended to kill or inactivate pathogenic microorganisms in water.

3.2.8. DoD Water System. A public or non-public water system.

3.2.9. Emergency Assessment. Evaluation of the susceptibility of the water source, treatment, storage and distribution system(s) to disruption of service caused by natural disasters, accidents, and sabotage.

3.2.10. First Draw Sample. A one-liter sample of tap water that has been standing in plumbing at least six hours and is collected without flushing the tap.

3.2.11. Haloacetic Acids. The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

3.2.12. Groundwater Under the Direct Influence of Surface Water (GWUDISW). Any water below the surface of the ground with significant occurrence of insects or other microorganisms, algae, or large diameter pathogens such as *Giardia lamblia*; or significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions.

3.2.13. Lead-free. A maximum lead content of 0.2% for solder and flux, and 8.0% for pipes and fittings.

3.2.14. Lead Service Line. A service line made of lead that connects the water main to the building inlet, and any lead pigtail, gooseneck, or other fitting that is connected to such line.

3.2.15. Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in water that is delivered to the free-flowing outlet of the ultimate user of a public water system except for turbidity for which the maximum permissible level is measured after filtration. Contaminants added to the water under circumstances controlled by the user, except those resulting from the corrosion of piping and plumbing caused by water quality, are excluded.

3.2.16. Maximum Residual Disinfectant Level (MRDL). The level of a disinfectant added for water treatment measured at the consumer's tap, which may not be exceeded without the unacceptable possibility of adverse health effects.

3.2.17. Point-of-Entry (POE) Treatment Device. A treatment device applied to the drinking water entering a facility to reduce contaminants in drinking water throughout the facility.

3.2.18. Point-of-Use (POU) Treatment Device. A treatment device applied to a tap to reduce contaminants in drinking water at that tap.

3.2.19. Potable Water. Water that has been examined and treated to meet the standards in this Chapter, and has been approved as potable by the appropriate DoD medical authority.

3.2.20. Public Water System (PWS). A system for providing piped water to the public for human consumption, if such system has at least 15 service connections or regularly serves a daily average of at least 25 individuals at least 60 days of the year. This also includes any collection, treatment, storage, and distribution facilities under control of the operator of such systems, and any collection or pretreatment storage facilities not under such control that are used primarily in connection with such systems. A PWS is either a "community water system" or a "non-community system":

3.2.20.1. Community Water System (CWS). A PWS that has at least 15 service connections used by year-round residents, or which regularly serves at least 25 year-round residents.

3.2.20.2. Non-Community Water System (NCWS). A PWS that serves the public, but does not serve the same people year-round.

3.2.20.2.1. Non-transient, Non-community Water System (NTNCWS). A PWS that supplies water to at least 25 of the same people at least six months per year, but not year round. Examples include schools, factories, office buildings, and hospitals that have their own water systems.

3.2.20.2.2. Transient, Non-Community Water System (TNCWS). A PWS that provides water to at least 25 persons (but not the same 25 persons) at least six months per year. Examples include but are not limited to gas stations, motels, and campgrounds that have their own water sources.

3.2.21. Sanitary Survey. An on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system to evaluate the adequacy of such elements for producing and distributing potable water.

3.2.22. Slow Sand Filtration. Water treatment process where raw water passes through a bed of sand at a low velocity (0.37 m/hr (1.2 ft/hr)), resulting in particulate removal by physical and biological mechanisms.

3.2.23. Supplier. Any person who delivers water to or conveys water through trunk mains pipelines or mains pipelines, or delivers water by road vehicle for the purpose of supplying potable water for drinking, washing, cooking or food production.

3.2.24. Total Trihalomethanes. The sum of the concentration in milligrams per liter of chloroform, bromoform, dibromochloromethane, and bromodichloromethane.

3.2.25. Underground Injection. A subsurface emplacement through a bored, drilled, driven or dug well where the depth is greater than the largest surface dimension, whenever the principal function of the well is emplacement of any fluid.

3.2.26. Vulnerability Assessment. The process the commander uses to determine the susceptibility to attack from the full range of threats to the security of personnel, family members, and facilities, which provide a basis for determining antiterrorism measures that can protect personnel and assets from terrorist attacks.

3.2.27. Water Producer. An entity producing potable water under a desalination approval or well water from well-field abstractions.

3.3. CRITERIA

3.3.1. DoD water systems, regardless of whether they produce or purchase water, will:

3.3.1.1. Maintain a map/drawing of the complete potable water system.

3.3.1.1.1. Additional Requirements in Abu Dhabi. Suppliers shall maintain copies of their systems available for inspection or copy by the Competent Authority. In the case of water production, plant operators shall prepare and submit operation diagrams for all potable water plants on the plant's side of connection points to the public utility, in accordance with connection agreements. Requests for inspection or information from the UAE authorities shall be coordinated through the LEC.

3.3.1.2. Update the potable water system master plan at least every 5 years.

3.3.1.3. Protect all water supply aquifers (groundwater) and surface water sources from contamination by suitable placement and construction of wells, by suitable placing of the new intake (heading) to all water treatment facilities, by siting and maintaining septic systems and onsite treatment units, and by appropriate land use management on DoD installations.

3.3.1.3.1. Additional Requirements in Dubai. Contact the LEC to determine if approval is required for the establishment of a desalination or purification plant.

3.3.1.4. Conduct sanitary surveys of the water system at least every 3 years for systems using surface water, and every 5 years for systems using groundwater, or as warranted, including review of required water quality analyses. Off-installation surveys will be coordinated with UAE authorities.

3.3.1.5. Provide proper treatment for all water sources. Surface water supplies, including GWUDISW, must conform to the surface water treatment requirements set forth in Table 3.1 Groundwater supplies, at a minimum, must be disinfected.

3.3.1.6. Maintain a continuous positive pressure of at least 137.9 kPa (20 pounds per square inch (psi)) in the water distribution system.

3.3.1.7. Perform water distribution system operation and maintenance practices consisting of:

3.3.1.7.1. Maintenance of a disinfectant residual throughout the water distribution system (except where determined unnecessary by the appropriate DoD medical authority);

3.3.1.7.2. Proper procedures for repair and replacement of mains (including disinfection and bacteriological testing);

3.3.1.7.3. An effective annual water main flushing program;

3.3.1.7.4. Proper operation and maintenance of storage tanks and reservoirs; and

3.3.1.7.5. Maintenance of distribution system appurtenances (including hydrants and valves).

3.3.1.8. Establish an effective cross connection control and backflow prevention program.

3.3.1.9. Manage underground injection on DoD installations to protect underground water supply sources. At a minimum, conduct monitoring to determine the effects of any underground injection wells on nearby groundwater supplies.

3.3.1.10. Develop and update as necessary an emergency contingency plan to ensure the provision of potable water despite interruptions from natural disasters and service interruptions. At a minimum, the plan will include:

3.3.1.10.1. Plans, procedures, and identification of equipment that can be implemented or utilized in the event of an intentional or un-intentional disruption:

3.3.1.10.2. Identification of key personnel;

3.3.1.10.3. Procedures to restore service;

3.3.1.10.4. Procedures to isolate damaged lines;

3.3.1.10.5. Identification of alternative water supplies; and

3.3.1.10.6. Installation public notification procedures.

3.3.1.11. Use only lead-free pipe, solder, flux, and fittings in the installation or repair of water systems and plumbing systems for drinking water. Provide installation public notification concerning the lead content of materials used in distribution or plumbing systems, or the corrosivity of water that has caused leaching, which indicates a potential health threat if exposed to leaded water, and remedial actions which may be taken.

3.3.1.12. Maintain records showing monthly operating reports for at least 3 years and records of bacteriological results for not < 5 years, and chemical results for not < 10 years.

3.3.1.13. Document corrective actions taken to correct breaches of criteria and maintain such records for at least three years. Cross connection and backflow prevention testing and repair records should be kept for at least 10 years.

3.3.1.14. Conduct vulnerability assessments, which include, but are not limited to, a review of:

3.3.1.14.1. Pipes and constructed conveyances, physical barriers, water collection, pretreatment, treatment, storage, and distribution facilities, electronic, computer, or other automated systems utilized by the PWS;

3.3.1.14.2. Use, storage, or handling of various chemicals; and

3.3.1.14.3. Operation and maintenance of the water storage, treatment, and distribution systems.

3.3.2. Regardless of whether a DoD water system produces or purchases water, it will, by independent testing or validated supplier testing, ensure conformance with the following:

3.3.2.1. Total Coliform Bacteria Requirements

3.3.2.1.1. An installation responsible for a PWS will conduct a bacteriological monitoring program to ensure the safety of water provided for human consumption and allow evaluation with the total coliform-related MCL. The MCL is based only on the presence or absence of total coliforms. The MCL is no more than 5% positive samples per month for a system examining 40 or more samples a month, and no more than one positive sample per month when a system analyzes < 40 samples per month. Further, the MCL is exceeded whenever a routine sample is positive for fecal coliforms or *E. coli* or any repeat sample is positive for total coliforms.

3.3.2.1.2. Each system must develop a written, site-specific monitoring plan and collect routine samples according to Table 3.2, "Total Coliform Monitoring Frequency in Surface Water and Groundwater", prior to distribution, and according to the various frequencies included in Section 3.3.5. during various regulated activities related to drinking water.

3.3.2.1.3. Systems with initial samples testing positive for total coliforms will collect repeat samples as soon as possible, preferably the same day. Repeat sample locations are required at the same tap as the original sample plus an upstream and downstream sample, each within five service connections of the original tap. Any additional repeat sampling which may be required will be performed according to the appropriate DoD medical authority. Monitoring will continue until total coliforms are no longer detected.

3.3.2.1.4. When any routine or repeat sample tests positive for total coliforms, it will be tested for fecal coliform or *E. coli*. Fecal-type testing can be foregone on a total coliform positive sample if fecal or *E. coli* is assumed to be present.

3.3.2.1.5. If a system has exceeded the MCL for total coliforms, the installation will complete the notification in subsection C3.3.3. to:

3.3.2.1.5.1. The appropriate DoD medical authority, as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

3.3.2.1.5.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test result that an acute risk to public health may exist.

3.3.2.2. Inorganic Chemical Requirements

3.3.2.2.1. An installation responsible for a PWS will ensure that the water distributed for human consumption does not exceed applicable federal UAE limitations set out in Table 3.3 and local Abu Dhabi limits included in Table 3.4 for nitrate, nitrite, and total nitrate/nitrite and other inorganic chemical substances. For systems monitored quarterly or more frequently, a system is out of compliance if the annual running average concentration of an inorganic chemical exceeds the MCL. For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL. For nitrate, nitrite, and total nitrate/nitrite, system compliance is determined by averaging the single sample that exceeds the MCL with its confirmation sample; if this average exceeds the MCL, the system is out of compliance.

3.3.2.2.2. Systems will be monitored for inorganic chemicals at the frequency set in Table 3.5, "Inorganics Monitoring Requirements in Surface Water and Groundwater" and according to the tables in Section 3.3.5.

3.3.2.2.3. If a system is out of compliance, the installation will complete the notification in paragraph 3.3.3. as soon as possible. If the nitrate, nitrite, or total nitrate and nitrite MCLs are exceeded, then this is considered an acute health risk and the installation will complete the notification to:

3.3.2.2.3.1. The appropriate DoD medical authority as soon as possible, but in no case later than the end of the same day the command responsible for operating the PWS is notified of the result.

3.3.2.2.3.2. The installation public as soon as possible, but not later than 72 hours after the system is notified of the test results. If the installation is only monitoring annually on the basis of direction from the appropriate DoD medical authority, it will immediately increase monitoring in accordance with Table 3.5, "Inorganics Monitoring Requirements," until remedial actions are completed and authorities determine the system is reliable and consistent.

3.3.2.2.4. The MCL for arsenic applies to CWS and NTNCWS.

3.3.2.3. Fluoride Requirements

3.3.2.3.1. An installation commander responsible for a PWS will ensure that the fluoride content of drinking water does not exceed the MCL of 1.5 mg/L, as stated in Tables 3.3 and 3.4, "Inorganic Chemical MCLs."

3.3.2.3.2. Systems will be monitored for fluoride by collecting one treated water sample annually at the entry point to the distribution system for surface water systems, and once every three years for groundwater systems. Daily monitoring is recommended for systems practicing fluoridation using the criteria in Table 3.6, "Recommended Fluoride Concentrations at Different Temperatures."

3.3.2.3.3. If any sample exceeds the MCL, the installation will complete the notification in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation.

3.3.2.4. Lead and Copper Requirements

3.3.2.4.1. DoD CWS and NTNCWS will comply with action levels (distinguished from the MCL) of 0.015 mg/L for lead and 1.3 mg/L for copper to determine if corrosion control treatment, public education, and removal of lead service lines, if appropriate, are required. Actions are triggered if the respective lead or copper levels are exceeded in more than 10% of all sampled taps.

3.3.2.4.2. Affected DoD systems will conduct monitoring in accordance with Table 3.7, "Monitoring Requirements for Lead and Copper Water Quality Parameters." High risk sampling sites will be targeted by conducting a materials evaluation of the distribution system. Sampling sites will be selected as stated in Table 3.7.

3.3.2.4.3. If an action level is exceeded, the installation will collect additional water quality samples specified in Table. 3.7, "Monitoring Requirements for Lead and Copper Water Quality Parameters." Optimal corrosion control treatment will be pursued. If action levels are exceeded after implementation of applicable corrosion control and source water treatment, lead service lines will be replaced if the lead service lines cause the lead action level to be exceeded. The installation commander will implement an education program for installation personnel (including U.S. and host nation) within 60 days and will complete the notification in paragraph 3.3.3. as soon as possible, but in no case later than 14 days after the violation.

3.3.2.5. Synthetic Organics Requirements

3.3.2.5.1. An installation responsible for CWS and NTNCWS will ensure that synthetic organic chemicals in water distributed to people do not exceed the limitations delineated in Table 3.8, "Synthetic Organic Chemical MCLs" and Table 3.9, "Abu Dhabi Synthetic Organic Chemical MCLs." For systems monitored annually or less frequently, a system is out of compliance if a single sample exceeds the MCL.

3.3.2.5.2. Systems will be monitored for synthetic organic chemicals according to the schedule stated in Table 3.10, "Synthetic Organic Chemical Monitoring Requirements in Surface Water and Groundwater" and according to the tables in Section 3.3.5. after the water source has been designated as drinking water.

3.3.2.5.3. If a system is out of compliance, the notification set out in paragraph 3.3.3. shall be completed as soon as possible, but in no case later than 14 days after the violation. The installation will immediately begin quarterly monitoring and will increase quarterly monitoring if the level of any contaminant is at its detection limit but less than its MCL, as noted in Table 3.10, "Synthetic Organic Chemical Monitoring Requirements," and will continue until the installation commander determines the system is back in compliance, and all necessary remedial measures have been implemented.

3.3.2.6. Disinfectant/Disinfection Byproducts (DDBP) Requirements

3.3.2.6.1. An installation responsible for a CWS and NTNCWS that adds a disinfectant (oxidant, such as chlorine, chlorine dioxide, chloramines, or ozone) to any part of its treatment process (to include the addition of disinfectant by a local water supplier) will:

3.3.2.6.1.1. Ensure that the MCL of 0.08 mg/L for total trihalomethanes (TTHM), the MCL of 0.06 mg/L for haloacetic acids (HAA5), the MCL of 0.1 mg/L for trichloroacetic acids, the MCL of 0.05 mg/l for dichloroacetic acids, the MCL of 0.2 mg/L for chlorite, the MCL of 0.01 mg/L for bromate are met in drinking water, and all additional limits shown in Table 3.11. Additional limits in Table 3.12 shall be followed for drinking water in Abu Dhabi.

3.3.2.6.1.2. Ensure that the maximum residual disinfectant level (MRDL) of 4.0 mg/L for chlorine, the MRDL of 4.0 mg/L (measured as combined total chlorine) for chloramines when ammonia is added during chlorination, and the MRDL of 0.8 mg/L for chlorine dioxide are met in drinking water. Operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

3.3.2.6.2. Such systems that add a disinfectant will monitor TTHM and HAA5 in accordance with Table 3.13, "Disinfectant/Disinfection Byproducts Monitoring Requirements." Additional disinfectant and disinfection byproduct monitoring for systems that utilize chlorine dioxide, chloramines, or ozone and for systems which involve the activities listed in Section 3.3.5. are also included in Table 3.13 and the tables in Section 3.3.5., respectively.

3.3.2.6.3. For TTHM and HAA5 a system is noncompliant when the running annual average of quarterly averages of all samples taken in the distribution system, computed quarterly, exceed the MCL for TTHM, 0.080 mg/L, or the MCL for HAA5, 0.060 mg/L. Refer to Table 3.13 for chlorine, chloramine, and chlorine dioxide compliance requirements. If a system is out of compliance as described in Table 3.13, the installation will accomplish the notification requirements outlined in paragraph C3.3.3. as soon as possible, but in no case later than 14 days after the violation, and undertake remedial measures.

3.3.2.7. Radionuclide Requirements

3.3.2.7.1. An installation responsible for a CWS will test the system for conformance with the applicable radionuclide limits contained in Table 3.14, "Radionuclide MCLs and Monitoring Requirements." Additional monitoring requirements are included in Section 3.3.5.

3.3.2.7.2. Systems will perform radionuclide monitoring as stated in Table 3.14.

3.3.2.7.3. If the average annual MCL for gross alpha activity for radium is exceeded, the installation will complete the notification according to the procedures in paragraph 3.3.3. within 14 days. Monitoring will continue until remedial actions are completed and the average annual concentration no longer exceeds the respective MCL. Continued monitoring for gross alpha-related contamination will occur quarterly, while gross beta-related monitoring will be monthly. If any gross beta MCL is exceeded, the major radioactive components will be identified.

3.3.2.8. Surface Water Treatment Requirements. DoD water systems that use surface water sources or GWUDISW will meet the surface water treatment requirements delineated in Table 3.1. If the turbidity readings in Table 3.1 are exceeded, the installation will complete the notification in paragraph 3.3.3. as soon as possible, but in no case later than 14 days after the violation and undertake remedial action. Surface water and GWUDISW systems that make changes to their disinfection practices (e.g., change in disinfectant or application point) in order to meet DDBP requirements (3.3.2.6.), will ensure that protection from microbial pathogens is not compromised.

3.3.2.9. Non-Public Water Systems. DoD NPWSs will be monitored for total coliforms, at a minimum, and disinfectant residuals periodically.

3.3.2.10. Alternative Water Supplies. DoD installations will, if necessary, only utilize alternative water sources, including POE/POU treatment devices and bottled water supplies, which are approved by the installation commander.

3.3.2.11. Filter Backwash Requirements. To prevent microbes and other contaminants from passing through and into finished drinking water, DoD PWSs will ensure that recycled streams (i.e., recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes) are treated by direct and conventional filtration processes. This requirement only applies to DoD PWSs that:

3.3.2.11.1. Use surface water or GWUDISW;

3.3.2.11.2. Use direct or conventional filtration processes; and

3.3.2.11.3. Recycle spent filter backwash water, sludge thickener supernatant, or liquids from dewatering processes.

3.3.3. Notification Requirements. When a DoD water system is out of compliance as set forth in the preceding criteria, the appropriate DoD medical authority and installation personnel (U.S. and host nation) will be notified. The notice will provide a clear and readily understandable explanation of the violation, any potential adverse health effects, the population at risk, the steps being taken to correct the violation, the necessity for seeking an alternative water supply, if any, and any preventive measures the consumer should take until the violation is corrected. The appropriate DoD medical authority will coordinate notification of host authorities in cases where off-installation populations are at risk.

3.3.3.1. Notification of Exceedances of Water Quality Standards in Abu Dhabi. When sample test results lie outside prescribed limits results shall be immediately reported in writing to the LEC with a statement of the action taken to bring water quality within the standard and mitigate the risk of public health.

3.3.4. System Operator Requirements. DoD installations will ensure that personnel are appropriately trained to operate DoD water systems.

3.3.5. Additional Monitoring Requirements for Drinking Water in Abu Dhabi. Installations producing, storing, transmitting or distributing drinking water shall adhere to the following sampling frequencies listed in the tables below. Activities for which monitoring requirements have been established include:

3.3.5.1. Water transmission (Table 3.15; Table 3.16)

3.3.5.2. Water distribution (Table 3.15; Table 3.16)

3.3.5.3. Water production by desalination (Table 3.17)

3.3.5.4. Water production by hybrid (thermal and membrane) (Table 3.18)

3.3.5.5. Water abstracted from well fields (Table 3.19)

3.3.5.6. Water tankers and storage facilities (Table 3.20; Table 3.21)

Table 3.1. Surface Water Treatment Requirements

1. Unfiltered Systems	a. Systems which use unfiltered surface water or GUDISW will analyze the raw water for total coliforms or fecal coliforms at least weekly and for turbidity at least daily, and must continue as long as the unfiltered system is in operation. If the total coliforms and/or fecal coliforms exceed 100/100 milliliters (mL) and 20/100 mL, respectively, in excess of 10% of the samples collected in the previous 6 months, appropriate filtration must be applied. Appropriate filtration must also be applied if turbidity of the source water immediately prior to the first or only point of disinfectant application exceeds 5 Nephelometric Turbidity Units (NTU). b. Disinfection must achieve at least 99.9% (3-log) inactivation of Giardia lamblia cysts and 99.99% (4-log) inactivation of viruses by meeting applicable CT values, as shown in Tables C3.T11. through C3.T24. c. Disinfection systems must have redundant components to ensure uninterrupted disinfection during operational periods. d. Disinfectant residual monitoring immediately after disinfection is required once every four hours that the system is in operation. Disinfectant residual measurements in the distribution system will be made at the same times as total coliforms are sampled. e. Disinfectant residual of water entering the distribution system cannot be < 0.2 mg/L for greater than four hours. f. Water in a distribution system with heterotrophic bacteria concentration ≤ 500/mL measured as heterotrophic plate count is considered to have a detectable disinfectant residual for the purpose of determining compliance with the Surface Water Treatment Requirements. g. If disinfectant residuals in the distribution system are undetected in more than 5% of monthly samples for 2 consecutive months, appropriate filtration must be implemented.
2. Filtered Systems	a. Filtered water systems will provide a combination of disinfection and filtration that achieves a total of 99.9% (3-log) removal of Giardia lamblia cysts and 99.99% (4-log) removal of viruses. b. The turbidity of filtered water will be monitored at least once every four hours. The turbidity of filtered water for direct and conventional filtration systems will not exceed 0.5 NTU (1 NTU for slow sand and diatomaceous earth filters) in 95% of the analyses in a month, with a maximum of 5 NTU. c. Disinfection must provide the remaining log-removal of Giardia lamblia cysts and viruses not obtained by the filtration technology applied.* d. Disinfection residual maintenance and monitoring requirements are the same as those for unfiltered systems. *Proper conventional treatment typically removes 2.5-log Giardia/ 2.0-log viruses. Proper direct filtration and diatomaceous earth filtration remove 2.0-log Giardia/ 1.0-log viruses. Slow sand filtration removes typically removes 2.0-log Giardia/ 2.0-log viruses. Less log-removal may be assumed if treatment is not properly applied.
3. SW or GWUDISW systems	will provide at least 99% (2-log) removal of Cryptosporidium. A system is considered to be compliant with the Cryptosporidium removal requirements if: a. For conventional and direct filtration systems, the turbidity level of the system's combined filter effluent water does not exceed 0.3 NTU in at least 95% of the measurements taken each month and at no time exceeds 1 NTU. b. For slow sand and diatomaceous earth filtration plants, the turbidity level of the system's combined filter effluent water does not exceed 1 NTU in at least 95% of measurements taken each month and at no time exceeds 5 NTUs. c. For alternative systems, the system demonstrates to the appropriate medical authority that the alternative filtration technology, in combination with disinfection treatment, consistently achieves 3-log removal and/or inactivation of Giardia lamblia cysts, 4-log removal and/or inactivation of viruses, and 2-log removal of Cryptosporidium oocysts. d. For unfiltered systems, the system continues to meet the source water monitoring requirements noted in 1a above to remain unfiltered.
4. Individual Filter Effluent Monitoring.	Conventional or direct filtration systems must continuously monitor (every 15 minutes) the individual filter turbidity for each filter used at the system. Systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity

	monitoring. If a system exceeds 1.0 NTU in two consecutive measurements for three months in a row (for the same filter), the installation must conduct a self-assessment of the filter within 14 days. The self-assessment must include at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a self-assessment report. If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, a Comprehensive Performance Evaluation (CPE) must be conducted within 90 days by a third party.
5. Covers for Finished Water Storage Facilities.	Installations must physically cover all finished water reservoirs, holding tanks, or storage water facilities.

Table 3.2. Total Coliform Monitoring Frequency

Population Served	Number of Samples [1]	Population Served	Number of Samples [1]
25 to 1,000 [2]	1	59,001 to 70,000	70
1,001 to 2,500	2	70,001 to 83,000	80
2,501 to 3,300	3	83,001 to 96,000	90
3,301 to 4,100	4	96,001 to 130,000	100
4,101 to 4,900	5	130,001 to 220,000	120
4,901 to 5,800	6	220,001 to 320,000	150
5,801 to 6,700	7	320,001 to 450,000	180
6,701 to 7,600	8	450,001 to 600,000	210
7,601 to 8,500	9	600,001 to 780,000	240
8,501 to 12,900	10	780,001 to 970,000	270
12,901 to 17,200	15	970,001 to 1,230,000	300
17,201 to 21,500	20	1,230,001 to 1,520,000	330
21,501 to 25,000	25	1,520,001 to 1,850,000	360
25,001 to 33,000	30	1,850,001 to 2,270,000	390
33,001 to 41,000	40	2,270,001 to 3,020,000	420
41,001 to 50,000	50	3,020,001 to 3,960,000	450
50,001 to 59,000	60	3,960,001 or more	480

Notes:
1. Minimum Number of Routine Samples Per Month

2. A non-community water system using groundwater and serving 1,000 or less people may monitor once in each calendar quarter during which the system provides water provided a sanitary survey conducted within the last 5 years shows the system is supplied solely by a protected groundwater source and free of sanitary defects.

Systems that use groundwater, serve < 4,900 people, and collect samples from different sites, may collect all samples on a single day. All other systems must collect samples at regular intervals throughout the month.

Table 3.3. Inorganic Chemical MCLs

Contaminant	MCL (mg/l unless otherwise specified)
Physical Parameters of Aesthetic Significance	
Color	15 true color unit
Turbidity	5 nephelometric turbidity unit
Taste and odor	Acceptable
Temperature	Acceptable
Inorganic Constituents of Aesthetic Significance	
Aluminum	0.2
Ammonia	1.5
Chloride	250
Copper	1
Total hardness	500
Hydrogen sulfide	0.05
Iron	0.3
Manganese	0.1
pH	6.5 – 8.5
Sodium	200 (sodium levels shall be reported to DoD medical authority upon receipt of analysis)
Sulfate	250
Total dissolved solids (TDS)	1000
Zinc	3
Inorganic Constituents of Health Significance	
Arsenic	0.010
Barium	0.7
Boron	0.5
Cadmium	0.003
Chromium	0.05
Copper	2
Cyanide	0.07
Fluoride	1.5
Lead	0.01
Silver	0.1
Tin	1 μg/l
Uranium	2 μg/l
Beryllium	1 μg/l
Manganese	0.5
Mercury (total)	0.001
Molybdenum	0.07
Nickel	0.02
Nitrate	10
Nitrite	1
Total Nitrite and Nitrate	≤1
Selenium	0.01
Antimony	0.005
Asbestos	7 million fibers/L (longer than 10 μm)
Thallium	0.002

Table 3.4. Abu Dhabi Inorganic Chemical MCLs

Contaminant	MCL (mg/l unless otherwise specified)
Nitrate (as N)	10
Nitrite (as N)	0.1
Sodium	150 (sodium levels shall be reported to DoD medical authority upon receipt of analysis)
Magnesium	30
Potassium	12
Ammonium (ammonia and ammonium ions)	0.5
Total Organic Carbon (C)	No significant increase over normally observed
Iron (Fe)	0.2
Copper (Cu)	1
Phosphorus	2.2

Table 3.5. Inorganics Monitoring Requirements

Contaminant	Groundwater Baseline Requirement [1]	Surface Water Baseline Requirement	Trigger That Increases Monitoring [2]	Reduced Monitoring
Arsenic	1 sample / 3 yr	Annual sample	>MCL	---
Antimony	1 sample / 3 yr	Annual sample	>MCL	---
Barium	1 sample / 3 yr	Annual sample	>MCL	---
Beryllium	1 sample / 3 yr	Annual sample	>MCL	---
Cadmium	1 sample / 3 yr	Annual sample	>MCL	---
Chromium	1 sample / 3 yr	Annual sample	>MCL	---
Cyanide	1 sample / 3 yr	Annual sample	>MCL	---
Fluoride	1 sample / 3 yr	Annual sample	>MCL	
Mercury	1 sample / 3 yr	Annual sample	>MCL	---
Nickel	1 sample / 3 yr	Annual sample	>MCL	---
Selenium	1 sample / 3 yr	Annual sample	>MCL	---
Thallium	1 sample / 3 yr	Annual sample	>MCL	---
Sodium	1 sample / 3 yr	Annual sample	---	---
Asbestos [3]	1 sample every 9 years	1 sample every 9 years	>MCL	Yes
Total Nitrate/Nitrite	Annual sample	Quarterly	>50% Nitrite MCL	---
Nitrate	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [6]
Nitrite	Annual sample [4]	Quarterly [4]	>50% MCL [5]	Yes [7]
Corrosivity [8]	Once	Once	---	---

Notes:

1. Samples shall be taken as follows: groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment; surface water systems shall take at least one sample at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after the treatment.
2. Increased quarterly monitoring requires a minimum of 2 samples per quarter for groundwater systems and at least 4 samples per quarter for surface water systems.
3. Necessity for analysis is predicated upon a sanitary survey conducted by the PWS.
4. Any sampling point with an analytical value ≥ to 0.5 mg/L as N, (50% of the Nitrite MCL) must begin sampling for nitrate and nitrite separately. Since nitrite readily converts to nitrate, a system can conclude that if the total nitrate/nitrite value of a sample is less than half of the nitrite MCL, then the value of nitrite in the sample would also be below half of its MCL.
5. Increased quarterly monitoring shall be undertaken for nitrate and nitrate if a sample is > 50% of the MCL.
6. The appropriate DoD medical authority may reduce repeat sampling frequency for surface water systems to annually if after 1 year results are < 50% of MCL.
7. The appropriate DoD medical authority may reduce repeat sampling frequency to 1 annual sample if results are 50 % of MCL.
8. PWSs shall be analyzed within 1 year of the effective date of country-specific FGS to determine the corrosivity entering the distribution system. Two samples (one mid-winter and one mid-summer) will be collected at the entry point of the distribution system for systems using surface water and GWUDISW. One sample will be collected for systems using only groundwater. Corrosivity characteristics of the water shall include measurements of pH, calcium, hardness, alkalinity, temperature, total dissolved solids, and calculation of the Langelier Saturation Index.

Table 3.6. Recommended Fluoride Concentrations at Different Temperatures

Annual Average of Maximum Daily Air Temperatures (°F)	Control Limits (mg/L)		
	Lower	Optimum	Upper
50.0 - 53.7	0.9	1.2	1.7
53.8 - 58.3	0.8	1.1	1.5
58.4 - 63.8	0.8	1.0	1.3
63.9 - 70.6	0.7	0.9	1.2
70.7 - 79.2	0.7	0.8	1.0
79.3 - 90.5	0.6	0.7	0.8

Table 3.7. Monitoring Requirements for Lead and Copper Water Quality Parameters

Population Served	No. of Sites for Standard Monitoring [1, 2]	No. of Sites for Reduced Monitoring [3]	No. of Sites for Water Quality Parameters [4]
>100,000	100	50	25
10,001 - 100,000	60	30	10
3,301 - 10,000	40	20	3
501 - 3,300	20	10	2
101 - 500	10	5	1
<100	5	5	1

Notes:

1. Every 6 months for lead and copper.
2. Sampling sites shall be based on a hierarchical approach. For CWS, priority will be given to single family residences which contain copper pipe with lead solder installed after 1982, contain lead pipes, or are served by lead service lines; then, structures, including multi-family residences with the foregoing characteristics; and finally, residences and structures with copper pipe with lead solder installed before 1983. For NTNCWS, sampling sites will consist of structures that contain copper pipe with lead solder installed after 1982, contain lead pipes, and/or are served by lead service lines. First draw samples will be collected from a cold water kitchen or bathroom tap; non-residential samples will be taken at an interior tap from which water is typically drawn for consumption.
3. Annually for lead and copper if action levels are met during each of 2 consecutive 6-month monitoring periods. Any small or medium-sized system (<50,000) that meets the lead and copper action levels during three consecutive years may reduce the monitoring for lead and copper from annually to once every three years. Annual or triennial sampling will be conducted during the four warmest months of the year.
4. This monitoring must be conducted by all large systems (>50,000). Small and medium sized systems must monitor water quality parameters when action levels are exceeded. Samples will be representative of water quality throughout the distribution system and include a sample from the entry to the distribution system. Samples will be taken in duplicate for pH, alkalinity, calcium, conductivity or total dissolved solids, and water temperatures to allow a corrosivity determination (via a Langelier saturation index or other appropriate saturation index); additional parameters are orthophosphate when a phosphate inhibitor is used and silica when a silicate inhibitor is used.

Table 3.8. Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	MCL (mg/L unless otherwise specified)	Detection limit, mg/L
Pesticides/PCBs		
Alachlor	0.002	0.0002
Aldicarb	0.003	0.0005
Aldicarb sulfone	0.003	0.0008
Aldicarb sulfoxide	0.004	0.0005
Aldrin	0.03	
Atrazine	0.002	0.0001
Bentazoane	0.3	
Benzopyrene	0.0007	
Benzo[a]pyrene	0.0002	
Carbofuran	0.007	0.0009
Chlordane	0.0002	0.0002
Chlorotoluron	0.03	
Cyanazine	0.0006	
DDT	0.002	
Dalapon	0.2	
2,4-D	0.07	0.0001
1,2-Dibromoethane	0.015	
2,4-Dichlorophexy acetic acid	0.030	
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
1,2-Dichloropropane	0.040	
1,2-Dichloropropene	0.020	
Di ethylhexyl adipate	0.080	
Di (2-ethylhexyl) adipate	0.4	
Di ethylhexyl phthalate	0.008	
Di (2-ethylhexyl) phthalate	0.006	
Dinoseb	0.007	
Diquat	0.010	
Endrin	0.002	0.00002
Endothall	0.1	
Ethylene dibromide (EDB)	0.00005	0.00001
Glyphosphate	0.7	
Heptachlor	0.0003	0.00004
Heptachlorepoxide	0.0002	0.00002
Hexachlorobenzene	0.001	
Hexachlorocyclopentadiene	0.05	
Isoproturan	0.009	
Lindane	0.0002	0.00002
MCPA	0.002	
Methoxychlor	0.020	0.0001
Metolachlor	0.010	
Molinate	0.006	
Oxamyl (Vydate)	0.2	
PCBs (as decachlorobiphenyls)	0.0005	0.0001
Pendimethalin	0.020	
Pentachlorophenol	0.001	0.00004
Permethrin	0.020	

Synthetic Organic Chemical	MCL (mg/L unless otherwise specified)	Detection limit, mg/L
Picloram	0.5	
Propanil	0.020	
Pyridate	0.100	
Simazine	0.002	
2,3,7,8-TCDD (Dioxin)	0.00000003	
Terbuthylazine (TBA)	0.007	
Toxaphene	0.003	0.001
Trifluralin	0.020	
2,4-DB	0.090	
Dichloroprop	0.100	
Fenoprop	0.009	
Mecoprop	0.010	
2,4,5-T	0.009	
2,4,5-TP (Silvex)	0.05	0.0002
Volatile Organic Chemicals		
Benzene	0.005	0.0005
Monochlorobenzene	0.3	
1,2-Dichlorobenzene	1.0	
1,4-Dichlorobenzene	0.3	
Trichlorobenzene (total)	0.020	
Carbon tetrachloride	0.002	0.0005
o-Dichlorobenzene	0.6	0.0005
cis-1,2-Dichloroethylene	0.07	0.0005
trans-1,2-Dichloroethylene	0.1	0.0005
1,1-Dichloroethylene	0.007	0.0005
1,1,1-Trichloroethane	0.20	0.0005
1,2-Dichloroethane	0.005	0.0005
Dichloromethane	0.005	
1,1,2-Trichloroethane	0.005	
1,2,4-Trichloro-benzene	0.07	
1,2-Dichloropropane	0.005	0.0005
Ethylbenzene	0.3	0.0005
Monochlorobenzene	0.1	0.0005
para-Dichlorobenzene	0.075	0.0005
Styrene	0.020	0.0005
1,1-Dichloroethene	0.030	
1,2-Dichloroethene	0.050	
Trichloroethene	0.070	
Tetrachloroethene	0.040	
Tetrachloroethylene	0.005	0.0005
Trichloroethylene	0.005	0.0005
Toluene	0.7	0.0005
Vinyl chloride	0.002	0.0005
Xylene (total)	0.5	0.0005
Other Organics		
Acrylamide	0.05% dosed at 1 ppm	
Epihydrochlorin	Treatment technique 0.01% dosed at 20 ppm	

Table 3.9. Additional Abu Dhabi Synthetic Organic Chemical MCLs

Synthetic Organic Chemical	mg/L	Detection limit, mg/L
Pesticides/PCBs		
Aldrin	0.00003	
DDT	0.001	
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00002
Dieldrin	0.00003	
Dinoseb	0.007	
Diquat	0.02	
Endrin	0.0006	0.00002
Heptachlor	0.00003	0.00003
Phenols	0.0005	
2,4,5-Trichlorophenoxy propionic acid	0.009	
Volatile Organic Chemicals		
Cyanide	0.07	

Table 3.10. Synthetic Organic Chemical Monitoring Requirements

Contaminant	Base Requirement [1]		Trigger for more monitoring [2]	Reduced monitoring
	Groundwater	Surface water		
VOCs	Quarterly	Quarterly	>0.0005 mg/L	Yes [3, 4]
Pesticides/PCBs	4 quarterly samples/3 years during most likely period for their presence		>Detection limit [5]	Yes [4, 6]

Notes:

1. Groundwater systems shall take a minimum of one sample at every entry point which is representative of each well after treatment; surface water systems will take a minimum of one sample at every entry point to the distribution system at a point which is representative of each source after treatment. For CWS, monitoring compliance is to be met within 1 year of the publishing of the OEBGD (FGS); for NTNCW, compliance is to be met within 2 years of the publishing of the OEBGD (FGS).
2. Increased monitoring requires a minimum of 2 quarterly samples for groundwater systems, and at least 4 quarterly samples for surface water systems.
3. Repeat sampling frequency may be reduced to annually after 1 year of no detection, and every 3 years after three rounds of no detection.
4. Monitoring frequency may be reduced if warranted based on a sanitary survey of the PWS.
5. Detection limits noted in Table 3.8 and 3.9, or as determined by the best available testing methods.
6. Repeat sampling frequency may be reduced to the following if after one round of no detection: systems >3,300 reduce to a minimum of 2 quarterly samples in one year during each repeat compliance period, or systems <3,300 reduce to a minimum of 1 sample every 3 years.
7. Compliance is based on an annual running average for each sample point for systems monitoring quarterly or more frequently; for systems monitoring annually or less frequently, compliance is based on a single sample, unless the appropriate DoD medical authority requests a confirmation sample. A system is out of compliance if any contaminant exceeds the MCL.

Table 3.11. Maximum Allowable Concentration for Disinfectant and Disinfectant By-Products

Parameter	MCL (mg/l unless otherwise stated)
Disinfectants	
Monochloramine	0.003
Chlorine	0.005
Disinfectant By-Products	
Bromate	0.025
Chlorite	0.2
2,4,6-trichlorophenol	0.2
Formaldehyde	0.9
Bromoform	0.1
Dibromo chloromethane	0.1
Bromo dichloromethane	0.06
Chloroform	0.2
Dichloroacetic acid	0.05
Trichloroacetic acid	0.1
Chloralhydrate (trichloroacetaldehyde)	0.01
Dichloro acetonitrile	0.09
Dibromoacetonitrile	0.1
Trichloro acetonitrile	0.001
Cyanogenchloride	0.07

Table 3.12. Maximum Allowable Concentration of Disinfectant By-Products in Drinking Water in Abu Dhabi

Parameter	PCV Limit (mg/l and maximum unless otherwise specified)
Chlorate	0.7

Table 3.13. Disinfectant/Disinfection Byproducts Monitoring Requirements

Source Water Type	Population Served by System	Analyte & Frequency of Samples	Number of Samples
Surface Water (SW) or Groundwater Under the Direct Influence of Surface Water (GWUDISW)	10,000 or more	TTHM & HAA5 – Quarterly[1,2]	4[1,2,3]
SW or GWUDISW	Serving 500 to 9,999	TTHM & HAA5 - Quarterly4	1[5,6]
SW or GWUDISW	499 or less	TTHM & HAA5 - Yearly	1[7,8]
Ground Water (GW)	10,000 or more	TTHM & HAA5 - Quarterly[9]	1[10,11]
GW	9,999 or less	TTHM & HAA5 - Yearly[12]	1[13,14]
		Chlorite - Daily & Monthly[15,16,17,18]	
		Bromate - Monthly[19,20]	
		Chlorine[21,22]	
		Chloramines[23,24]	
		Chlorine Dioxide[25,26,27]	
		TOC[28]	

Notes:

1. For TTHM and HAA5, a DoD system using surface water or GWUDISW that treats its water with a chemical disinfectant must collect the number of samples listed above. One of the samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system. The remaining samples shall be taken at representative points in the distribution system.

2. To be eligible for reduced monitoring, a system must meet all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; c) at least one year of routine monitoring has been completed; and d) the annual average source water total organic carbon level is no more than 4.0 mg/L prior to treatment. Systems may then reduce monitoring of TTHM and HAA5 to one sample per treatment plant per quarter. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter. 3. A system is noncompliant if the running annual average for any quarter exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.

4. One sample must be collected per treatment plant in the system at the point of maximum residence time in the distribution system.

5. Systems meeting the eligibility requirements in Note 2 may reduce monitoring frequency to one sample per treatment plant per year. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine (quarterly) monitoring the following quarter.

6. A system is noncompliant if the annual average of all samples taken that year exceeds the TTHM MCL, 0.080 mg/L or the HAA5 MCL, 0.060 mg/L.

7. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. If annual sample exceeds MCL (TTHM or HAA5) the system must increase monitoring to one sample per treatment plant per quarter at the point of maximum residence time. The system may return to routine monitoring if the annual average of quarterly samples is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.

Table 3.13. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

8. No reduced monitoring schedule is available. Noncompliance exists when the annual sample (or average of annual samples is conducted) exceeds the TTHM MCL, 0.080 mg/L or if the HHA5 concentration exceeds the MCL, 0.060 mg/L.
9. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. Samples must be taken at a location in the distribution system reflecting the maximum residence time of water in the system.
10. System may reduce monitoring to one sample per treatment plant per year if the system meets all of the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring the following quarter.
11. Noncompliance exists when the annual average of quarterly averages of all samples, compounded quarterly, exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
12. For TTHM and HAA5, a DoD system using only ground water NOT under the influence of surface water that treats its water with a chemical disinfectant must collect the number of samples listed above. One sample per treatment plant must be taken at a location in the distribution system reflecting the maximum residence time of water in the system and during the month of warmest water temperature. If the sample exceeds the MCL, the system must increase monitoring to quarterly.
13. System may reduce monitoring to one sample per three-year monitoring cycle if the system meets all the following conditions: a) the annual average for TTHM is no more than 0.040 mg/L; b) the annual average for HAA5 is no more than 0.030 mg/L; and c) at least one year of routine monitoring has been completed. Sample must be taken at the point of maximum residence time in the distribution system and during the month of warmest water temperature. Systems remain on the reduced schedule as long as the average of all samples taken in the year is no more than 0.060 mg/L for TTHM, and 0.045 mg/L for HAA5. Systems that do not meet these levels must revert to routine monitoring. Systems on increased monitoring may return to routine monitoring if the annual average of quarterly samples does not exceed 0.060 mg/L for TTHM and 0.045 mg/L for HAA5.
14. Noncompliance exists when the annual sample (or average of annual samples) exceeds the TTHM MCL, 0.080 mg/L or the HHA5 the MCL, 0.060 mg/L.
15. For systems using chlorine dioxide for disinfection or oxidation, daily samples are taken for chlorite at the entrance to the distribution system for chlorite. The monthly chlorite samples are collected within the distribution system, as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system).
16. Additional monitoring is required when a daily sample exceeds the chlorite MCL, 1.0 mg/L. A three-sample set (following the monthly sample set protocol) is required to be collected the following day. Further distribution system monitoring will not be required in that month unless the chlorite concentration at the entrance to the distribution system again exceeds the MCL, 1.0 mg/L.
17. For chlorite, systems may reduce routine distribution system monitoring from monthly to quarterly if the chlorite concentration in all samples taken in the distribution system is below the MCL, 1.0 mg/L, for a period of one year and the system has not been required to conduct any additional monitoring. Daily samples must still be collected. Monthly sample set monitoring resumes when if any one daily sample exceeds the MCL, 1.0 mg/L.
18. Noncompliance for chlorite exists if the average concentration of any three-sample set (i.e., one monthly sample set from within the distribution system) exceeds the MCL, 1.0 mg/L.
19. Systems using ozone for disinfection or oxidation are required to take at least one sample per month from the entrance to the distribution system for each treatment plant in the system using ozone under normal operating conditions. Systems may reduce monitoring from monthly to once per quarter if the system demonstrates that the yearly average raw water bromide concentration is < 0.05 mg/L based upon monthly measurements for one year.

Table 3.13. Disinfectant/Disinfection Byproducts Monitoring Requirements (continued)

20. Noncompliance is based on a running yearly average of samples, computed quarterly, that exceeds the MCL, 0.01 mg/L.
21. Chlorine samples must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
22. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
23. Chloramine samples (as either total chlorine or combined chlorine) must be measured at the same points in the distribution system and at the same time as total coliforms. Notwithstanding the MRDL, operators may increase residual chlorine levels in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
24. Noncompliance is based on a running yearly average of monthly averages of all samples, computed quarterly, exceeds the MRDL, 4.0 mg/L.
25. For systems using chlorine dioxide for disinfection or oxidation, samples must be taken daily at the entrance to the distribution system. If the MRDL, 0.8 mg/L, is exceeded, three additional samples must be taken the following day as follows: one as close as possible to the first customer, one in a location representative of average residence time, and one as close as possible to the end of the distribution system (reflects maximum residence time within the distribution system). Systems not using booster chlorination systems after the first customer must take three samples in the distribution system as close as possible to the first customer at intervals of not < 6 hours.
26. If any daily sample from the distribution system exceeds the MRDL and if one or more of the three samples taken the following day from within the distribution system exceeds the MRDL, the system is in violation of the MRDL and must issue public notification in accordance with paragraph C3.3.3. If any two consecutive daily samples exceed the MRDL but none of the distribution samples exceed the MRDL, the system is in violation of the MRDL. Failure to monitor at the entrance to the distribution system on the day following exceedances of the chlorine dioxide MRDL is also an MRDL violation.
27. The MRDL for chlorine dioxide may NOT be exceeded for short periods to address specific microbiological contamination problems.
28. Systems that use conventional filtration treatment must monitor each treatment plant water source for TOC on a monthly basis. Samples must be taken from the source water prior to treatment and the treated water not later than the point of combined filter effluent turbidity monitoring. Source water alkalinity must also be monitored at the same time. Surface water and GWUDISW systems with average treated water TOC of < 2.0 mg/L for two consecutive years, or < 1.0 mg/L for one year, may reduce TOC and alkalinity to one paired sample per plant per quarter.

Table 3.14. Radionuclide MCLs and Monitoring Requirements

Contaminant	MCL
Gross Alpha	≤0.5 Bq/l (13.51 pCi/l)
Combined Radium-226 and -228	5 pCi/L
Beta Particle and Photon Radioactivity	4 mrem/yr [2, 3]
Uranium	30 µg/L

Notes:
[1] Gross alpha activity includes radium-226, but excludes radon and uranium.
[2] Beta particle and photon activity is also referred to as gross beta activity from manmade radionuclides.
[3] The dose MCL is ≤1 Bq/l.

Monitoring Requirements:
All CWSs using ground water, surface water, or systems using both ground and surface water must sample at every point (i.e., sampling points) to the distribution system that is representative of all sources being used under normal operating conditions.

For gross alpha activity and radium-226 and radium-228, systems will be tested once every 4 years. Testing will be conducted using an annual composite of 4 consecutive quarterly samples or the average of four samples obtained at quarterly intervals at a representative point in the distribution system.

Gross alpha only may be analyzed if activity is <5 picoCuries per liter (pCi/L). Where radium-228 may be present, radium-226 and/or -228 analyses should be performed when activity is >2 pCi/L. If the average annual concentration is less than half the MCL, analysis of a single sample may be substituted for the quarterly sampling procedure. A system with two or more sources having different concentrations of radioactivity shall monitor source water in addition to water from a free-flowing tap. If the installation introduces a new water source, these contaminants will be monitored within the first year after introduction.

Table 3.15. Abu Dhabi Sampling Frequencies at Distribution Supply Points

Water Supply Zone or Combination of Zones		Standard Sampling Frequency (number/ annum)																							
Volume distributed (m^3/d)	Population supplied	Microbiological Parameters			Inorganic Chemical Parameters			Inorganic Chemical Parameters (mostly trace metals)			Organic Parameters			Organic Parameters (mostly Pesticides)			Radioactive Parameters			Disinfectant By-Products			Physical Parameters		
		R[1]	S[2]	I[3]	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I
≤100	≤500	6	12	24	1	2	3	2	3	4	1	2	3	-	-	-	1	2	3	3	6	24	2	4	8
101 – 1,000	501 – 5,000	6	12	24	1	2	3	2	3	4	1	2	3	-	-	-	1	3	3	3	6	24	3	6	12
1,001 – 2,000	5,001 – 10,000	12	24	48	3	4	6	3	4	6	2	3	4	-	-	-	2	3	4	6	9	48	6	12	24
2,001 – 4,000	10,001 – 20,000	12	24	48	3	4	6	3	4	6	2	3	4	-	-	-	2	3	4	6	9	48	12	24	48
4,001 – 10,000	20,001 – 50,000	18	36	72	6	8	12	4	6	8	3	4	6	-	-	-	3	6	8	9	12	48	18	36	72
10,001 – 20,000	50,001 – 100,000	18	36	72	6	10	12	4	6	8	3	4	6	-	-	-	3	6	8	9	12	48	18	48	72
>20,000	>100,000	36	48	72	6	10	12	6	8	10	4	6	6	-	-	-	3	6	8	9	12	48	18	48	72

Notes:

1 Reduced sampling frequency

2 Standard sampling frequency

3 Increased sampling frequency

Select appropriate frequency associated with applicable volume or population based on whichever has the highest associated frequency.

Table 3.16. Abu Dhabi Sampling Frequencies at Main Pump Station Exit Lines and Connection Supply Points

Water Supply Zone or Combination of Zones	Standard Sampling Frequency (number/ annum)																							
Volume distributed (m3/d)	Microbiological Parameters			Inorganic Chemical Parameters			Inorganic Chemical Parameters (mostly trace metals)			Organic Parameters[4]			Organic Parameters (mostly Pesticides)			Radioactive Parameters			Disinfectant By-Products			Physical Parameters		
	R[1]	S[2]	I[3]	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I
≤100	2	4	8	2	4	8	2	4	8	1	1	2	-	-	-	-	-	-	1	3	6	2	4	8
101 – 1,000	2	4	8	2	4	8	2	4	8	1	1	2	-	-	-	-	-	-	1	3	6	3	6	12
1,001 – 4,000	2	4	8	2	4	8	2	4	8	1	1	2	-	-	-	-	-	-	6	12	24	6	12	24
4,001 – 10,000	3	6	12	3	6	12	2	4	8	1	1	2	-	-	-	-	-	-	6	12	24	6	12	24
10,001 – 20,000	6	12	24	3	6	12	3	6	12	1	2	4	-	-	-	-	-	-	6	12	24	12	24	48
20, 001 – 30,000	6	12	24	3	6	12	3	6	12	2	2	4	-	-	-	-	-	-	6	12	24	12	24	48
30,001 – 60,000	12	24	48	3	6	12	3	6	12	2	2	4	-	-	-	-	-	-	6	12	24	18	36	72
60,001 – 100,000	12	24	48	3	6	12	6	12	24	2	4	6	-	-	-	-	-	-	6	12	24	18	36	72
>100,000	18	36	72	6	12	24	6	12	24	2	4	6	-	-	-	-	-	-	6	12	24	24	48	96

Notes:
1 Reduced sampling frequency
2 Standard sampling frequency
3 Increased sampling frequency
4 Apply for situations where glass-reinforced plastic (GRP)

Table 3.17. Abu Dhabi Sampling Frequencies at Desalination Plants Connection Points by Thermal Desalination Processes (Multi Stage Flash, Multi Effect Distillation, Solar, Thermal Vapor Compression)

Water Supply Zone or Combination of Zones	Standard Sampling Frequency (number/ annum)																							
Volume distributed (m3/d)	Microbiological Parameters			Inorganic Chemical Parameters			Inorganic Chemical Parameters (mostly trace metals)			Organic Parameters			Organic Parameters (mostly Pesticides)			Radioactive Parameters			Disinfectant By-Products			Physical Parameters		
	R[1]	S[2]	I[3]	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I
≤1,000	2	4	8	2	4	8	2	4	8	-	-	-	-	-	-	-	-	-	2	4	8	12	36	48
1,001 – 10,000	2	4	8	3	6	12	2	4	8	-	-	-	-	-	-	-	-	-	6	12	24	15	30	60
10,001 – 20,000	2	4	8	3	6	12	2	4	8	-	-	-	-	-	-	-	-	-	6	12	24	30	60	240
20,001 – 50,000	3	6	8	6	12	24	2	4	8	-	-	-	-	-	-	-	-	-	12	24	48	60	120	240
50,001 – 100,000	3	6	12	6	12	24	3	6	12	-	-	-	-	-	-	-	-	-	12	24	48	60	180	240
100,001 – 200,000	3	6	12	12	24	48	3	6	12	-	-	-	-	-	-	-	-	-	12	24	48	180	240	360
200,001 – 300,000	5	12	20	12	24	48	3	6	9	-	-	-	-	-	-	-	-	-	12	24	48	240	360	720
300,001 – 500,000	12	24	40	18	36	72	6	9	12	-	-	-	-	-	-	-	-	-	12	24	48	240	360	720
>500,000	24	36	48	18	36	72	6	9	12	-	-	-	-	-	-	-	-	-	12	24	48	240	360	720

Notes:
1 Reduced sampling frequency
2 Standard sampling frequency
3 Increased sampling frequency

Table 3.18. Abu Dhabi Sampling Frequencies at Well Field Connection Points

Water Supply Zone or Combination of Zones	Standard Sampling Frequency (number/ annum)																							
Volume distributed (m3/d)	Microbiological Parameters			Inorganic Chemical Parameters			Inorganic Chemical Parameters (mostly trace metals)			Organic Parameter			Organic Parameters (mostly Pesticides)			Radioactive Parameters			Disinfectant By-Products			Physical Parameters		
	R[1]	S[2]	I[3]	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I
≤100	2	4	8	2	4	8	2	4	8	2	4	8	1	1	2	-	-	-	6	12	24	2	4	8
101 – 1,000	2	4	8	2	4	8	2	4	8	2	4	8	1	2	4	-	-	-	6	12	24	3	6	12
1,001 – 2,000	2	4	8	2	4	8	3	6	12	2	4	8	3	6	12	-	-	-	12	24	48	6	12	24
2001 – 4,000	3	6	12	3	6	12	3	6	12	4	6	12	3	6	12	-	-	-	12	24	48	12	24	48
4,001 – 10,000	6	12	24	3	6	12	6	12	24	4	6	12	6	12	24	-	-	-	12	24	48	30	60	120
10,001 – 20,000	12	24	48	6	12	24	12	24	36	8	12	24	6	12	24	-	-	-	12	24	48	30	60	120

Notes:

1 Reduced sampling frequency

2 Standard sampling frequency

3 Increased sampling frequency

Table 3.19. Abu Dhabi Sampling Frequencies for Water Tankers

Water Supply Zone or Combination of Zones	Standard Sampling Frequency (number/ annum)																							
Volume distributed (m3/d)	Microbiological Parameters			Inorganic Chemical Parameters			Inorganic Chemical Parameters (mostly trace metals)			Organic Parameters[4]			Organic Parameters (mostly Pesticides)			Radioactive Parameters			Disinfectant By-Products			Physical Parameters		
	R[1]	S[2]	I[3]	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I
All sizes	1	2	4	-	-	-	1	2	4	1	2	4	-	-	-	-	-	-	-	-	-	1	2	4

Notes:
1 Reduced sampling frequency
2 Standard sampling frequency
3 Increased sampling frequency
4 Tankers internally coated (paint) are required to test for TOC and relevant organic parameters (1,2 Dichloroethane, Toluene, Benzo(a)pyrene, Vinyl Chloride) as a minimum.

Table 3.20. Abu Dhabi Sampling Frequencies for Potable Water Storage Tanks, Reservoirs, and Water Towers

Water Supply Zone or Combination of Zones	Standard Sampling Frequency (number/ annum)																							
Volume distributed (m3/d)	Microbiological Parameters			Inorganic Chemical Parameters			Inorganic Chemical Parameters (mostly trace metals)			Organic Parameter			Organic Parameters (mostly Pesticides)			Radioactive Parameters			Disinfectant By-Products			Physical Parameters		
	R[1]	S[2]	I[3]	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I	R	S	I
<2,000	2	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	8
2,001 – 10,000	2	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	8
10,001 – 50,000	2	3	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	9
50,001 – 200,000	3	4	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	9
>200,001	4	6	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	6	12

Notes:
1 Reduced sampling frequency
2 Standard sampling frequency
3 Increased sampling frequency

Table 3.21. CT Values for Inactivation of Giardia Cysts by Free Chlorine at 0.5°C or Lower*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	23	46	69	91	114	137	27	54	82	109	136	163	33	65	98	130	163	195	40	79	119	158	198	237
0.6	24	47	71	94	118	141	28	56	84	112	140	168	33	67	100	133	167	200	40	80	120	159	199	239
0.8	24	48	73	97	121	145	29	57	86	115	143	172	34	68	103	137	171	205	41	82	123	164	205	246
1	25	49	74	99	123	148	29	59	88	117	147	176	35	70	105	140	175	210	42	84	127	169	211	253
1.2	25	51	76	101	127	152	30	60	90	120	150	180	36	72	108	143	179	215	43	86	130	173	216	259
1.4	26	52	78	103	129	155	31	61	92	123	153	184	37	74	111	147	184	221	44	89	133	177	222	266
1.6	26	52	79	105	131	157	32	63	95	126	158	189	38	75	113	151	188	226	46	91	137	182	228	273
1.8	27	54	81	108	135	162	32	64	97	129	161	193	39	77	116	154	193	231	47	93	140	186	233	279
2	28	55	83	110	138	165	33	66	99	131	164	197	39	79	118	157	197	236	48	95	143	191	238	286
2.2	28	56	85	113	141	169	34	67	101	134	168	201	40	81	121	161	202	242	50	99	149	198	248	297
2.4	29	57	86	115	143	172	34	68	103	137	171	205	41	82	124	165	206	247	50	99	149	199	248	298
2.6	29	58	88	117	146	175	35	70	105	139	174	209	42	84	126	168	210	252	51	101	152	203	253	304
2.8	30	59	89	119	148	178	36	71	107	142	178	213	43	86	129	171	214	257	52	103	155	207	258	310
3	30	60	91	121	151	181	36	72	109	145	181	217	44	87	131	174	218	261	53	105	158	211	263	316

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	46	92	139	185	231	277	55	110	165	219	274	329	65	130	195	260	325	390
0.6	48	95	143	191	238	286	57	114	171	228	285	342	68	136	204	271	339	407
0.8	49	98	148	197	246	295	59	118	177	236	295	354	70	141	211	281	352	422
1	51	101	152	203	253	304	61	122	183	243	304	365	73	146	219	291	364	437
1.2	52	104	157	209	261	313	63	125	188	251	313	376	75	150	226	301	376	451
1.4	54	107	161	214	268	321	65	129	194	258	323	387	77	155	232	309	387	464
1.6	55	110	165	219	274	329	66	132	199	265	331	397	80	159	239	318	398	477
1.8	56	113	169	225	282	338	68	136	204	271	339	407	82	163	245	326	408	489
2	58	115	173	231	288	346	70	139	209	278	348	417	83	167	250	333	417	500
2.2	59	118	177	235	294	353	71	142	213	284	355	426	85	170	256	341	426	511
2.4	60	120	181	241	301	361	73	145	218	290	363	435	87	174	261	348	435	522
2.6	61	123	184	245	307	368	74	148	222	296	370	444	89	178	267	355	444	533
2.8	63	125	188	250	313	375	75	151	226	301	377	452	91	181	272	362	453	543
3	64	127	191	255	318	382	77	153	230	307	383	460	92	184	276	368	460	552

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.22. CT Values for Inactivation of Giardia Cysts by Free Chlorine at 5.0°C*

Chlorine Concentration	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
(mg/L)	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	16	32	49	65	81	97	20	39	59	78	98	117	23	46	70	93	116	139	28	55	83	111	138	166
0.6	17	33	50	67	83	100	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	114	143	171
0.8	17	34	52	69	86	103	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175
1	18	35	53	70	88	105	21	42	63	83	104	125	25	50	75	99	124	149	30	60	90	119	149	179
1.2	18	36	54	71	89	107	21	42	64	85	106	127	25	51	76	101	127	152	31	61	92	122	153	183
1.4	18	36	55	73	91	109	22	43	65	87	108	130	26	52	78	103	129	155	31	62	94	125	156	187
1.6	19	37	56	74	93	111	22	44	66	88	110	132	26	53	79	105	132	158	32	64	96	128	160	192
1.8	19	38	57	76	95	114	23	45	68	90	113	135	27	54	81	108	135	162	33	65	98	131	163	196
2	19	39	58	77	97	116	23	46	69	92	115	138	28	55	83	110	138	165	33	67	100	133	167	200
2.2	20	39	59	79	98	118	23	47	70	93	117	140	28	56	85	113	141	169	34	68	102	136	170	204
2.4	20	40	60	80	100	120	24	48	72	95	119	143	29	57	86	115	143	172	35	70	105	139	174	209
2.6	20	41	61	81	102	122	24	49	73	97	122	146	29	58	88	117	146	175	36	71	107	142	178	213
2.8	21	41	62	83	103	124	25	49	74	99	123	148	30	59	89	119	148	178	36	72	109	145	181	217
3	21	42	63	84	105	126	25	50	76	101	126	151	30	61	91	121	152	182	37	74	111	147	184	221

Chlorine Concentration	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
(mg/L)	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	33	66	99	132	165	198	39	79	118	157	197	236	47	93	140	186	233	279
0.6	34	68	102	136	170	204	41	81	122	163	203	244	49	97	146	194	243	291
0.8	35	70	105	140	175	210	42	84	126	168	210	252	50	100	151	201	251	301
1	36	72	108	144	180	216	43	87	130	173	217	260	52	104	156	208	260	312
1.2	37	74	111	147	184	221	45	89	134	178	223	267	53	107	160	213	267	320
1.4	38	76	114	151	189	227	46	91	137	183	228	274	55	110	165	219	274	329
1.6	39	77	116	155	193	232	47	94	141	187	234	281	56	112	169	225	281	337
1.8	40	79	119	159	198	238	48	96	144	191	239	287	58	115	173	230	288	345
2	41	81	122	162	203	243	49	98	147	196	245	294	59	118	177	235	294	353
2.2	41	83	124	165	207	248	50	100	150	200	250	300	60	120	181	241	301	361
2.4	42	84	127	169	211	253	51	102	153	204	255	306	61	123	184	245	307	368
2.6	43	86	129	172	215	258	52	104	156	208	260	312	63	125	188	250	313	375
2.8	44	88	132	175	219	263	53	106	159	212	265	318	64	127	191	255	318	382
3	45	89	134	179	223	268	54	108	162	216	270	324	65	130	195	259	324	389

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.23. CT Values for Inactivation of Giardia Cysts by Free Chlorine at 10°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	24	37	49	61	73	15	29	44	59	73	88	17	35	52	69	87	104	21	42	63	83	104	125
0.6	13	25	38	50	63	75	15	30	45	60	75	90	18	36	54	71	89	107	21	43	64	85	107	128
0.8	13	26	39	52	65	78	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131
1	13	26	40	53	66	79	16	31	47	63	78	94	19	37	56	75	93	112	22	45	67	89	112	134
1.2	13	27	40	53	67	80	16	32	48	63	79	95	19	38	57	76	95	114	23	46	69	91	114	137
1.4	14	27	41	55	68	82	16	33	49	65	82	98	19	39	58	77	97	116	23	47	70	93	117	140
1.6	14	28	42	55	69	83	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	96	120	144
1.8	14	29	43	57	72	86	17	34	51	67	84	101	20	41	61	81	102	122	25	49	74	98	123	147
2	15	29	44	58	73	87	17	35	52	69	87	104	21	41	62	83	103	124	25	50	75	100	125	150
2.2	15	30	45	59	74	89	18	35	53	70	88	105	21	42	64	85	106	127	26	51	77	102	128	153
2.4	15	30	45	60	75	90	18	36	54	71	89	107	22	43	65	86	108	129	26	52	79	105	131	157
2.6	15	31	46	61	77	92	18	37	55	73	92	110	22	44	66	87	109	131	27	53	80	107	133	160
2.8	16	31	47	62	78	93	19	37	56	74	93	111	22	45	67	89	112	134	27	54	82	109	136	163
3	16	32	48	63	79	95	19	38	57	75	94	113	23	46	69	91	114	137	28	55	83	111	138	166

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	25	50	75	99	124	149	30	59	89	118	148	177	35	70	105	139	174	209
0.6	26	51	77	102	128	153	31	61	92	122	153	183	36	73	109	145	182	218
0.8	26	53	79	105	132	158	32	63	95	126	158	189	38	75	113	151	188	226
1	27	54	81	108	135	162	33	65	98	130	163	195	39	78	117	156	195	234
1.2	28	55	83	111	138	166	33	67	100	133	167	200	40	80	120	160	200	240
1.4	28	57	85	113	142	170	34	69	103	137	172	206	41	82	124	165	206	247
1.6	29	58	87	116	145	174	35	70	106	141	176	211	42	84	127	169	211	253
1.8	30	60	90	119	149	179	36	72	108	143	179	215	43	86	130	173	216	259
2	30	61	91	121	152	182	37	74	111	147	184	221	44	88	133	177	221	265
2.2	31	62	93	124	155	186	38	75	113	150	188	225	45	90	136	181	226	271
2.4	32	63	95	127	158	190	38	77	115	153	192	230	46	92	138	184	230	276
2.6	32	65	97	129	162	194	39	78	117	156	195	234	47	94	141	187	234	281
2.8	33	66	99	131	164	197	40	80	120	159	199	239	48	96	144	191	239	287
3	34	67	101	134	168	201	41	81	122	162	203	243	49	97	146	195	243	292

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.24. CT Values for Inactivation of Giardia Cysts by Free Chlorine at 15°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	16	25	33	41	49	10	20	30	39	49	59	12	23	35	47	58	70	14	28	42	55	69	83
0.6	8	17	25	33	42	50	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
0.8	9	17	26	35	43	52	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88
1	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75	15	30	45	60	75	90
1.2	9	18	27	36	45	54	11	21	32	43	53	64	13	25	38	51	63	76	15	31	46	61	77	92
1.4	9	18	28	37	46	55	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
1.6	9	19	28	37	47	56	11	22	33	44	55	66	13	26	40	53	66	79	16	32	48	64	80	96
1.8	10	19	29	38	48	57	11	23	34	45	57	68	14	27	41	54	68	81	16	33	49	65	82	98
2	10	19	29	39	48	58	12	23	35	46	58	69	14	28	42	55	69	83	17	33	50	67	83	100
2.2	10	20	30	39	49	59	12	23	35	47	58	70	14	28	43	57	71	85	17	34	51	68	85	102
2.4	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86	18	35	53	70	88	105
2.6	10	20	31	41	51	61	12	24	37	49	61	73	15	29	44	59	73	88	18	36	54	71	89	107
2.8	10	21	31	41	52	62	12	25	37	49	62	74	15	30	45	59	74	89	18	36	55	73	91	109
3	11	21	32	42	53	63	13	25	38	51	63	76	15	30	46	61	76	91	19	37	56	74	93	111

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	17	33	50	66	83	99	20	39	59	79	98	118	23	47	70	93	117	140
0.6	17	34	51	68	85	102	20	41	61	81	102	122	24	49	73	97	122	146
0.8	18	35	53	70	88	105	21	42	63	84	105	126	25	50	76	101	126	151
1	18	36	54	72	90	108	22	43	65	87	108	130	26	52	78	104	130	156
1.2	19	37	56	74	93	111	22	45	67	89	112	134	27	53	80	107	133	160
1.4	19	38	57	76	95	114	23	46	69	91	114	137	28	55	83	110	138	165
1.6	19	39	58	77	97	116	24	47	71	94	118	141	28	56	85	113	141	169
1.8	20	40	60	79	99	119	24	48	72	96	120	144	29	58	87	115	144	173
2	20	41	61	81	102	122	25	49	74	98	123	147	30	59	89	118	148	177
2.2	21	41	62	83	103	124	25	50	75	100	125	150	30	60	91	121	151	181
2.4	21	42	64	85	106	127	26	51	77	102	128	153	31	61	92	123	153	184
2.6	22	43	65	86	108	129	26	52	78	104	130	156	31	63	94	125	157	188
2.8	22	44	66	88	110	132	27	53	80	106	133	159	32	64	96	127	159	191
3	22	45	67	89	112	134	27	54	81	108	135	162	33	65	98	130	163	195

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.25. CT Values for Inactivation of Giardia Cysts by Free Chlorine at 20°C*

Chlorine Concentration (mg/L)	pH<=6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	6	12	18	24	30	36	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62
0.6	6	13	19	25	32	38	8	15	23	30	38	45	9	18	27	36	45	54	11	21	32	43	53	64
0.8	7	13	20	26	33	39	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66
1	7	13	20	26	33	39	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67
1.2	7	13	20	27	33	40	8	16	24	32	40	48	10	19	29	38	48	57	12	23	35	46	58	69
1.4	7	14	21	27	34	41	8	16	25	33	41	49	10	19	29	39	48	58	12	23	35	47	58	70
1.6	7	14	21	28	35	42	8	17	25	33	42	50	10	20	30	39	49	59	12	24	36	48	60	72
1.8	7	14	22	29	36	43	9	17	26	34	43	51	10	20	31	41	51	61	12	25	37	49	62	74
2	7	15	22	29	37	44	9	17	26	35	43	52	10	21	31	41	52	62	13	25	38	50	63	75
2.2	7	15	22	29	37	44	9	18	27	35	44	53	11	21	32	42	53	63	13	26	39	51	64	77
2.4	8	15	23	30	38	45	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
2.6	8	15	23	31	38	46	9	18	28	37	46	55	11	22	33	44	55	66	13	27	40	53	67	80
2.8	8	16	24	31	39	47	9	19	28	37	47	56	11	22	34	45	56	67	14	27	41	54	68	81
3	8	16	24	31	39	47	10	19	29	38	48	57	11	23	34	45	57	68	14	28	42	55	69	83

Chlorine Concentration (mg/L)	pH<=8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	12	25	37	49	62	74	15	30	45	59	74	89	18	35	53	70	88	105
0.6	13	26	39	51	64	77	15	31	46	61	77	92	18	36	55	73	91	109
0.8	13	26	40	53	66	79	16	32	48	63	79	95	19	38	57	75	94	113
1	14	27	41	54	68	81	16	33	49	65	82	98	20	39	59	78	98	117
1.2	14	28	42	55	69	83	17	33	50	67	83	100	20	40	60	80	100	120
1.4	14	28	43	57	71	85	17	34	52	69	86	103	21	41	62	82	103	123
1.6	15	29	44	58	73	87	18	35	53	70	88	105	21	42	63	84	105	126
1.8	15	30	45	59	74	89	18	36	54	72	90	108	22	43	65	86	108	129
2	15	30	46	61	76	91	18	37	55	73	92	110	22	44	66	88	110	132
2.2	16	31	47	62	78	93	19	38	57	75	94	113	23	45	68	90	113	135
2.4	16	32	48	63	79	95	19	38	58	77	96	115	23	46	69	92	115	138
2.6	16	32	49	65	81	97	20	39	59	78	98	117	24	47	71	94	118	141
2.8	17	33	50	66	83	99	20	40	60	79	99	119	24	48	72	95	119	143
3	17	34	51	67	84	101	20	41	61	81	102	122	24	49	73	97	122	146

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.26. CT Values for Inactivation of Giardia Cysts by Free Chlorine at 25°C*

Chlorine Concentration (mg/L)	pH< = 6 Log Inactivations						pH = 6.5 Log Inactivations						pH = 7.0 Log Inactivations						pH = 7.5 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	4	8	12	16	20	24	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	28	35	42
0.6	4	8	13	17	21	25	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43
0.8	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44
1	4	9	13	17	22	26	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45
1.2	5	9	14	18	23	27	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46
1.4	5	9	14	18	23	27	6	11	17	22	28	33	7	13	20	26	33	39	8	16	24	31	39	47
1.6	5	9	14	19	23	28	6	11	17	22	28	33	7	13	20	27	33	40	8	16	24	32	40	48
1.8	5	10	15	19	24	29	6	11	17	23	28	34	7	14	21	27	34	41	8	16	25	33	41	49
2	5	10	15	19	24	29	6	12	18	23	29	35	7	14	21	27	34	41	8	17	25	33	42	50
2.2	5	10	15	20	25	30	6	12	18	23	29	35	7	14	21	28	35	42	9	17	26	34	43	51
2.4	5	10	15	20	25	30	6	12	18	24	30	36	7	14	22	29	36	43	9	17	26	35	43	52
2.6	5	10	16	21	26	31	6	12	19	25	31	37	7	15	22	29	37	44	9	18	27	35	44	53
2.8	5	10	16	21	26	31	6	12	19	25	31	37	8	15	23	30	38	45	9	18	27	36	45	54
3	5	11	16	21	27	32	6	13	19	25	32	38	8	15	23	31	38	46	9	18	28	37	46	55

Chlorine Concentration (mg/L)	pH< = 8 Log Inactivations						pH = 8.5 Log Inactivations						pH = 9.0 Log Inactivations					
	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0	0.5	1.0	1.5	2.0	2.5	3.0
<=0.4	8	17	25	33	42	50	10	20	30	39	49	59	12	23	35	47	58	70
0.6	9	17	26	34	43	51	10	20	31	41	51	61	12	24	37	49	61	73
0.8	9	18	27	35	44	53	11	21	32	42	53	63	13	25	38	50	63	75
1	9	18	27	36	45	54	11	22	33	43	54	65	13	26	39	52	65	78
1.2	9	18	28	37	46	55	11	22	34	45	56	67	13	27	40	53	67	80
1.4	10	19	29	38	48	57	12	23	35	46	58	69	14	27	41	55	68	82
1.6	10	19	29	39	48	58	12	23	35	47	58	70	14	28	42	56	70	84
1.8	10	20	30	40	50	60	12	24	36	48	60	72	14	29	43	57	72	86
2	10	20	31	41	51	61	12	25	37	49	62	74	15	29	44	59	73	88
2.2	10	21	31	41	52	62	13	25	38	50	63	75	15	30	45	60	75	90
2.4	11	21	32	42	53	63	13	26	39	51	64	77	15	31	46	61	77	92
2.6	11	22	33	43	54	65	13	26	39	52	65	78	16	31	47	63	78	94
2.8	11	22	33	44	55	66	13	27	40	53	67	80	16	32	48	64	80	96
3	11	22	34	45	56	67	14	27	41	54	68	81	16	32	49	65	81	97

*$CT_{99.9}$ =CT for 3 log inactivation.

Table 3.27. CT Values for Inactivation of Viruses by Free Chlorine

	Log Inactivation		Log Inactivation		Log Inactivation	
	2.0 pH		3.0 pH		4.0 pH	
Temperature (C)	6-9	10	6-9	10	6-9	10
0.5	6	45	9	66	12	90
5	4	30	6	44	8	60
10	3	22	4	33	6	45
15	2	15	3	22	4	30
20	1	11	2	16	3	22
25	1	7	1	11	2	15

Table 3.28. CT Values for Inactivation of Giardia Cysts by Chlorine Dioxide

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
0.5-log	10	4.3	4	3.2	2.5	2
1-log	21	8.7	7.7	6.3	5	3.7
1.5-log	32	13	12	10	7.5	5.5
2-log	42	17	15	13	10	7.3
2.5-log	52	22	19	16	13	9
3-log	63	26	23	19	15	11

Table 3.29. CT Values for Inactivation of Viruses by Free Chlorine Dioxide pH 6-9

	Temperature (C)					
Removal	<=1	5	10	15	20	25
2-log	8.4	5.6	4.2	2.8	2.1	1.4
3-log	25.6	17.1	12.8	8.6	6.4	4.3
4-log	50.1	33.4	25.1	16.7	12.5	8.4

Table 3.30 CT Values for Inactivation of Giardia Cysts by Ozone

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
0.5-log	0.48	0.32	0.23	0.16	0.12	0.08
1-log	0.97	0.63	0.48	0.32	0.24	0.16
1.5-log	1.5	0.95	0.72	0.48	0.36	0.24
2-log	1.9	1.3	0.95	0.63	0.48	0.32
2.5-log	2.4	1.6	1.2	0.79	0.60	0.40
3-log	2.9	1.9	1.43	0.95	0.72	0.48

Table 3.31. CT Values for Inactivation of Viruses by Free Ozone

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
2-log	0.9	0.6	0.5	0.3	0.25	0.15
3-log	1.4	0.9	0.8	0.5	0.4	0.25
4-log	1.8	1.2	1.0	0.6	0.5	0.3

Table 3.32. CT Values for Inactivation of Giardia Cysts by Chloramine pH 6-9

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
0.5-log	635	365	310	250	185	125
1-log	1,270	735	615	500	370	250
1.5-log	1,900	1,100	930	750	550	375
2-log	2,535	1,470	1,230	1,000	735	500
2.5-log	3,170	1,830	1,540	1,250	915	625
3-log	3,800	2,200	1,850	1,500	1,100	750

Table 3.33. CT Values for Inactivation of Viruses by Chloramine

	Temperature (C)					
Inactivation	<=1	5	10	15	20	25
2-log	1,243	857	643	428	321	214
3-log	2,063	1,423	1,067	712	534	356
4-log	2,883	1,988	1,491	994	746	497

Table 3.34. CT Values for Inactivation of Viruses by UV

Log Inactivation	
2.0	3.0
21	36

CHAPTER 4

WASTEWATER

4.1. SCOPE

This Chapter contains criteria to control and regulate discharges of wastewater into surface waters. This includes, but is not limited to, storm water runoff associated with industrial activities, domestic and industrial wastewater discharges, and pollutants from indirect dischargers.

4.2. DEFINITIONS

4.2.1. 7-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of seven consecutive days.

4.2.2. 30-day Average. The arithmetic mean of pollutant parameter values for samples collected in a period of 30 consecutive days.

4.2.3. Average Monthly Discharge Limitations. The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

4.2.4. Average Weekly Discharge Limitation. The highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

4.2.5. Best Management Practices (BMP). Practical practices and procedures that will minimize or eliminate the possibility of pollution being introduced into waters of the host nation.

4.2.6. Biochemical Oxygen Demand (BOD_5). The five-day measure of the dissolved oxygen used by microorganisms in the biochemical oxidation of organic matter. The pollutant parameter is biochemical oxygen demand (i.e., biodegradable organics in terms of oxygen demand).

4.2.7. Carbonaceous BOD_5 ($CBOD_5$). The five-day measure of the pollutant parameter, $CBOD_5$. This test can substitute for the BOD_5 testing which suppresses the nitrification reaction/component in the BOD_5 test.

4.2.8. Conventional Pollutants. BOD_5, total suspended solids (TSS), oil and grease, fecal coliforms, and pH.

4.2.9. Daily Discharge. The "discharge of a pollutant" measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) "daily discharge" is calculated as the average measurement of the pollutant over the day.

4.2.10. Direct Discharge. Any "discharge of pollutants" other than an indirect discharge.

4.2.11. Discharge of a Pollutant. Any addition of any pollutant or combination of pollutants to waters of the host nation from any "point source."

4.2.12. Domestic Wastewater Treatment System (DWTS). Any DoD or HN facility designed to treat wastewater before its discharge to waters of the host nation and in which the majority of such wastewater is made up of domestic sewage.

4.2.13. Effluent Limitation. Any restriction imposed on quantities, discharge rates, and concentrations of pollutants that are ultimately discharged from point sources into waters of the host nation.

4.2.14. Existing Source. A source in operation, or under construction, prior to 1 October 1994, unless it is subsequently substantially modified, that discharges pollutants.

4.2.15. Indirect Discharge. An introduction of pollutants in process wastewater to a DWTS.

4.2.16. Industrial Activities Associated with Storm Water. Activities that may contribute pollutants to storm water runoff or drainage during wet weather events. (See Table 4.16, "Best Management Practices.")

4.2.17. Industrial Wastewater Treatment System (IWTS). Any DoD facility other than a DWTS designed to treat process wastewater before its discharge to waters of the host nation.

4.2.18. Interference. Any addition of any pollutant or combination of pollutant discharges that inhibits or disrupts the DWTS, its treatment processes or operations, or its sludge handling processes, use or disposal.

4.2.19. Maximum Daily Discharge Limitation. The highest allowable daily discharge based on volume as well as concentration.

4.2.20. New Source. A source built or substantially modified on or after 1 October 1994 that directly or indirectly discharges pollutants to the wastewater system.

4.2.21. Point Source. Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock; but not including vessels, aircraft, or any conveyance that merely collects natural surface flows of precipitation.

4.2.22. Pollutant. Includes, but is not limited to, the following: dredged spoil; solid waste; incinerator residue; filter backwash; sewage; garbage; sewage sludge; munitions; chemical waste; biological material; radioactive material; heat; wrecked or discarded equipment; rock; sand; cellar dirt; and industrial, municipal, and agricultural waste discharged into water.

4.2.23. Process Wastewater. Any water which during manufacturing or processing, comes into direct contact with, or results from the production or use of, any raw material, intermediate product, finished product, by-product, or waste product.

4.2.24. Regulated Facilities. Those facilities for which criteria are established under this Chapter, such as DWTS, IWTS, or industrial discharges.

4.2.25. Storm Water. Run-off and drainage from wet weather events such as rain, snow, ice, sleet, or hail.

4.2.26. Substantial Modification. Any modification to a facility, the cost of which exceeds 3.67M Dirham (AED) ($1,000,000), regardless of funding source.

4.2.27. Total Suspended Solids (TSS). The pollutant parameter total filterable suspended solids.

4.2.28. Total Toxic Organics (TTO). The summation of all quantifiable values > 0.01 mg/L for the toxic organics in Table 4.14, "Components of Total Toxic Organics."

4.2.29. Waters of the Host Nation. Surface water including the territorial seas recognized under customary international law, including:

4.2.29.1. All waters which are currently used, were used in the past, or may be susceptible to use in commerce.

4.2.29.2. Waters which are or could be used for recreation or other purposes.

4.2.29.3. Waters from which fish or shellfish are or could be taken and sold.

4.2.29.4. Waters which are used or could be used for industrial purposes by industries.

4.2.29.5. Waters including lakes, rivers, streams (including intermittent streams), sloughs, prairie potholes, or natural ponds.

4.2.29.6. Tributaries of waters identified in subparagraphs C4.2.29.1. through C4.2.29.5. of this definition.

4.2.29.7. Exclusions to waters of the host nation. Domestic or industrial waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of this Chapter, are not waters of the host nation. This exclusion applies only to manmade bodies of water that were neither originally waters of the host nation nor resulted from impoundment of waters of the host nation.

4.3. CRITERIA

4.3.1. Effluent Limitations for Direct Dischargers of Conventional Pollutants

4.3.1.1. All new sources of pollutants directly discharged to waters of host nations will comply with the following effluent limitations:

4.3.1.1.1. $\underline{BOD_5}$

4.3.1.1.1.1. The 30-day average will not exceed 30 mg/L.

4.3.1.1.1.2. The 7-day average will not exceed 45 mg/L. In Dubai, the 7-day average shall not exceed 30 mg/L.

4.3.1.1.1.3. $CBOD_5$ may be substituted for BOD_5. $CBOD_5$ limit, if substituted for the parameter BOD_5, should be at least 5 mg/L less than each numerical limit for the 30-day and 7-day average for the BOD_5 limit. The $CBOD_5$ test procedure suppresses the nitrification component in the BOD_5 test procedure, thereby reducing the value or effects and lowering the oxygen demand. When $CBOD_5$ is substituted for BOD_5, the following limits will apply:

4.3.1.1.1.3.1. 30-day average will not exceed 25 mg/L.

4.3.1.1.1.3.2. The 7-day average will not exceed 40 mg/L. In Dubai, the 7-day average shall not exceed 25 mg/L.

4.3.1.1.2. <u>TSS</u>

4.3.1.1.2.1. The 30-day average will not exceed 30 mg/L.

4.3.1.1.2.2. The 7-day average will not exceed 45 mg/L. In Dubai, the 7-day average shall not exceed 30 mg/L. In Jebel Ali, the 7-day average shall not exceed 30 mg/L for harbor and open water discharges for all other discharges the 7-day average will not exceed 45mg/L.

4.3.1.1.2.3. The effluent pH values will be maintained between 6.0 and 9.0.

4.3.1.1.3. <u>Discharges to Dubai Creeks</u>. Sewage discharge effluents to the Dubai creek shall be treated to achieve 10 mg/L suspended solids and 10 mg/L of BOD_5. Contact the LEC to determine if any other permissible limits apply.

4.3.1.2. Existing sources of pollutants to waters of host nations will comply with the following effluent limitations:

4.3.1.2.1. $\underline{BOD_5}$

4.3.1.2.1.1. The 30-day average will not exceed 45 mg/L.

4.3.1.2.1.2. The 7-day average will not exceed 65 mg/L. In Abu Dhabi and the Jebel Ali area, the 7-day average shall not exceed 50 mg/L.

4.3.1.2.1.3. $\underline{BOD_5 \text{ limit in Dubai}}$. BOD_5 shall not exceed 30 mg/L regardless of the measuring period.

4.3.1.2.2. <u>TSS</u>

4.3.1.2.2.1. The 30-day average will not exceed 45 mg/L.

4.3.1.2.2.2. The 7-day average will not exceed 65 mg/L. In Abu Dhabi, the 7-day average shall not exceed 50 mg/L.

4.3.1.2.2.3. TSS Limit in Dubai. TSS shall not exceed 30 mg/L regardless of the measuring period.

4.3.1.2.2.4. TSS Limit in Jebel Ali. TSS shall not exceed 40 mg/L regardless of the measuring period.

4.3.1.2.2.5. The effluent pH values will be maintained between 6.0 and 9.0.

4.3.1.2.3. Discharges to Dubai Creeks. Sewage discharge effluents to the Dubai creek shall be treated to achieve 10 mg/L suspended solids and 10 mg/L of BOD_5. Contact the LEC to determine if any other permissible limits apply.

4.3.1.3. Additional Parameters. In addition to BOD_5 and TSS, new and existing sources of pollution to waters of the UAE will comply with the additional effluent limits included in:

4.3.1.3.1. Abu Dhabi. Table 4.1 for treated industrial wastewater discharges in Abu Dhabi;

4.3.1.3.2. Dubai. Table 4.2 for wastewater discharges to marine environment in Dubai; and,

4.3.1.3.3. Jebel Ali. Table 4.3 for wastewater discharges to open waters and harbors in Jebel Ali. In addition, industrial and domestic wastewater shall not be comingled prior to any discharge/ disposal activities in Jebel Ali. Contact the LEC to determine requirements should comingling exist or if it is suspected.

4.3.1.4. Prohibited Substances for Discharge to the Marine Environment

4.3.1.4.1. Dubai. The following compounds or materials are strictly prohibited for discharge into the marine environment in Dubai:

4.3.1.4.1.1. Pesticides, herbicides and insecticides

4.3.1.4.1.2. PCBs and chlorinated organic compounds

4.3.1.4.1.3. Radioactive elements

4.3.1.4.1.4. All materials produced for biological or chemical warfare

4.3.1.4.1.5. Any other compounds or materials deleterious to the marine environment as specified by the Competent Authority.

4.3.1.4.2. Jebel Ali. The following substances are prohibited substances in Jebel Ali and shall not be discharged to the water environment:

4.3.1.4.2.1. Pesticides and herbicides

4.3.1.4.2.2. Oils or solvent wastes

4.3.1.4.2.3. Radioactive wastes

4.3.1.4.2.4. Residues from the removal of antifouling paints

4.3.1.4.2.5. Any other substance/ material determined by the Competent Authority to be a prohibited substance/ material

4.3.1.4.2.6. Untreated sewage waste (to harbors)

4.3.1.5. Discharges to Land in Dubai and Jebel Ali. Installations. including military installations, shall comply with the effluent limitations for discharges to land in Dubai and Jebel Ali as included in Table 4.5 and Table 4.6, respectively.

4.3.1.6. Monitoring. Monitoring requirements apply to all regulated facilities. The monitoring frequency (including both sampling and analysis) given in Table 4.15, "Monitoring Requirements Based on Plant Capacity," and Table 4.4, which specifies monitoring requirements specific to marine discharges, includes all three parameters which are regulated (BOD_5, TSS, and pH). Samples shall be collected at the point of discharge to the waters of the host nation.

4.3.1.6.1. Monitoring Programs. Contact the LEC to coordinate approval for monitoring programs related to the following approved discharges:

4.3.1.6.1.1. Approval to release pollutants to the marine environment in Abu Dhabi;

4.3.1.6.1.2. Approval for re-use and land disposal of wastewater and sludge may require a monitoring program in Dubai;

4.3.1.6.1.3. Approval to discharge treated wastewater to harbor in Jebel Ali.

4.3.1.6.2. Sampling Requirements in Dubai. All discharge areas shall be equipped with a sampling point to provide access for taking representative samples of the waste being discharged. Discharge points to the water environment shall be sited at a minimum of 1 meter (3.28 feet) below the lowest low tide level at the proposed discharge site.

4.3.1.6.3. Additional Monitoring Requirements in Dubai. In addition, facilities shall monitor discharges to ensure that wastewater does not result in:

4.3.1.6.3.1. Visible floating particles / matter, grease or oil;

4.3.1.6.3.2. Aesthetically undesirable discoloration;

4.3.1.6.3.3. Visible residual effects in water or on branches, rocks or structures;

4.3.1.6.3.4. Alteration of organic matter in adjacent sediments which may led to the degradation of benthic marine life;

4.3.1.6.3.5. Objectionable aquatic growth which degrades indigenous biota;

4.3.1.6.3.6. Objectionable odors emanating from receiving water at point of disposal; and,

4.3.1.6.3.7. Alteration of the natural taste, odor, color and overall quality of fish, shellfish or other marine resources used for human consumption.

4.3.1.6.4. Additional Monitoring Requirements in Jebel Ali. Wastewater point sources of industrial facilities shall be liable, as determined on a case by case basis, for performance testing prior to commencing operation as well as on a weekly basis, to assure compliance with relevant standards.

4.3.1.7. Recordkeeping Requirements. The following monitoring and recordkeeping requirements are BMPs and apply to all facilities. In Dubai, sampling analysis results must be submitted to the LEC for forwarding to the Competent Authority as required. Retain records for three years.

4.3.1.7.1. The effluent, concentration, or other measurement specified for each regulated parameter.

4.3.1.7.1.1. Additional Requirements in Dubai. Qualitative details of the discharged waste shall also be recorded.

4.3.1.7.1.2. Additional Requirements in Jebel Ali. Exceedances in threshold values of standards shall be recorded. A 20% exceedances shall be immediately reported to the LEC for forwarding to the Competent Authority, along with the following details: date and level of exceedances, reason(s) of having exceedances, action(s) taken to prevent, control or mitigate exceedances, and any action(s) taken or to be taken to prevent re-occurrence of exceedances.

4.3.1.7.2. The daily volume of effluent discharge from each point source.

4.3.1.7.2.1. Additional Requirements in Abu Dhabi. Total and pollutant discharge rates shall be reported annually to the LEC for forwarding to the Competent Authority as required.

4.3.1.7.2.2. Additional Requirements in Dubai. Discharge volumes, locations and types shall be recorded as part of the wastewater survey.

4.3.1.7.3. Test procedures for the analysis of pollutants.

4.3.1.7.4. The date, exact place, and time of sampling and/or measurements.

4.3.1.7.5. The name of the person who performed the sampling and/or measurements.

4.3.1.7.6. The date of analysis.

4.3.1.8. Complaint System. A system for investigating water pollution complaints from individuals or HN water pollution control authorities will be established, involving the EEA, as appropriate.

4.3.1.9. Limited Effluent Standards. If DWTS plant capacity is between 0.0 and 185.49 m^3 (0.0 and 0.049 million gallons per day (MGD)), monthly sample must comply with level for 30-day average.

4.3.2. Effluent Limitations for Non-Categorical Industrial Indirect Dischargers

4.3.2.1. Effluent Limits. The following effluent limits will apply to all discharges of pollutants to DWTSs and associated collection systems from process wastewater for which categorical standards have not been established (see subparagraphs 4.3.3.1.8., 4.3.3.1.9., and 4.3.3.1.10. for a list of categorical standards).

4.3.2.1.1. Solid or Viscous Pollutants. The discharge of solid or viscous pollutants, or any other substance which alone, or in combination with other substances, that would result in an obstruction to the domestic wastewater treatment plant flow is prohibited.

4.3.2.1.2. Ignitability and Explosivity

4.3.2.1.2.1. The discharge of wastewater with a closed cup flashpoint of < 60°C (140°F) is prohibited.

4.3.2.1.2.2. The discharge of waste with any of the following characteristics is prohibited:

4.3.2.1.2.2.1. A liquid solution that contains more than 24% alcohol by volume and has a flash point < 60°C (140°F).

4.3.2.1.2.2.2. A non-liquid which under standard temperature and pressure can cause a fire through friction.

4.3.2.1.2.2.3. An ignitable compressed gas.

4.3.2.1.2.2.4. An oxidizer, such as peroxide.

4.3.2.1.2.2.5. In Jebel Ali. Volatile petroleum products.

4.3.2.1.2.2.6. In Jebel Ali. Any additional compounds which in its state or in combination produce in the sewers a flammable compound.

4.3.2.1.3. Reactivity and Fume Toxicity. The discharge of any of the following wastes is prohibited:

4.3.2.1.3.1. Wastes that are normally unstable and readily undergo violent changes without detonating;

4.3.2.1.3.2. Wastes that react violently with water;

4.3.2.1.3.3. Wastes that form explosive mixtures with water or forms toxic gases or fumes when mixed with water (e.g., Calcium carbide);

4.3.2.1.3.4. Cyanide or sulfide waste that can generate potentially harmful toxic fumes, gases, or vapors;

4.3.2.1.3.5. Waste capable of detonation or explosive decomposition or reaction at standard temperature and pressure;

4.3.2.1.3.6. Wastes that contain explosives regulated by Chapter 5, "Hazardous Material";

4.3.2.1.3.7. Wastes that produce any toxic fumes, vapors, or gases with the potential to cause safety problems or harm to workers;

4.3.2.1.3.8. In Jebel Ali. Wastes that will persist in water including polychlorinated biphenyls (PCBs), chlorinated pesticides and other similar chlorinated organic compounds;

4.3.2.1.3.9. In Jebel Ali. Radioactive materials;

4.3.2.1.3.10. In Jebel Ali. Chlorinated hydrocarbons or related compounds; and

4.3.2.1.3.11. In Jebel Ali. Any additional compounds which in its state or in combination produce in the sewers a flammable compound.

4.3.2.1.4. Corrosivity. It is prohibited to discharge pollutants with the potential to be structurally corrosive to the DWTS. In addition, no discharge of wastewater below a pH of 5.0 is allowed, unless the DWTS is specifically designed to handle that type of wastewater.

4.3.2.1.5. Oil and Grease. The discharge of the following oils that can pass through or cause interference to the DWTS is prohibited: petroleum oil, non-biodegradable cutting oil, and products of mineral oil origin.

4.3.2.1.6. Discharge Effluent Limits in Dubai and Jebel Ali. Effluent discharges shall not exceed the maximum limits shown in Tables 4.7 and 4.8 for Dubai and Jebel Ali, respectively.

4.3.2.1.7. Spills and Batch Discharges (slugs). Activities or installations that have a significant potential for spills or batch discharges will develop a slug prevention plan. Each plan must contain the following minimum requirements:

4.3.2.1.7.1. Description of discharge practices, including non-routine batch discharges;

4.3.2.1.7.2. Description of stored chemicals;

4.3.2.1.7.3. Plan for immediately notifying the DWTS of slug discharges and discharges that would violate prohibitions under this Chapter, including procedures for subsequent written notification within five days;

4.3.2.1.7.4. Necessary practices to prevent accidental spills. This would include proper inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, and worker training.

4.3.2.1.7.5. Proper procedures for building containment structures or equipment;

4.3.2.1.7.6. Necessary measures to control toxic organic pollutants and solvents; and

4.3.2.1.7.7. Proper procedures and equipment for emergency response, and any subsequent plans necessary to limit damage suffered by the treatment plant or the environment.

4.3.2.1.7.8. Also see Chapter 16, "Spill Prevention and Response Planning."

4.3.2.1.7.9. Additional Requirements in Jebel Ali. Facilities producing wastewater are required to have on-site capacity for two days storage of industrial wastewater for emergencies. The storage pond or tank shall be lined with an HDPE liner (minimum: 2.0 m thick) below the concrete base. Proper leak detection and ground water monitoring wells shall also be installed. Contact the LEC for information on requirements.

4.3.2.1.8. Trucked and Hauled Waste. The discharge of trucked and hauled waste into the DWTS, except at locations specified by the DWTS operator, is prohibited.

4.3.2.1.9. Heat. Heat in amounts that inhibit biological activity in the DWTS resulting in interference, but in no case in such quantities that the temperature of the process water at the DWTS exceeds 40°C (104°F) or in the case of Dubai and Jebel Ali, be > 40°C (104°F) or more than 5°C (41°F) higher than ambient in cases where ambient is < 40°C (104°F).

4.3.2.2. Complaint System. A system for investigating water pollution complaints from HN water pollution control authorities will be established, involving the EEA as appropriate.

4.3.3. Effluent Limitations for Categorical Industrial Dischargers (Direct or Indirect). Any installations which have activities that fall into any of the industrial categories listed below must comply with the following effluent limitations (i.e., either direct or indirect discharge limitations at the source of the discharge). For most categories, the effluent limitations are the same for new and existing activities. Where differences in limitations exist, activities constructed or substantially modified on or after 1 October 1994 will meet the limitations for new activities.

4.3.3.1. Electroplating. The following discharge standards apply to electroplating operations in which metal is electroplated on any basis material and to related metal finishing operations as set forth in the various subparts. These standards apply whether such operations are operations are conducted in conjunction with electroplating, independently, or as part of some other operation. Electroplating subparts are identified as follows:

4.3.3.1.1. Electroplating of Common Metals. Discharges of pollutants in process waters resulting from the process in which a material is electroplated with copper, nickel, chromium, zinc, tin, lead, cadmium, iron, aluminum, or any combination thereof.

4.3.3.1.2. Electroplating of Precious Metals. Discharges of pollutants in process waters resulting from the process in which a material is plated with gold, silver, iridium, palladium, platinum, rhodium, ruthenium, or any combination thereof.

4.3.3.1.3. Anodizing. Discharges of pollutants in process waters resulting from the anodizing of ferrous and nonferrous materials.

4.3.3.1.4. Metal Coatings. Discharges of pollutants in process waters resulting from the chromating, phosphating, or immersion plating on ferrous and nonferrous materials.

4.3.3.1.5. Chemical Etching and Milling. Discharges of pollutants in process waters resulting from the chemical milling or etching of ferrous and nonferrous materials.

4.3.3.1.6. Electroless Plating. Discharges of pollutants in process waters resulting from the electroless plating of a metallic layer on a metallic or nonmetallic substrate.

4.3.3.1.7. Printed Circuit Board Manufacturing. Discharges of pollutants in process waters resulting from the manufacture of printed circuit boards, including all manufacturing operations required or used to convert an insulating substrate to a finished printed circuit board.

4.3.3.1.8. The following discharge standards apply to new and existing facilities in the above electroplating subparts which directly or indirectly discharge < 38,000 liters per day (10,000 gallons per day):

Pollutant	**Daily Maximum (mg/L)**	**4-day Average (mg/L)**
Cyanide, amenable	5.0	2.7
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Toxic Organics	4.57	---

4.3.3.1.9. The following discharge standards apply to new and existing facilities in the above electroplating subparts that directly, or indirectly, discharge 38,000 liters per day (10,000 gallons per day) or more:

Pollutant	**Daily Maximum (mg/L)**	**4-day Average (mg/L)**
Cyanide, total	1.9	1.0

Copper	4.5	2.7
Nickel	4.1	2.6
Chrome	7.0	4.0
Zinc	4.2	2.6
Lead	0.6	0.4
Cadmium	1.2	0.7
Total Metals	10.5	6.8
Total Toxic Organics	2.13	---

4.3.3.1.10. In addition to the above standards, new and existing facilities that electroplate precious metals and that directly or indirectly discharge 38,000 liters per day (10,000 gallons per day) or more must comply with the following standard:

Pollutant	**Daily Maximum (mg/L)**	**4-day Average (mg/L)**
Silver	1.2	0.7

4.3.3.1.11. Electroplating Liquid Discharge Handling Requirements for Sharjah. Installations shall handle wastewater from electroplating works as follows:

4.3.3.1.11.1. Process baths shall be recycled after concentration and filtration. Rinse waters shall be recycled after filtration.

4.3.3.1.11.2. Racks shall be cleaned between baths to minimize contamination.

4.3.3.1.11.3. Degreasing baths containing chlorinated solvents shall be covered when not in operation to reduce losses.

4.3.3.1.11.4. Spent solvents shall be sent to solvent recyclers and the residue from solvent recovery properly managed.

4.3.3.1.11.5. Underground sumps storing liquid wastes shall be routinely inspected to assure proper maintenance.

4.3.3.1.11.6. Contact the LEC to determine requirement to forward wastewater samples to the Competent Authority for separate analysis.

4.3.3.2. Laundry Wastewater Discharge Handling Requirements for Sharjah. Installations shall handle wastewater from laundry activities as follows:

4.3.3.2.1. Rinsing water shall be collected and recycled back into the system.

4.3.3.2.2. Wastewater shall be analyzed, pre-treated, neutralized or separated prior to disposal.

4.3.3.3. Monitoring. Monitoring of categorical industrial dischargers (including both sampling and analysis) will be accomplished quarterly and will include all parameters that are specified in the paragraph of this Chapter dealing with industrial dischargers. Samples should be collected at the point of discharge prior to any mixing with the receiving water. Sampling for TTO may not be required if the commanding officer determines that no discharge of concentrated toxic organics into the wastewater has occurred and the facility has implemented a TTO management plan. (See Table 4.15, "Monitoring Requirements.")

4.3.4. Storm Water Management

4.3.4.1. Develop and implement storm water pollution prevention (P2) plans (SWPPP) for activities listed in Table 4.16, "Best Management Practices." Update the SWPPP annually using in-house resources.

4.3.4.2. Employee Training. Personnel who handle hazardous substances or perform activities that could contribute pollution in wet weather events should be trained in appropriate BMPs. Such training should stress P2 principles and awareness of possible pollution sources, including non-traditional sources such as sediment, nitrates, pesticides, and fertilizers.

4.3.4.3. Additional Storm Water Management Requirements in Jebel Ali. Installations, in Jebel Ali shall comply with the following regulations regarding disposal of potentially contaminated or uncontaminated storm water:

4.3.4.3.1. Potentially contaminated storm water (e.g., Bermuda storage tanks, process areas, etc.) shall be contained and analyzed, prior to disposal, as required by the Competent Authority.

4.3.4.3.2. Rainwater or storm water from uncontaminated areas is allowed for disposal to the marine environment.

4.3.5. Septic System. Discharge to a septic system of wastewater containing industrial pollutants in levels that will inhibit biological activity is prohibited. Known discharges of industrial pollutants to existing septic systems shall be eliminated, and appropriate actions should be taken to eliminate contamination. Siting of such systems is addressed in Chapter 3, "Drinking Water."

4.3.6. Sludge Disposal. All sludge produced during the treatment of wastewater will be disposed in accordance with the guidance under Chapter 6, "Hazardous Waste" or Chapter 7, "Solid Waste," as appropriate.

4.3.6.1. Sludge Disposal to Land in Dubai and Jebel Ali. Disposal limits for sludge produced during wastewater treatment and disposed on land are included in Table 4.9.

4.3.6.2. Additional Handling Requirements in Jebel Ali. Soakaways (i.e., location specific discharges to ground) for industrial waste handling at new facilities are prohibited. Phase-out or replace existing industrial soakaways with proper effluent treatment facilities.

4.3.7. Approvals

4.3.7.1. Wastewater Discharge Approval. Approvals for wastewater disposal or re-use are required. Consult the LEC to obtain approvals.

4.3.7.1.1. Dubai. Approval is required for discharge of following types of waste to sewer, land, and marine environment in Dubai.

Waste Type	Sewer	Land	Marine
Domestic	Not required	Required	Required
Trade or Industrial	Required	Required	Required

4.3.7.1.2. Dubai. Approval is required for sludge disposal or re-use as soil conditioner. Installations shall be exempt from obtaining approval if sludge has been stockpiled for a period ≥ 5 years or if sludge has been sterilized to an approved level.

4.3.7.1.3. Jebel Ali. The following disposal/ discharge activities require approval in Jebel Ali:

4.3.7.1.3.1. Approval for harbor wastewater disposal in Jebel Ali

4.3.7.1.3.2. Approval for open water disposal in Jebel Ali.

4.3.7.1.3.3. Approval to discharge industrial wastewater to the sewerage system.

4.3.7.1.3.4. Approval for trade waste disposal.

4.3.8. Ambient Standards. In Abu Dhabi, Dubai and Jebel Ali, installations shall consult the ambient marine water quality standards included in Tables 4.10 through 4.12 and ensure that wastewater discharge does not lead to exceedances of these standards. In Jebel Ali, installations shall also consult the land contaminant indicator levels included in Table 4.13. These levels shall not be exceeded due to installation activities.

Table 4.1. Characteristics of Treated Industrial Wastewater at Point of Discharge into the Sea in Abu Dhabi

Parameter	Symbol	Suggested Limits (mg/l unless otherwise specified
Physical Properties		
Total Dissolved Solids	TDS	1500
pH		6-9 pH Units
Floating Particles		None
Temperature (higher than background)	T	5 °C
Turbidity		75 NTU
Inorganic Chemical Properties		
Total Ammonia (as N)	NH_4^+	2
Nitrate	NO_3-N	40
Chlorine Residual	Cl^-	1
Cyanide	CN^-	0.05
Dissolved Oxygen	DO	>3
Fluoride	F^-	20
Sulfide	S^{-2}	0.1
Total Kleidahi Nitrogen (as N)	TKN	10
Total Phosphorus (as P)	PO_4^{-3}	2
Chemical Oxygen Demand	COD	100
Trace Metals		
Aluminum	Al	20
Antimony	Sb	0.1
Arsenic	As	0.05
Barium	Ba	2
Beryllium	Be	0.05
Cadmium	Cd	0.05
Total Chromium	Cr	0.2
Chromium VI	Cr^{+6}	0.15
Cobalt	Co	0.2
Copper	Cu	0.5
Iron	Fe	2
Lead	Pb	0.1
Manganese	Mn	0.2
Mercury	Hg	0.001
Nickel	Ni	0.1
Selenium	Se	0.02
Silver	Ag	0.005
Zinc	Zn	0.5
Organic Chemical Properties		
Halogenated Hydrocarbons & Pesticides		Nil
Hydrocarbons	HC	15
Oil & Grease		10
Phenols		0.1
Solvents		Nil
Total Organic Carbon	TOC	75
Biological Properties		
Total Coliform		1000 MPN[2]/100mL
Fecal Coliform Bacteria		1000 Cells/ 100mL
Colon Group		5000 No. 100 cm^2
Egg Parasites		None
Worm Parasites		None

Notes:

[1] BOD_{5-20} was not defined in the report. It is expected that BOD_{5-20} refers to the Biological Oxygen Demand over a 5-20 day average.
[2] MPN stands for Most Probable Number.

Table 4.2. Dubai Wastewater Discharge Limits to Marine Environment

Indicators	Maximum Discharge Limits to the Marine Environment (mg/l unless otherwise specified)
Chlorine (total)	1
Nitrogen (ammoniacal)	5.0
pH	6 – 9 (no units)
Phenols	0.1
Phosphate	0.1
Turbidity (JTU)	75
Suspended Solids	30
Sulfide	0.10
Arsenic (As)	0.05
Cadmium (Cd)	0.05
Chromium (Cr)	0.5
Copper (Cu)	0.5
Iron (Fe)	2
Mercury (Hg)	0.001
Zinc (Zn)	0.1
Cyanide (CN)	0.1
Lead (Pb)	0.1
Nickel (Ni)	0.10
Selenium (Se)	0.02
Silver (Ag)	0.005
Bacteriological	
Fecal Coliforms (MPN/100ml)	100 (80% of samples)
Fecal Streptococci (MPN/100ml)	100
Salmonella (MPN/1L)	Non-detectable
Enteroviruses (PFU/10L)	Non-detectable
Oil & Grease	5

Table 4.3. Maximum Wastewater Discharge Limits to Harbors and Open Waters in Jebel Ali

Indicators	Maximum Discharge Limits (mg/l unless otherwise specified) to Harbors & Marine Environment
Color (color units)	50
Chemical Oxygen Demand (COD)	100
Chlorine (free)	-
Chlorine (residual)	1[1]
Chloride	-
Dissolved Oxygen (DO)	>3[2]
Cyanide (CN)	0.1
Detergents (synthetic)	-
Floating Particles (mg/m^3)	None
Fluoride (F)	20 (aluminum smelting, glass manufacturing, mixed fertilizer, phosphate fertilizer plants)
Halogenated Hydrocarbons	None
Organic Nitrogen (Kjeldahal)	-
Total Nitrogen	10
Nitrogen (ammoniacal)	2
Nitrate (NO_3-N)	40
Hydrocarbons (HC)	15
Tar/ Oils	-
Tar (emulsified)	-
Oil and Grease	10 [3]
Oil and Grease (emulsified)	
pH (range)	6 – 9
Pesticides (non-chlorinated)	None
Phenols	0.1
Phosphorus (total as P)	2
Sodium (Na)	-
Sodium Absorption Ratio (SAR) (SAR units)	-
Solvent	none
Sulfates (total)	-
Sulfide (S^{2-})	0.1
Detergents	-
Temperature	35°C (max.) [4]
Total Dissolved Solids (TDS)	1,500
Total Organic Carbon (TOC)	75
Turbidity (NTU)	75
Total Metals	-
Aluminum (Al)	20
Antimony	0.1
Arsenic (As)	0.05
Barium (Ba)	2
Beryllium (Be)	0.05

Indicators	Maximum Discharge Limits (mg/l unless otherwise specified) to Harbors & Marine Environment
Boron (B)	-
Cadmium (Cd)	0.05
Chromium (Cr) (total)	0.2
Chromium Hexavalent	-
Chromium VI (Cr^{6+})	0.15
Cobalt (Co)	0.2
Copper (Cu)	0.5
Iron (Fe)	2
Lead (Pb)	0.1
Magnesium	-
Manganese (Mn)	0.2
Mercury (Hg)	0.001
Molybdenum	-
Nickel (Ni)	0.1
Selenium (Se)	0.02
Silver (Ag)	0.005
Sulfate (total)	-
Sulfide	0.1
Zinc (Zn)	0.5
Fecal Coliform (cells/100ml)	1,000
Total Coliform (MPN/100ml)	1,000
Colon Group (TC) (No./$100cm^{2)}$	5,000
Worm Parasites	None
Egg Parasites	None
Nematodes (No./10mL)	-
Protozoan Cysts (No./ 10mL)	-
Platyhelminths Worms (No./ 10mL)	-

Notes:

[1] Chlorine residual is after 30 minutes contact and is total residual chlorine.

[2] Dissolved oxygen requirement is a minimum concentration requirement.

[3] No differentiation between free and emulsified oil and grease.

[4] Temperature limit is the maximum allowed for discharge.

Table 4.4. Dubai Monitoring Requirements for Discharges to the Marine Environment

Characteristic	Monitoring Frequency	Specific Parameters to be Monitored
Physical		
Tidal Cycles	Monthly	Maximum and minimum tidal heights
Water Currents	Monthly every hour for 25 hours during the max. tidal height fluctuation at surface, mid-water and bottom depths	Average speed & direction at surface, mid-water and bottom depths
Wind Conditions	Monthly	Wind speed & direction at point of effluent discharge
Salinity, Temperature & Turbidity	Monthly every hour for 25 hours during the max. tidal height fluctuation at surface, mid-water and bottom depths	-
Bottom Topography, Depth Contours & Geological Characterization	One-off measurement	-
Chemical		
Oxygen and pH	Monthly every hour for 25 hours during the max. tidal height fluctuation at surface, mid-water and bottom depths	Dissolved Oxygen
Nutrients	Water samples collected monthly every 3 hours for 25 hours during maximum tidal height fluctuations	One-day average concentrations of phosphate, nitrogen compounds and silicate
Heavy Metals	Twice during 13 month period	Various heavy metals in sediment adjacent to disposal site
Biological		
Plankton	Counts shall be made monthly at the disposal site	Zooplankton & phytoplankton (including fish eggs and larvae)
Benthic Macroflora and Macrofauna	Survey once every four months	Abundance and distribution of the dominant benthic invertebrates and algae adjacent to disposal site
Primary Productivity	Determination of primary productivity shall be made in conjunction with monthly planktonic surveys	Primary productivity or receiving waters in the disposal site

Table 4.5. Effluent Limitations for Discharges to Land in Dubai

Indicators	Maximum Allowable Discharge Limits to Land (for Irrigation)		Discharge Limits to Land[1]	
	Drip	Spray	Maximum	Monthly[2]
BOD_5 (5-day average)	20	10	15	10
Chemical Oxygen Demand (COD)	100	50	100	50
Chlorides	500	350	350	250
Chlorine (residual)	0.5 (min.) (after 30 min contact time)		0.5 (min.) (after 30 min contact time)	
Cyanides (as CN)	0.05	0.05	0.1	0.05
Fluorides	1	1	2	1
Nitrogen (ammoniacal)	5	1	5	1
Nitrogen (organic)[3]	10	5	10	5
Nitrogen (total)	50	30	50	30
Oil and Grease (free)	5	5	5	2
pH (range)	6 - 8	6 – 8	6 - 9	6 - 9
Phenols	0.1	0.1	1	0.1
Phosphorus (as P)	20	20	30	20
Sulfates	200	200	400	200
Sulfides	0.05	0.05	0.1	0.05
Suspended Solids	50	10	15	10
Total Dissolved Solids (TDS)	1,500	1,000	1,500	1,000
Aluminum (Al)	2	2	5	1
Arsenic (As)	0.05	0.05	0.2	0.05
Barium (Ba)	1	1	2	1
Beryllium (Be)	0.1	0.1	0.3	0.1
Boron (B)	2.0	2.0	2.0	0.75
Cadmium (Cd)	0.01	0.01	0.03	0.01
Chromium (Cr)	0.1	0.1	0.5	0.1
Cobalt (Co)	0.1	0.1	0.5	0.05
Copper (Cu)	0.2	0.2	0.3	0.2
Iron (Fe)	2	2	5	2
Lead (Pb)	0.5	0.5	1	0.5
Lithium (Li)	-	-	10	2.5
Magnesium (Mg)	100	100	150	30
Manganese (Mn)	0.2	0.2	1	0.2
Mercury (Hg)	0.001	0.001	0.005	0.001
Molybdenum (Mo)	0.01	0.01	0.05	0.01
Nickel (Ni)	0.2	0.2	0.5	0.2
Selenium (Se)	0.02	0.02	0.05	0.02
Sodium (Na)	500	200	200	70
Sulfate	-	-	400	200
Sulfide	-	-	0.1	0.05
Vanadium	-	-	1	0.01

Indicators	Maximum Allowable Discharge Limits to Land (for Irrigation)		Discharge Limits to Land[1]	
Zinc (Zn)	0.5	0.2	5	2
Total Coliforms (MPN/100ml)	-	-	300[4]	<100
Visible Pathogenic Ova & Cysts	-	-	Non-detectable	Non-detectable
Fecal Coliforms (MPN/100ml)	20	-	-	-

Notes:

1. Assuming these limits for land discharges are different from land discharges for the purpose of irrigation.
2. Over 4 consecutive weeks
3. Nitrogen (organic) limit was determined quantitatively through the Kjeldahl method.
4. Not to be exceeded in any sample. Drip/ Spray land disposal method was not specified in the order.
5. Wastewater shall be treated to meet these effluent standards to maximize its potential for re-use. Less protective standards may be specified by the Municipality for waters produced re-used within the same site of production ad if there is no risk to public health.

Table 4.6. Maximum Effluent Limits of Land Discharges for Re-Use and Irrigation Purposes in Jebel Ali

Indicators	Maximum Discharge Limits (mg/l unless otherwise specified) to Land (for Re-Use or Irrigation Purposes)
BOD (5-day average)	10
Chemical Oxygen Demand (COD)	50
Chlorine (residual)	0.5
Chloride	350
Dissolved Oxygen (DO)	2.0 (min.)
Cyanide (CN)	0.05
Fluoride (F)	1.0
Halogenated Hydrocarbons	0.1 (chlorinated hydrocarbons)
Organic Nitrogen (Kjeldahal)	5.0
Total Nitrogen	30
Nitrogen (ammoniacal)	1
Oil and Grease	5.0
pH (range)	6 – 8
Phenols	0.1
Phosphorus (total as P)	20
Sodium (Na)	200
Sulfates (total)	200
Sulfide (S^{2-})	0.05
Total Suspended Solids	10
Temperature	10
Total Dissolved Solids (TDS)	1,000
Total Organic Carbon (TOC)	150
Turbidity (NTU)	5
Aluminum (Al)	2
Arsenic (As)	0.05
Barium (Ba)	1
Beryllium (Be)	0.1
Boron (B)	2.0
Cadmium (Cd)	0.01
Chromium (Cr) (total)	0.1
Cobalt (Co)	0.1
Copper (Cu)	0.2
Iron (Fe)	2.0
Lead (Pb)	0.5
Magnesium	100
Manganese (Mn)	0.2
Mercury (Hg)	0.001
Molybdenum	0.010
Nickel (Ni)	0.20
Selenium (Se)	0.02
Zinc (Zn)	2.0
Fecal Coliform (cells/100ml)	<5 (MPN/100mL)

Indicators	Maximum Discharge Limits (mg/l unless otherwise specified) to Land (for Re-Use or Irrigation Purposes)
Nematodes (No./10mL)	1
Protozoan Cysts (No./ 10mL)	1
Platyhelminths Worms (No./ 10mL)	1

Table 4.7. Maximum Discharge Effluent Limits in the Dubai Emirate

Indicators	Maximum Discharge Limits (mg/L unless otherwise specified)
	Sewerage System
BOD_5 (5-day average)	1,000
Chemical Oxygen Demand (COD)	3,000
Chlorides	-
Chlorine (residual)	10
Cyanides (as CN)	1
Detergents	30
Fluorides	-
Nitrogen (ammoniacal)	40
Nitrogen (organic)[1]	-
Nitrogen (total)	-
Oil and Grease (emulsified)	150
Oil and Grease (free)	50
pH (range)	6 – 10
Pesticides (non-chlorinated)	5
Phenols	50
Phosphorus (as P)	30
Sulfates	500
Sulfides	10
Suspended Solids	500
Temperature	45°C or >5°C of ambient
Total Dissolved Solids (TDS)	3,000
Total Metals	10
Aluminum (Al)	-
Arsenic (As)	0.50
Barium (Ba)	-
Beryllium (Be)	-
Boron (B)	2.0
Cadmium (Cd)	0.3
Chromium (Cr)	1.0
Cobalt (Co)	-
Copper (Cu)	1.0
Iron (Fe)	-
Lead (Pb)	1.0
Lithium (Li)	-
Magnesium (Mg)	-
Manganese (Mn)	1.0
Mercury (Hg)	0.01
Molybdenum (Mo)	-
Nickel (Ni)	1.0
Selenium (Se)	-
Silver (Ag)	1.0
Sodium (Na)	-
Sulfate	-

Indicators	Maximum Discharge Limits (mg/L unless otherwise specified)
	Sewerage System
Sulfide	-
Vanadium	-
Zinc (Zn)	2.0
Total Coliforms (MPN/100ml)	-
Visible Pathogenic Ova & Cysts	-
Fecal Coliforms (MPN/100ml)	500

Notes:

1. Nitrogen (organic) limit was determined quantitatively through the Kjeldahl method.

Table 4.8. Jebel Ali Pre-Treatment Criteria for Industrial Effluent into Dubai Municipality Sewers

Indicators	Maximum Discharge Limits (mg/l unless otherwise specified)
Color (color units)	-
BOD (5-day average)	1,000
Benzene (C_6H_6)	
Vinyl Chloride	
Benzo(a)pyrene	
Chemical Oxygen Demand (COD)	3,000
Chlorine (free)	10 [4]
Chlorine (residual)	-
Chloride	700 [3,4]
Dissolved Oxygen (DO)	-
Cyanide (CN)	1
Detergents (synthetic)	100
Floating Particles (mg/m^3)	-
Fluoride (F)	30 [4]
Halogenated Hydrocarbons	-
Total Nitrogen (Kjeldahl)	-
Nitrogen (ammoniacal)	40 [3,4]
Nitrate (NO_3-N)	-
Hydrocarbons (HC)	-
Tar/ Oils	20
Tar (emulsified)	150
Oil and Grease	50
Oil and Grease (emulsified)	150
pH (range)	6 – 9
Pesticides (non-chlorinated)	5
Phenols	50
Phosphorus (total as P)	30
Sodium (Na)	1,000 [3,4]
Sodium Absorption Ratio (SAR) (SAR units)	20 [3,4]
Solvent	
Sulfates (total)	500
Sulfide (S^{2-})	10
Detergents	30
Total Suspended Solids	500
Temperature	45°C
Total Dissolved Solids (TDS)	3,000
Total Organic Carbon (TOC)	1,000
Turbidity (NTU)	-
Total Metals	10 [1]
Aluminum (Al)	30
Antimony	-
Arsenic (As)	0.5

Indicators	Maximum Discharge Limits (mg/l unless otherwise specified)
Barium (Ba)	2
Beryllium (Be)	
Boron (B)	2 [3,4]
Cadmium (Cd)	0.3
Chromium (Cr) (total)	1.0
Chromium Hexavalent	0.25
Chromium VI (Cr^{6+})	-
Cobalt (Co)	2
Copper (Cu)	1
Iron (Fe)	25
Lead (Pb)	1
Manganese (Mn)	1
Mercury (Hg)	0.015
Nickel (Ni)	1
Selenium (Se)	-
Silver (Ag)	1
Sulfate (total)	500
Sulfide	6
Zinc (Zn)	2 [2]
Fecal Coliform (cells/100ml)	-
Total Coliform (MPN/100ml)	-
Colon Group (TC) (No./100cm[2])	-
Worm Parasites	-
Egg Parasites	-

Notes:

[1] Total amount of metals shall not exceed 10mg/l of effluent

[2] Zinc equivalent is defined as the sum of the concentrations in milligrams per liter of the following after application of toxicity factors. Toxicity Factors: Zn = X1; Cu = X2; Ni = X3

Zinc Equivalent = $1X_1$ (Zn) + $2X_2$ (Cu) + $3X_3$ (Ni)

[3] Parameters will change if waste water, after treatment, is not used for irrigation

[4] Assumes well-drained sandy soils are present in irrigation water receiving areas. Areas will not be used for foraging.

Table 4.9. Dubai & Jebel Ali Sludge Disposal Limits of Trace Metals on Land

Parameter	Maximum Allowable Limits in Dubai and Jebel Ali (grams/tonne)	Long-term Cumulative Loading on Land in Dubai (kg/hectare)	10 Year Cumulative Loading on Land in Jebel Ali (kg/hectare)
Cadmium (Cd)	30	18	20
Chromium (Cr)	1000	210	200
Cobalt (Co)	100	30	30
Copper (Cu)	1000	46	50
Lead (Pb)	1000	125	125
Molybdenum (Mo)	20	5	5
Mercury (Hg)	10	15	5
Nickel (Ni)	200	78	100
Zinc	1000	170	250

Table 4.10. Ambient Marine Water Quality Standards in the Emirate of Abu Dhabi

Indicators	Proposed Maximum Concentration (mg/L unless otherwise specified)
Physical Indicators	
Floating Particles/Floatable/debris	Nil
Temperature	+-3 Δ°C
Turbidity	10 NTU
Transparency/Clarity	>=10 Meter of Secchi Depth
Salinity (% of Background concentration)	<5%
BOD ((5 day at 20°C Annual Average)	5
Odor	Not Objectionable
Color	No Charge from Background
Chemical Indicators	
Ammonia (Free as N) or Ammonia (NH_3-N)	0.004
Arsenic (As)	0.005
Cadmium (Cd)	0.001
Chlorine Residual (Cl_2)	0.01
Chromium (Cr)	0.01
Copper (Cu)	0.01
Cyanide (Cn)	0.004
Lead (Pb)	0.01
Oil and Grease	Not visible
Petroleum Hydrocarbons	5 (ppm or mg/L)
Dissolved Oxygen (DO)	>4
Total Suspended Solids (TSS)	<33
Si-SiO_3	890 µg/L
pH (no units)	6.5-8.5
Phenols	0.001
Phosphorous (As Total P)	0.001
Phosphate (PO_4)	34 µg/L
Sulfides (S)	0.004
Total Organic Carbon (TOC)	2.5
Zinc (Zn)	0.01
Nickel (Ni)	20 µg/L
Iron (Fe)	0.3
Vanadium (V)	9.4 µg/L
Nitrate NO_3-N	95 µg/L
NO_2	34 µg/L
Biological Indicators	
Total Coliform	70 MPN/100ml

Table 4.11. Dubai Ambient Water Quality Limits to Sea and Coastal Zones and the Dubai Creek

Indicators	Maximum Water Quality Objectives	
	Open Waters (Sea and Coastal Zones) (mg/l unless otherwise specified)	Dubai Creek (mg/l unless otherwise specified)
BOD_5	20	10
Chlorine (total residual)	0.01	0.01
Dissolved Oxygen	Not <5 (or 90% saturation)	Not <5mg/l (or 90% saturation)
Nitrogen (Ammonia (NH_3-N))	0.1	0.1
Nitrogen (nitrate)	0.5	0.5
Nitrogen (total)	2.0	2.0
Petroleum Hydrocarbons	0.001 (aromatic fraction)	0.001 (aromatic fraction)
pH	1 pH unit from ambient	1 pH unit from ambient
Phenols	-	-
Phosphate-Phosphorus	0.05	0.05
Temperature	2°C from background levels	2°C from background levels
TDS	2% from background levels	2% from background levels
Turbidity/Color (NTU)	75 or that which will reduce light penetration by no more than 20% of background levels	75 or that which will reduce light penetration by no more than 20% of background levels
Surfactants	0.02	0.02
Suspended Solids	10 (mean); 25 (maximum)	10 (mean); 15 (maximum)
Sulfide (S^{2-})		
Trace Metals		
Aluminum (Al)	0.2	0.2
Arsenic (As)	0.01	0.01
Cadmium (Cd)	0.003	0.003
Chromium (Cr)	0.01	0.01
Copper (Cu)	0.005	0.005
Iron (Fe)	0.2	0.2
Mercury (Hg)	0.001	0.001
Zinc (Zn)	0.02	0.02
Cyanide (CN)	-	-
Lead (Pb)	-	-
Nickel (Ni)	-	-
Selenium (Se)	-	-
Silver (Ag)		
Bacteriological		
Bacteria (E.Coli) (organisms/100ml H_2O)	200	200
Fecal Coliforms (MPN/100ml)	-	-
Fecal Streptococci (MPN/100ml)	-	-
Salmonella (MPN/1L)	-	-
Enteroviruses (PFU/10L)	-	-
Oil & Grease	-	-

Table 4.12. Jebel Ali Harbor Water Quality Objectives

Indicators[2]	Maximum Allowable Limit (mg/l unless otherwise specified)[3]
Physical Properties	
TSS	10 (mean) 50 (max.)
Turbidity (NTU)	75
pH	1 pH unit from background or 6.5 – 8.5 range
Surfactants	0.02
Temperature	2°C from background level
TDS	2% from background level
Ammonia (total as N)	0.1
BOD_5	10
Chlorine Residual Total	0.01
Dissolved Oxygen (DO)	>5 (90% saturation)
Nitrate (NO_3-N)	0.5
Nitrogen Total	2.0
Sulfide (S^{2-})	0.01
Total Phosphorus (total as P)	0.05
Trace Metals	
Aluminum (Al)	0.2
Arsenic (As)	0.01
Cadmium (Cd)	0.003
Chromium (Cr)	0.01
Copper (Cu)	0.05
Cyanide (CN)	0.01
Iron (Fe)	0.2
Lead (Pb)	0.05
Mercury (Hg)	0.001
Zinc (Zn)	0.02
Organic Chemical Properties	
Petroleum Hydrocarbons (Aromatics)	0.001
Oil & Grease	1
Biological Properties	
Bacteria E. Coli (organisms/ 100ml H_2O)	200

Notes:

1. Any discharge to surface drainage ditches must be authorized
2. Any undefined parameters will be considered on a case-by-case basis.
3. Any sample repeated twice exceedances of allowable standard will be out of compliance.
4. Inclusive range not to be exceeded.
5. The temperature increment standard for harbor discharge applies to treated wastewater/cooling water discharges.
6. "NTU" stands for Nephelometric Turbidity Unit.
7. Chlorine residual is after 30 minutes contact and is total residual chlorine.
8. Dissolved oxygen requirement is a minimum concentration requirement
9. "MPN" stands for Most Probable Number.

Table 4.13. Objectives for Land Contaminants in Jebel Ali

Indicators	Acceptable Levels (mg/kg)
Arsenic	50
Barium	400
Cadmium	5
Chromium	250
Copper	100
Lead	200
Manganese	700
Mercury	2
Selenium	2
Zinc	500
Cyanide	10
Fluoride	500
Phenols	1
Benzene	1
Chlorinated Hydrocarbons	1
Pesticides (total)	2
Polychorinated Biphenyls (PCBs)	0.5
Total Petroleum Hydrocarbons $<C_9$ $>C_9$	 1,000 10,000
BTEX (Total)	100

Table 4.14. Components of Total Toxic Organics

Volatile Organics	
Acrolein (Propenyl)	Bromodichloromethane
Acrylonitrile	1,1,2,2-Tetrachloroethane
Methyl chloride (chloromethane)	1,2-Dichloropropane
Methyl bromide (bromomethane)	1,3-Dichloropropylene (1,3-Dichloropropene)
Vinyl Chloride (chloroethylene)	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride (9 dichloromethane)	1,1,2-Trichloroethane
1,1-Dichloroethene	Benzene
1,1-Dichloroethane	2-Chloroethyl vinyl ether (mixed)
1,2-Dichloroethane	Bromoform (tribromomethane)
1,2-trans-Dichloroethene	Tetrachloroethene
Chloroform (trichloromethane)	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride (tetrachloromethane)	Ethylbenzene
Base/Neutral Extractable Organics	
N-nitrosodimethylamine	Diethyl phthalate
bis (2-chloroethyl) ether	1,2-Diphenylhydrazine
1,3-Dichlorobenzene	N-nitrosodiphenylamine
1,4-Dichlorobenzene	4-Bromophenyl phenyl ether
1,2-Dichlorobenzene	Hexachlorobenzene
bis(2-chloroisopropyl)-ether	Phenanthrene
Hexachloroethane	Anthracene
N-nitrosodi-n-propylamine	Di-n-butyl phthalate
Nitrobenzene	Fluoranthene
Isophorone	Pyrene
bis (2-chloroethoxy) methane	Benzidine
1,2,4-trichlorobenzene	Butyl benzyl phthalate
Naphthalene	1,2-benzoanthracene (benzo (a) anthracene)
Hexachlorobutadiene	Chrysene
Hexachlorocyclopentadiene	3,3-Dichlorobenzidine
2-Chloronaphthalene	bis (2-ethylhexyl) phthalate
Acenaphthylene	Di-n-octyl phthalate
Dimethyl Phthalate	3,4-Benzofluoranthene (benzo (b) fluoranthene)
2,6-Dinitrotoluene	11,12-Benzofluoranthene (benzo (k) fluoranthene)
Acenaphthene	Benzo (a) pyrene (3,4-benzopyrene)
2,4-Dinitrotoluene	Indeno (1,2,3-cd) pyrene (2,3-o-phenylene pyrene)
Fluorene	1,2,5,6-Dibenzanthracene (dibenezo (a,h) anthracene)
4-Chlorophenyl phenyl ether	1,12-Benzoperylene (benzo (g,h,i) perylene)
Acid Extractables Organics	
2-Chlorophenol	2,4,6-Trichlorphenol
Phenol	2,4-Dinitrophenol
2-Nitrophenol	4-Nitrophenol
2,4-Dimethylphenol	p-Chloro-m-cresol
2,4-Dichlorophenol	Pentachlorophenol
4,6-Dinitro-o-cresol	
Pesticides/PCBs	
Alpha-Endosulfan	Endrin
Beta-Endosulfan	Endrin aldehyde
Endosulfan sulfate	Heptachlor
Alpha-BHC	Heptachlor Epoxide (BHC-hexachlorocyclohexane)

Table 4.14. Components of Total Toxic Organics

Beta-BHC	Toxaphene
Delta-BHC	PCB-1242 (Arochlor 1242)
Gamma-BHC	PCB-1254 (Arochlor 1254)
4,4-DDT	PCB-1221 (Arochlor 1221)
4,4-DDE (p,p-DDX)	PCB-1232 (Arochlor 1232)
(p,p-TDE)	PCB-1248 (Arochlor 1248)
Aldrin	PCB-1260 (Arochlor 1260)
Chlordane (technical mixture and metabolites)	PCB-1016 (Arochlor 1016)
Dieldrin	

Table 4.15. Monitoring Requirements

Plant Capacity (MGD)	**Monitoring Frequency**
0.001 - 0.99	Monthly
1.0 - 4.99	Weekly
> 5.0	Daily

CHAPTER 5

HAZARDOUS MATERIAL

5.1. SCOPE

This Chapter contains criteria for the storage, handling, and disposition of hazardous materials. It does not cover solid or hazardous waste, underground storage tanks, petroleum storage, and related spill contingency and emergency response requirements, which are covered under other Chapters. This Guide does not cover munitions.

5.2. DEFINITIONS

5.2.1. Hazardous Chemical Warning Label. A label, tag, or marking on a container that provides the following information:

5.2.1.1. Identification/name of hazardous chemicals;

5.2.1.2. Appropriate hazard warnings; and

5.2.1.3. The name and address of the manufacturer, importer, or other responsible party; and that is prepared in accordance with DoDI 6050.05 (DoD Hazard Communication (HAZCOM) Program).

5.2.2. Hazardous Material. Any material - solid, liquid or gas - that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table 5.1, "Typical Hazardous Materials Characteristics," the material is listed in Table AP1.4., "List of Hazardous Waste/Substances/Materials," or the material falls into one of the following hazard classes. Munitions are excluded.

5.2.2.1. Explosives (Class 1)

5.2.2.2. Compressed or Liquefied Gases (Class 2)

5.2.2.3. Flammable Liquids (Class 3)

5.2.2.4. Flammable Solids (Class 4)

5.2.2.5. Oxidizing Agents (Class 5)

5.2.2.6. Toxic materials (Class 6)

5.2.2.7. Radioactive Materials (Class 7)

5.2.2.8. Corrosive Materials (Class 8)

5.2.2.9. Miscellaneous Dangerous Goods (Class 9)

5.2.3. Hazardous Material Information Resource System (HMIRS). The computer-based information system developed to accumulate, maintain and disseminate important information on hazardous material used by the Department of Defense in accordance with DoD hazardous Communication (HAZCOM) Program.

5.2.4. Hazardous Material Shipment. Any movement of hazardous material in a DoD land vehicle, either from an installation to a final destination off the installation, or from a point of origin off the installation to a final destination on the installation, in which certification of the shipment is involved.

5.2.5. Material Safety Data Sheet (MSDS). A form prepared by manufacturers or importers of chemical products to communicate to users the chemical and physical properties and the hazardous effects of a particular product.

5.3. CRITERIA

5.3.1. Storage and handling of hazardous materials will adhere to the DoD Component policies, including Joint Service Publication on Storage and Handling of Hazardous Materials. Defense Logistics Agency Instruction (DLAI) 4145.11, Army Technical Manual (TM) 38-410, Naval Supply Publication (NAVSUP PUB) 573, Air Force Joint Manual (AFJMAN) 23-209, and Marine Corps Order (MCO) 4450.12A (Storage and Handling of Hazardous Materials) provide additional guidance on the storage and handling of hazardous materials. The International Maritime Dangerous Goods (IMDG) Code and appropriate DoD and Component instructions provide requirements for international maritime transport of hazardous materials originating from DoD installations. International air shipments of hazardous materials originating from DoD installations are subject to International Civil Aviation Organization Technical Instructions or DoD Component guidance, including Air Force Interservice Manual 24-204(I), Army Technical Manual (TM) 38-250, NAVSUP PUB 505, MCO P4030.19I, and DLAI 4145.3, DCMAD1, Ch3.4 (HM24), (Preparing Hazardous Materials for Military Air Shipments). Additional requirements are outlined in the following criteria for the storage, handling, and transport of hazardous materials.

5.3.2. Hazardous material dispensing areas will be properly maintained. Drums/containers must not be leaking. Drip pans/absorbent materials will be placed under containers as necessary to collect drips or spills. Container contents will be clearly marked. Dispensing areas will be located away from catch basins and floor/storm drains.

5.3.3. Installations will ensure that for each hazardous material shipment:

5.3.3.1. The shipment is accompanied throughout by shipping papers that clearly describe the quantity and identity of the material, location on board, shipment origin, unloading destinations, and include an MSDS;

5.3.3.2. Vehicle Transport. DoD-owned vehicles transporting hazardous chemical substances shall comply with the following requirements:

5.3.3.2.1. Vehicles shall comply with the required speed limit.

5.3.3.2.2. Vehicles shall have labels on all sides of their outer surfaces that indicate the level of danger of the substances they contain. Labels shall be weather-resistant and painted in a reflective color.

5.3.3.2.3. Vehicles shall fix a yellow intermittent light on the driver cabin.

5.3.3.2.4. Dubai. Vehicles transporting hazardous materials in Dubai are required to utilize placards adhering to the following requirements:

5.3.3.2.4.1. Placards shall be made of metal sheet painted the appropriate color (Table 5.4) with reflective paint. The color of the hazard warning diamond shall be in accordance with Table 5.4. The placard shall be durable and weather resistant.

5.3.3.2.4.2. Placards shall be securely attached.

5.3.3.2.4.3. Vehicles transporting Class 1 hazardous materials shall contact the LEC for additional safe transport requirements.

5.3.3.3. All drivers are approved and trained on the hazardous material included in the shipment including health risks of exposure and the physical hazards of the material, including potential for fire, explosion, and reactivity. Contact the LEC for driver approval requirements.

5.3.3.4. For any hazardous material categorized on the basis of section AP1.1. of this Guide, the shipping papers and briefing for the driver include identification of the material in terms of the nine United Nations (UN) Hazard Classes and its scientific and common names;

5.3.3.5. The transport vehicles are subjected to a walk-around inspection by the driver before and after the hazardous material is loaded; and

5.3.3.6. Packages are labeled in accordance with paragraph 5.3.7.

5.3.4. Each installation will maintain a master listing of all storage locations for hazardous material as well as an inventory of all hazardous materials contained therein. Inventories of hazardous materials shall be available at the storage areas, and copies shall be kept at the environmental office (See paragraph 18.3.2.).

5.3.4.1. Storage areas shall be designed and managed in the following manner to protect from fire, injury and spills:

5.3.4.1.1. Exit routes shall be well marked and easy to access in the dark or in the case of extensive smoke

5.3.4.1.2. Areas shall be sufficiently ventilated.

5.3.4.1.3. Floors shall be non-porous, non-sliding, and designed to sustain leakage with fire-fighting water.

5.3.4.1.4. A plan for emergency management at the site shall be prepared.

5.3.4.1.5. Installations shall ensure that storage areas are equipped with fire-fighting equipment and instruments (e.g. extinguishers, fire alarms, etc.) in accessible locations especially when low flashpoint solvents are stored.

5.3.4.1.6. Fire-fighting equipment and instruments shall be inspected periodically.

5.3.4.1.7. Incidents shall be recorded including details as to mitigation and handling of the incident.

5.3.4.1.8. Industrial premises storing hazardous materials shall ensure that a distance of 3 m (9.8 ft) is maintained between facilities producing non-ignitable materials and any igniting source, and 10 m (32.8 ft) between flammable materials and any igniting source.

5.3.4.2. Additional requirements in Dubai and Jebel Ali. The following additional requirements shall be complied with in the Dubai emirate (including Jebel Ali):

5.3.4.2.1. Installations intending to store hazardous materials in excess of the quantities specified in Table 5.2 shall contact the LEC.

5.3.4.2.2. Any person managing, supervising or working in a hazardous materials storage area shall complete training in the following subjects:

5.3.4.2.2.1. Classes and properties of hazardous materials

5.3.4.2.2.2. Proper labeling and packaging

5.3.4.2.2.3. Safe handling of hazardous materials

5.3.4.2.2.4. Personal protective equipment for hazardous materials handling

5.3.4.2.2.5. Understanding an MSDS

5.3.4.2.2.6. UN numbers /Hazardous symbols

5.3.4.2.2.7. Design of storages

5.3.4.22.8. Emergency contingency planning

5.3.5.2.2.9. Segregation within stores

5.3.4.2.2.10. Handling drums, sacks, etc.

5.3.4.2.2.11. Occupational health standards

5.3.4.2.2.12. Respiratory protection

5.3.4.2.2.13. Skin protection

5.3.4.2.2.14. Static charge mitigation

5.3.5. Each MSDS shall be in English and Arabic if local national workers are present. If a translated MSDS is not available, bilingual training will be provided on the content of the MSDS. MSDS shall contain at least the following information:

5.3.5.1. The identity used on the label.

5.3.5.1.1. If the hazardous chemical is a single substance, its chemical and common name.

5.3.5.1.2. If the hazardous chemical is a mixture that has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients that contribute to these known hazards, and the common name(s) of the mixture itself; or

5.3.5.1.3. If the hazardous chemical is a mixture that has not been tested as a whole:

5.3.5.1.3.1. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise 1% or greater of the composition, except that chemicals identified as carcinogens shall be listed if the concentrations are 0.1% or greater;

5.3.5.1.3.2. The chemical and common name(s) of all ingredients that have been determined to be health hazards, and that comprise < 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations that would exceed an established Occupational Safety and Health Administration (OSHA)-permissible exposure limit, or could present a health hazard to employees; and

5.3.5.1.3.3. The chemical and common name(s) of all ingredients that have been determined to present a physical hazard when present in the mixture.

5.3.5.2. Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

5.3.5.3. The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

5.3.5.4. The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions that are generally recognized as being aggravated by exposure to the chemical;

5.3.5.5. The primary route(s) of entry (inhalation, skin absorption, ingestion, etc.);

5.3.5.6. The appropriate occupational exposure limit recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available;

5.3.5.7. Whether the hazardous chemical has been found to be a potential carcinogen, or for Abu Dhabi, if it has been found to be a potential carcinogen, reproductive toxin or target-organ systemic toxin;

5.3.5.8. Any generally applicable precautions for safe handling and use that are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

5.3.5.9. Any generally applicable control measures that are known to the chemical manufacturer, importer, or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment;

5.3.5.10. Emergency and first aid procedures;

5.3.5.11. The date of preparation of the MSDS or the last change to it; and

5.3.5.12. The name, address and telephone number of the chemical manufacturer, importer, employer, or other responsible party preparing or distributing the MSDS who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

5.3.6. Each work center will maintain a file of MSDSs for each hazardous material procured, stored, or used at the work center, with a copy maintained at the environmental office. MSDSs that are not contained in the HMIRS and those MSDSs prepared for locally purchased items should be incorporated into the HMIRS. A file of MSDS information not contained in the HMIRS should be maintained on site. In Abu Dhabi, employers shall maintain current MSDS for stored hazardous materials in an electronic retrieval system or other such format which is easily accessible to workers, contractors and visitors.

5.3.7. All hazardous materials on DoD installations will have a Hazardous Chemical Warning Label in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program" and the regulations for Abu Dhabi and Dubai (see below) and have MSDS information either available or in the HMIRS in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program" and other DoD Component instructions. Labels shall be fixed onto containers in such a way to ensure that they cannot be erased or damaged and they can withstand normal transport conditions.

5.3.7.1. In Dubai and Jebel Ali, the form and coloring of labels required for waste classes are shown in Table 5.4. Class 7 Radioactive Substances shall be labeled and packaged in accordance with International Atomic Energy Agency (IAEA) regulations.

5.3.7.2. In Jebel Ali, containers with unknown contents shall be marked "Caution: Do not use – Unknown Substance" until the contents can be identified or suitably disposed of.

5.3.7.3. In Abu Dhabi, hazardous materials labeling shall conform to the United Nations Economic Commission for Europe (UNECE) Globally Harmonized System of Classification and Labeling (GHS).

5.3.8. DoD installations will reduce the use of hazardous materials where practical through resource recovery, recycling, source reduction, acquisition, or other minimization strategies in accordance with Service guidance on improved hazardous material management processes and techniques.

5.3.9. All excess hazardous material will be processed through the Defense Logistics Agency (DLA) Disposition Services in accordance with the procedures in DoD 4160.21-M (Defense Materiel Deposition Manual). The DLA Disposition Services will only donate, transfer, or sell hazardous material to environmentally responsible parties. This paragraph is not intended to prohibit the transfer of usable hazardous material between DoD activities participating in a regional or local pharmacy or exchange program.

5.3.10. All personnel who use, handle, or store hazardous materials will be trained in accordance with DoD Instruction 6050.05, "DoD Hazard Communication (HAZCOM) Program" and other DoD Component instructions.

5.3.10.1. HN employees who use, handle, or store hazardous materials shall also receive training in accordance with HN requirements.

5.3.10.2. Drivers will be trained on spill control and emergency notification procedures, and have spill contingency and emergency plans readily available in the vehicle.

5.3.11. The installation must prevent the unauthorized entry of persons or livestock into the hazardous materials storage area.

5.3.12. Hazardous Material Approval. Installations may require approval for the handling of hazardous materials. Contact the LEC to determine approval requirements. An installation's records for hazardous substances shall be kept for a period of five years from the date of commencement of the handling activity including the production, storage, transport, and disposition.

5.3.13. Secondary Containment for Hazardous Material Storage Tanks and Transfer Facilities in Dubai.

5.3.13.1. All storage tanks, drum stores, loading pads and areas, and work locations where dangerous goods are used and transferred shall be contained. Activities shall never take place on open ground or on interlocking paving.

5.3.13.2. Containment areas shall consist of a base and a wall. The wall may be of a vertical or roll-over design depending on the work-site requirements.

5.3.13.3. Construction. Containment areas shall be constructed as follows:

5.3.13.3.1. Materials. Floor slabs and walls shall be impervious and compatible with the liquids to be contained.

5.3.13.3.2. Joints. Concrete walls should be poured integrally with the slab. When joints are used, they should be sealed with a suitable sealing material.

5.3.13.3.3. Drains. The floor should be graded and drained to the collection pit. A drain from the collection pit is not recommended. However any drains which are provided should also be provided with an isolation valve and operated under control conditions.

5.3.13.4. Materials Segregation. Some liquid materials shall be segregated on-site. Installations shall comply with the following requirements for liquid material segregation and storage:

5.3.13.4.1. For two or more liquid materials stored separately on-site, separate containment areas shall be provided where possible for each liquid to maximize collection and re-use of uncontaminated spilled liquid. Incompatible materials shall not share the same containment area.

5.3.13.4.2. Minimum separation distance for storage vessels containing chemicals belonging to different classes shall be followed. See Section 5.3.14.

5.3.13.5. Height. Wall height requirements are as follows:

5.3.13.5.1. Tank Storage. The gross capacity of a containment area should be sufficient to hold at least 100% of the largest tank plus 10% of the capacity of the second largest tank plus any other major displaced volumes below wall crest.

5.3.13.5.2. Drum Storage. The gross capacity of a containment area should be sufficient to hold at least the volume of 25% of the drums to be stored up to 10 kl plus 10% of any volume in excess thereof.

5.3.13.5.3. Tank Vehicle Loading. The capacity of a containment area should at least equal to 100% of the largest compartment of any tank vehicle using the filling facility and the maximum quantity capable of being discharged from the filling point with full flow during a period of 2 minutes.

5.3.14. Hazardous Material Segregation. Installations shall maintain the minimum separation distance, shown in Table 5.3, for storage vessels containing chemical substances belonging to different UN hazard classes for the safety of personnel, the general public, and the environment in the event of container damage or spillage. Maintenance of safety distance shall also minimize the foreseeable risks of a major accident or hazard.

Table 5.1. Typical Hazardous Materials Characteristics

1. The item is a health or physical hazard. Health hazards include carcinogens, corrosive materials, irritants, sensitizers, toxic materials, and materials that damage the skin, eyes, or internal organs. Physical hazards include combustible liquids, compressed gasses, explosives, flammable materials, organic peroxides, oxidizers, pyrophoric materials, unstable (reactive) materials and water-reactive materials.
2. The item and/or its disposal are regulated by the host nation because of its hazardous nature.
3. The item has a flashpoint below 93 ℃ (200 ℉) closed cup, or is subject to spontaneous heating or is subject to polymerization with release of large amounts of energy when handled, stored, and shipped without adequate control.
4. The item is a flammable solid or is an oxidizer or is a strong oxidizing or reducing agent with a standard reduction potential of > 1.0 volt or < -1.0 volt.
5. In the course of normal operations, accidents, leaks, or spills, the item may produce dusts, gases, fumes, vapors, mists, or smokes with one or more of the above characteristics.
6. The item has special characteristics that in the opinion of the manufacturer or the DoD Components could cause harm to personnel if used or stored improperly.

Table 5.2. Maximum Quantities for Hazardous Material Storage Areas in Dubai & Jebel Ali

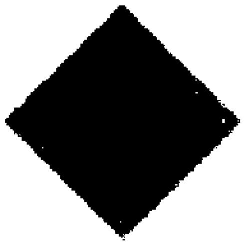
UN Hazard Class	Quantity
2	20 cylinders
3	50 drums or 10,000 liters in bulk[1]
4	500 kg
5	1 tons or 1 m^3
6	5 tons or 5 m^3
7	
8	$10m^3$

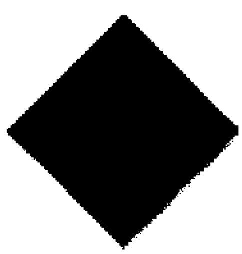
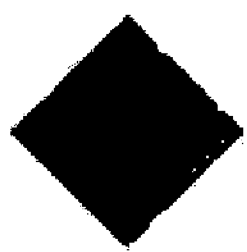
Table 5.3. Hazardous Materials Separation Requirements

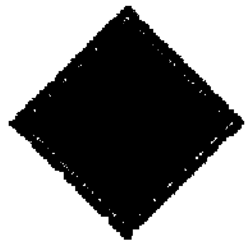
UN Hazard Class	UN Hazard Class											
	1-1	2-1	2-2	2-3	3-1	4-1	4-2	4-3	5-1	5-2	6-1	8
1-1		c	c	c	c	c	c	c	c	c	c	c
2-1	c			c	b	b	c	b	c	c	b	b
2-2	c			c	a	a	b	a	a	b	a	a
2-3	c	c	c		c	c	c	c	c	c	c	b
3-1	c	b	a	c		b	b	b	c	c	b	a
4-1	c	b	a	c	b		b	b	c	c	b	a
4-2	c	c	b	c	b	b		b	c	c	b	a
4-3	c	b	a	c	b	b	b		c	c	b	b
5-1	c	c	a	c	c	c	c	c		b	b	b
5-2	c	c	b	c	c	c	c	c	b		c	b
6-1	c	b	a	c	b	b	b	b	b	c		a
8	c	b	a	c	a	a	a	b	b	b	a	

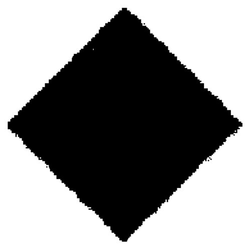
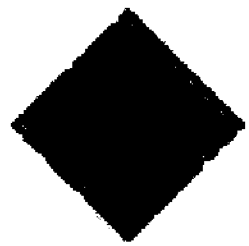
Notes:
[1] The separation distance between one category, shown in the vertical column, and the second category, shown in horizontal row, is listed in the cell bounded by the vertical and horizontal lines.
[2] "a" represents a separation of at least 3m.
"b" represents a separation of at least 5m.
"c" chemicals can be stored in the same room or area provided that the minimum separation distance is 10m.

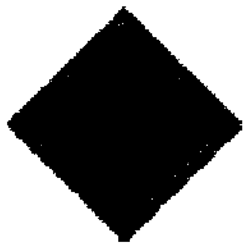
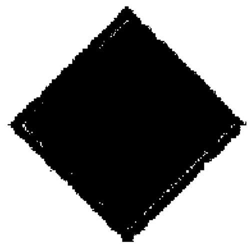
Table 5.4. Form and Coloring of Class Labels and Subsidiary Risk Labels in Dubai

Class or Subsidiary Risk Category	**Class Label (Notes 1,2)**	**Subsidiary Risk Label (Notes 1,2,3)**	**Colouring of Label**
1.1, 1.2 or 1.3			Background of the colour Orange specified in Table 1.1 Black lettering, symbol, numerals (if any) and lines (Note 4)
1.4		N/A	Background of the colour Orange specified in Table 1.1 Black lettering, symbol, numerals and lines. (Note 5)

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
1.5		N/A.	Background of the colour Orange specified in Table 1.1 Black lettering, symbol, numerals and lines.
1.6		N/A	Background of the colour Orange specified in Table 1.1. Black lettering, symbol, numerals (if any) and lines (Note 4)
2.1			Background of the colour Red specified in Table 1.1 Black or white lettering symbol, numeral (if any) and lines.

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
2.2			Background of the colour Red specified in Table 1.1 Black or white lettering symbol, numeral (if any) and lines.
2.2 and Subsidiary Risk 5.1	 (Only for use on cylinders and unit loads of NITROUS OXIDE, COMPRESSED and OXYGEN COMPRESSED)	N/A	Background of the colour Yellow specified in Table 1.1 Black lettering, symbol, numerals and lines.
2.3		N/A	White background. Black lettering, symbol, numeral (if any) and lines.

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
3			Background of the colour Red specified in Table 1.1 Black or white lettering symbol, numeral (if any) and lines.
4.1			Background : seven red and six vertical white stripes, all of equal width. The colour Red shall be as specified in Table 1.1 Black symbol, lettering and numeral (if any) and lines.
4.2			Background: upper half white; lower half of the colour Red Specified in Table 1.1 Black symbol, lettering and numeral (if any) and lines.

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
4.3			Background of the colour Blue specified in Table 1.1 Black or white lettering symbol, numeral (if any) and lines.
5.1			Background of the colour Yellow specified in Table 1.1 Black symbol, lettering numerals (if any) and lines .
5.2		N/A	Background of the colour Yellow specified in Table 1.1 Black or white lettering symbol, numeral and lines.

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
6.1			Background White. Black lettering symbol, and numeral (if any) and lines. (Note 6).
6.2		N/A	Background white. Black symbol, lettering and numeral and lines.

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
7	 (for use on vehicle only)	N/A	Background: Upper half of the colour Yellow specified in Table 1.1 with a white border; lower half white. Black symbol, lettering numeral and lines. Numerals shall be not less than 25 mm height, label size 250 mm x 250 mm.
7	 (Category I)	N/A	Background white. Black symbol lettering, numeral and lines. One vertical red bar of the colour specified in Table 1.1 shall follow the word 'Radioactive'.
7	 (Category II)	N/A	Background : upper half of the colour yellow specified in Table 1.1 with a white border; lower half white. Black symbol, lettering, numeral and lines. Two vertical red bars of the colour specified in Table 1.1 shall follow the word 'Radioactive'

Class or Subsidiary Risk Category	Class Label (Notes 1,2)	Subsidiary Risk Label (Notes 1,2,3)	Colouring of Label
7	 (Category III)	N/A	Background : upper half of the colour yellow specified in Table 1.1 with a white border; lower half white. Black symbol, lettering, numeral and lines. Three vertical red bars of the colour specified in Table 1.1 shall follow the word 'Radioactive'.
8			Background: upper half, white; lower half black with white border. Symbol black, lettering and numeral (if any) white.
9		N/A	Upper half: seven black and six white vertical stripes wall of equal width. Lower half: white background with black lettering and black numeral, underlines

Note 1: The lettering on Class labels and Subsidiary Risk labels may appear on one or more lines.

Note 2: The surface of each Class and Subsidiary Risk label shall have a line of the same colour as the symbol inside the edge and running parallel with it. This line shall be 5 mm inside the edge for a label of dimensions of 100 mm square. The distance of the line from the edge shall be reduced or increased in proportion to the size of the label. Labels shall be in the form of a square set at an angle of approximately 45^{o} (diamond shaped).

Note 3: A Class label may be used as a Subsidiary Risk label provided the bottom corner of the Class label (including the numeral) is removed as shown below or the numeral is otherwise obscured.

Note 4: The classification code for explosives, shall appear in the space marked '*'.

Note 5: The compatibility group for explosives of Class 1.4 shall appear in the space marked '*'.

=Note 6: Outer packages, transport containers and vehicles containing dangerous goods of both Classes 6.1 (a) and 6.1 (b) shall be marked with the Class 6. (a) label only.

In addition, placards shall comply with the following format:

Flammable Gas 2.1.	-	Black lettering, symbol, numeral (if any) and lines on a background color - red (Signal red)
Non-flammable Gas 2.2	-	Black lettering, symbol, numerals (if any) and lines on a background color Green (Fern green)
Poisonous Gas 2.3	-	Black lettering, symbol, numeral (if any) and lines on a white background.
Flammable Liquids 3	-	Black lettering, symbol, numerals (if any) and lines on a background color - red (signal Red)
Flammable Solids 4.1	-	Black lettering, symbol, numeral (if any) and lines on a white background with vertical strips of the color Red.
Spontaneously Combustible 4.2	-	Upper background white, lower background Red-black lettering, symbol numerals (if any) and lines.
Substances which emit flammable gases in contact with water 4.3.	-	Black lettering, symbol, numeral (if any) and lines on a background blue (ultramarine blue)
Oxidizing agent 5.1	-	Black lettering, symbol, numerals (if any) and lines on a background - yellow (canary)
Organic peroxides 5.2	-	Black lettering, symbol, numerals (if any) and lines on a background - yellow (canary)
Poisonous Substances 6	-	Black lettering, symbol, numeral (if any) and lines on a white background. 6.1. (a) Poison Background white, black symbol, Lettering numerals and lines 6.1. (b) Harmful Background white, black symbol, Lettering numerals and lines 6.2. **Infectious substance** Background white, black symbol, lettering and numerals and lines
Radioactive Substances 7	-	Upper background yellow color - lower back - ground white, black lettering, symbol, numerals and lines
Corrosive Substances 8	-	Upper background white. Black symbol and lines. Lower background black. White lettering and numerals (if any).

CHAPTER 6

HAZARDOUS WASTE

6.1. SCOPE

This chapter contains criteria for a comprehensive management program to ensure that hazardous waste is identified, stored, transported, treated, disposed, and recycled in an environmentally sound manner.

6.2. DEFINITIONS

6.2.1. Acute Hazardous Waste. Those wastes listed in Table AP1.T4., "List of Hazardous Waste/Substances/Material." with a U.S. Environmental Protection Agency (USEPA) waste number with the "P" designator, or those hazardous wastes in Table AP1.T4. with Hazard Code "H".

6.2.2. Disposal. The discharge, deposit, injection, dumping, spilling, leaking, or placing of any hazardous waste into or on any land or water that would allow the waste or constituent to enter the environment. Proper disposal effectively mitigates hazards to human health and the environment.

6.2.3. DoD Hazardous Waste Generator. The Department of Defense considers a generator to be the installation, or activity on an installation, that produces a hazardous waste.

6.2.4. Hazardous Constituent. A chemical compound listed by name in Table AP1.4., "List of Hazardous Waste/Substances/Material," or that possesses the characteristics described in section AP1.1.

6.2.5. Hazardous Waste. A discarded material that may be solid, semi-solid, liquid, or contained gas and either exhibit a characteristic of a hazardous waste as defined in section AP1.1. or is listed as a hazardous waste in Tables AP1.T1. through AP1.T4. Excluded from this definition are domestic sewage sludge, household wastes, and medical wastes.

6.2.6. Hazardous Waste Accumulation Point (HWAP). A shop, site, or other work center where hazardous wastes are accumulated until removed to a Hazardous Waste Storage Area (HWSA) or shipped for treatment or disposal. An HWAP may be used to accumulate no more than 208 liters (55 gallons) of hazardous waste, or 1 liter (1 quart) of acute hazardous waste, from each waste stream. The HWAP must be at or near the point of generation and under the control of the operator.

6.2.7. Hazardous Waste Fuel. Hazardous wastes burned for energy recovery. Fuel produced from hazardous waste by processing, blending, or other treatment is also hazardous waste fuel.

6.2.8. Hazardous Waste Generation. Any act or process that produces hazardous waste (HW) as defined in this Guide.

6.2.9. Hazardous Waste Profile Sheet (HWPS). A document that identifies and characterizes the waste by providing user's knowledge of the waste, and/or lab analysis, and details the physical, chemical, and other descriptive properties or processes that created the hazardous waste.

6.2.10. Hazardous Waste Storage Area (HWSA). One or more locations on a DoD installation where HW is collected prior to shipment for treatment or disposal. An HWSA may store more than 208 liters (55 gallons) of a HW stream, and more than 1 liter (1 quart) of an acute HW stream.

6.2.11. Hazardous Waste Storage Area Manager. A person, or agency, on the installation assigned the operational responsibility for receiving, storing, inspecting, and general management of the installation's HWSA or HWSA program.

6.2.12. Land Disposal. Placement in or on the land, including, but not limited to, land treatment, facilities, surface impoundments, underground injection wells, salt dome formations, salt bed formations, underground mines or caves.

6.2.13. Treatment. Any method, technique, or process, excluding elementary neutralization, designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste that would render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

6.2.14. Unique Identification Number. A number assigned to generators of hazardous waste to identify the generator and used to assist in tracking the waste from point of generation to ultimate disposal. The number could be the Unit Identification Code (UIC) or the DoD Activity Address Code (DoDAAC). The EEA should specify the method for determining the unique identification number in the FGS.

6.2.15. Used Oil Burned for Energy Recovery. Used oil that is burned for energy recovery is termed "used oil fuel." Used oil fuel includes any fuel produced from used oil by processing, blending, or other treatment. "Used oil," means any oil or other waste petroleum, oil, or lubricant (POL) product that has been refined from crude oil, or is synthetic oil, has been used and as a result of such use, is contaminated by physical or chemical impurities, or is off specification and cannot be used as intended. In all UAE locations except Dubai, used oil may exhibit the characteristics of reactivity, toxicity, ignitability, or corrosivity, and still be considered used oil, unless it has been mixed with hazardous waste. In Dubai, used oil may be classified as HW, see Section 6.3.8.2. Used oil mixed with hazardous waste is a hazardous waste and will be managed as such.

6.2.16. Hazardous Waste Log. A listing of HW deposited and removed from an HWSA. Information such as the waste type, volume, location, and storage removal dates should be recorded.

6.2.17. Elementary Neutralization. A process of neutralizing a HW, that is hazardous only because of the corrosivity characteristic. It must be accomplished in a tank, transport vehicle, or container.

6.2.18. Hazard Classes:

6.2.18.1. Explosives (Class 1)

6.2.18.2. Compressed or Liquefied Gases (Class 2)

6.2.18.3. Flammable Liquids (Class 3)

6.2.18.4. Flammable Solids (Class 4)

6.2.18.5. Oxidizing Agents (Class 5)

6.2.18.6. Toxic materials (Class 6)

6.2.18.7. Radioactive Materials (Class 7)

6.2.18.8. Corrosive Materials (Class 8)

6.2.18.9. Miscellaneous (Class 9)

6.3. CRITERIA

6.3.1. DoD Hazardous Waste Generators

6.3.1.1. Hazardous Waste Determination and Characterization. Generators will identify and characterize the wastes generated at their site using the hazard class system (see C6.2.18) and using their knowledge of the materials and processes that generated the waste or through laboratory analysis of the waste. Generators will identify inherent hazardous characteristics associated with a waste in terms of physical properties (e.g., solid, liquid, contained gases), chemical properties (e.g., chemical constituents, technical or chemical name), and/or other descriptive properties (e.g., ignitable, corrosive, reactive, toxic). The properties defining the characteristics should be measurable by standardized and available testing protocols.

6.3.1.1.1. Waste Characterization Requirements in Dubai. For HW components in a non-hazardous inert matrix, installations shall conduct a standard leaching procedure (elutriation testing) to determine the leached fractions to be compared against the standard concentrations (see Table 6.1). At concentrations below these limits, the HW can be deposited into the domestic waste stream, but while at concentrations above these limits the HW shall be handled as HW.

6.3.1.2. An HWPS will be used to identify each hazardous waste stream. The HWPS must be updated by the generator, as necessary, to reflect any new waste streams or process modifications that change the character of the hazardous waste being handled at the storage area.

6.3.1.3. Each generator will use a unique identification number for all recordkeeping, reports, and manifests for hazardous waste.

6.3.1.4. Pre-Transport Requirements

6.3.1.4.1. Transportation

6.3.1.4.1.1. When transporting HW via commercial transportation on UAE public roads and highways, HW generators will prepare off-installation HW shipments in compliance with applicable UAE transportation regulations. Hazardous waste designated for international transport will be prepared in accordance with applicable international regulations. In the absence of UAE regulations, international standards will be used.

6.3.1.4.1.2. When transporting HW via military vehicle on HN public roads and highways, generators will ensure compliance with Service regulations for the transport of hazardous materials and, if required by applicable international agreement (Status of Forces Agreement (SOFA), basing, etc.), HN transportation regulations.

6.3.1.4.2. <u>Manifesting</u>. All HW leaving the installation will be accompanied by a manifest to ensure a complete audit trail from point of origin to ultimate disposal.

6.3.1.4.2.1. In Abu Dhabi, this manifest is called the Manifest for Transporting Toxic and Hazardous Wastes and a copy shall be maintained in vehicles at all times. In addition to tracking waste, this manifest is used to record transfers between vehicles and rejections from treatment facilities.

6.3.1.4.2.2. The manifest will include the information listed below. Local forms will be used when applicable; otherwise, DD Form 1348-1A, "Issue Release/Receipt Document," or DD Form 1348-2, "Issue Release/Receipt Document with Address Label," may be used. This manifest should include:

6.3.1.4.2.2.1. Generator's name, address, and telephone number;

6.3.1.4.2.2.2. Generator's unique identification number and UN identification number;

6.3.1.4.2.2.3. Transporter's name, address, and telephone number;

6.3.1.4.2.2.4. Destination name, address, and telephone number;

6.3.1.4.2.2.5. Description of waste including chemical and scientific names;

6.3.1.4.2.2.6. Total quantity of waste;

6.3.1.4.2.2.7. Date of shipment; and

6.3.1.4.2.2.8. Date of receipt.

6.3.1.4.3. Generators will maintain an audit trail of HW from the point of generation to disposal. Generators using Defense Logistics Agency (DLA) Disposition Services disposal services will obtain a signed copy of the manifest from the initial DLA Disposition Services recipient of the waste, at which time the DLA Disposition Services will assume responsibility. A generator, as provided in a host-tenant agreement, that uses the HW management and/or disposal program of a DoD Component that has a different unique identification number (see definition 6.2.14.) will obtain a signed copy of the manifest from the receiving component, at which time the receiving component will assume responsibility for subsequent storage, transfer, and disposal of the waste. Activities desiring to dispose of their HW outside the DLA Disposition Services system will develop their own manifest tracking system to provide an audit trail from point of generation to ultimate disposal.

6.3.1.4.4. Transport Requirements. Vehicles transporting hazardous wastes shall comply with the following requirements:

6.3.1.4.4.1. Approval is required for the transport of HW. See Section 6.3.11.

6.3.1.4.4.2. Vehicles shall be equipped with all means of safety to prevent injury, accident.

6.3.1.4.4.3. Vehicles shall be capable of containing HW without leakage.

6.3.1.4.4.4. Vehicle capacity shall be sufficient to accommodate quantity of HW.

6.3.1.4.4.5. Drivers shall be licensed and trained for emergency response.

6.3.1.4.4.6. Vehicles shall be equipped with a clear sign stating the extent of hazard of their load and best practice in case of emergency.

6.3.1.4.4.7. Vehicle routes shall be determined prior to transport and Civil Defense must be immediately informed of any chance of danger or accident.

6.3.1.4.4.8. Additional HW Transport Requirements in Abu Dhabi. If DLA Disposition Services is not used, installations shall ensure that approved Environmental Service Providers are utilized, if required.

6.3.1.4.4.9. Exemptions from Local Abu Dhabi Transport Requirements. The following transport activities are exempt from local transport requirements:

6.3.1.4.4.9.1. Emergency transport to protect human health, environment, or property

6.3.1.4.4.9.2. Transport of waste by pipeline

6.3.1.4.4.9.3. Transport for research purposes (upon approval of the Competent Authority)

6.3.1.4.4.9.4. Transport of refillable containers (if the container will be filled with the same type of substance)

6.3.2. Hazardous Waste Accumulation Point (HWAP)

6.3.2.1. An HWAP is defined in paragraph 6.2.6. Each HWAP must be designed and operated to provide appropriate segregation for different waste streams, including those that are chemically incompatible. Each HWAP will have warning signs (National Fire Protection Association or appropriate international sign) appropriate for the waste being accumulated at that site.

6.3.2.2. An HWAP will comply with the storage limits in paragraph 6.2.6. When these limits have been reached, the generator will make arrangements within five working days to move the HW to an HWSA or ship it off-site for treatment or disposal. Arrangements must include submission of all appropriate turn-in documents to initiate the removal (e.g., DD 1348-1A) to appropriate authorities responsible for removing the HW (e.g., DLA Disposition Services). Wastes intended to be recycled or used for energy recovery (for example, used oil or antifreeze) is exempt from the 208-liter (55-gallons)/1-liter (1-quart) volume accumulation limits, but must be transported off-site to a final destination facility within one year.

6.3.2.3. All criteria of paragraph 6.3.4., "Use and Management of Containers," apply to HWAPs with the exception of subparagraph 6.3.4.1.5., "Weekly Inspections."

6.3.2.4. The following provisions of paragraph 6.3.5., "Recordkeeping Requirements," apply to HWAPs: 6.3.5.1. ("Turn-in Documents"), 6.3.5.5. ("Manifests"), and 6.3.5.6. ("Waste Analysis/Characterization Records").

6.3.2.5. Personnel Training. Personnel assigned HWAP duty must successfully complete appropriate HW training necessary to perform their assigned duties. At a minimum, this must include pertinent waste handling and emergency response procedures. Generic HW training requirements are described in paragraph 6.3.9.

6.3.3. Hazardous Waste Storage Area (HWSA). Installations storing their own HW shall contact the LEC to determine approval requirements. In addition, installations employing private contractors in Abu Dhabi shall ensure that these contractors are approved Environmental Service Providers.

6.3.3.1. Location Standards. To the maximum extent possible, all HWSAs will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where they may face such risks, the installation spill prevention and control plan must address the risk.

6.3.3.2. Design and Operation of HWSAs. HWSAs must be designed, constructed maintained and operated to minimize the possibility of a fire, explosion, or any unplanned release of HW or HW constituents to air, soil, groundwater or surface water that could threaten human health or the environment. A collection schedule must be established to ensure that hazardous waste is not stored longer than one year in an HWSA.

6.3.3.3. Waste Analysis and Verification

6.3.3.3.1. Waste Analysis Plan. The HWSA manager, in conjunction with the installation(s) served, will develop a plan to determine how and when wastes are to be analyzed. The waste analysis plan will include procedures for characterization and verification testing of both on-site and off-site hazardous waste. The plan should include: parameters for testing and rationale for choosing them, frequency of analysis, test methods, and sampling methods.

6.3.3.3.2. Maintenance of Waste Analysis File. The HWSA must have, and keep on file, with a copy at the environmental office, an HWPS for each waste stream that is stored at each HWSA.

6.3.3.3.3. Waste Verification. Generating activities will provide identification of incoming waste on the HWPS to the HWSA manager. Prior to accepting the waste, the HWSA manager will:

6.3.3.3.3.1. Inspect the waste to ensure it matches the description provided.

6.3.3.3.3.2. Ensure that no waste is accepted for storage unless an HWPS is provided, or is available and properly referenced.

6.3.3.3.3.3. Request a new HWPS from the generator if there is reason to believe that the process generating the waste has changed;

6.3.3.4. Security

6.3.3.4.1. General. The installation must prevent the unknowing entry, and minimize the possibility for unauthorized entry, of persons or livestock onto the HWSA grounds.

6.3.3.4.2. Security System Design. An acceptable security system for a HWSA consists of either:

6.3.3.4.2.1. A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or other designated personnel) that continuously monitors and controls entry into the HWSA; or

6.3.3.4.2.2. An artificial or natural barrier (e.g., a fence in good repair or a fence combined with a cliff) that completely surrounds the HWSA, combined with a means to control entrance at all times (e.g., an attendant, television monitors, locked gate, or controlled roadway access).

6.3.3.4.3. Required Signs. A sign with the legend "Danger Unauthorized Personnel Keep Out," must be posted at each entrance to the HWSA, and at other locations, in sufficient numbers to be seen from any approach to the HWSA. The legend must be written in English and in any other language predominant in the area surrounding the installation, and must be legible from a distance of at least 7.62 meters (25 feet). Existing signs with a legend other than "Danger Unauthorized Personnel Keep Out," may be used if the legend on the sign indicates that only authorized personnel are allowed to enter the HWSA, and that entry can be dangerous.

6.3.3.5. Required Aisle Space. Aisle space must allow for unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation during an emergency. Containers must not obstruct an exit.

6.3.3.6. Access to Communications or Alarm System

6.3.3.6.1. General. Whenever HW is being poured, mixed, or otherwise handled, all personnel involved in the operation must have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another person.

6.3.3.6.2. If there is only one person on duty at the HWSA premises, that person must have immediate access to a device, such as a telephone (immediately available at the scene of operation) or a hand-held two-way radio, capable of summoning external emergency assistance.

6.3.3.7. Required Equipment. All HWSAs must be equipped with the following:

6.3.3.7.1. An alarm system capable of providing immediate emergency instruction (voice or signal) to HWSA personnel.

6.3.3.7.2. A device, such as an intrinsically safe telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning emergency assistance from installation security, fire departments, or emergency response teams.

6.3.3.7.3. Portable fire extinguishers, fire control and protection equipment appropriate to the material in storage (including special extinguishing equipment as needed, such as that using foam, inert gas, or dry chemicals), fire alarm systems, spill control equipment, and decontamination equipment.

6.3.3.7.4. Water at adequate volume and pressure to supply water hose streams, foam-producing equipment, automatic sprinklers, or water spray systems.

6.3.3.7.5. Readily available personal protective equipment appropriate to the materials stored, and eyewash and shower facilities.

6.3.3.7.6. Testing and Maintenance of Equipment. All HWSA alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be maintained to ensure its availability, accessibility, and proper operation in time of emergency.

6.3.3.8. General Inspection Requirements

6.3.3.8.1. General. The installation must inspect the HWSA for malfunctions and deterioration, operator errors, and discharges that may be causing, or may lead to, a release of HW constituents to the environment or threat to human health. The inspections must be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

6.3.3.8.2. Types of Equipment Covered. Inspections must include all equipment and areas involved in storage and handling of HW, including all containers and container storage areas, tank systems and associated piping, and all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

6.3.3.8.3. Inspection Schedule. Inspections must be conducted according to a written schedule that is kept at the HWSA. The schedule must identify the types of problems (e.g., malfunctions or deterioration) that are to be looked for during the inspection (e.g., inoperative sump pump, leaking fitting, or eroding dike).

6.3.3.8.4. Frequency of Inspections. Minimum frequencies for inspecting containers and container storage areas are found in subparagraph 6.3.4.1.5. Minimum frequencies for inspecting tank systems are found in subparagraph 6.3.7.5.2. For equipment not covered by those paragraphs, inspection frequency should be based on the rate of possible deterioration of the equipment and probability of an environmental or human health incident if the deterioration or malfunction or any operator error goes undetected between inspections. Areas subject to spills, such as loading and unloading areas, must be inspected daily when in use.

6.3.3.8.5. Remedy of Problems Revealed by Inspection. The installation must remedy any deterioration or malfunction of equipment or structures that the inspection reveals on a schedule, which ensures that the problem does not lead to an environmental or human health hazard. Where a hazard is imminent or has already occurred, action must be taken immediately.

6.3.3.8.6. Maintenance of Inspection Records. The installation must record inspections in an inspection log or summary, and keep the records for at least three years from the date of inspection. At a minimum, these records must include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions.

6.3.3.9. Personnel Training. Personnel assigned HWSA duty must successfully complete an appropriate HW training program in accordance with the training requirements in paragraph 6.3.9.

6.3.3.10. Storage Practices

6.3.3.10.1. Compatible Storage. The storage of ignitable, reactive, or incompatible wastes must be handled so that it does not threaten human health or the environment. Dangers resulting from improper storage of incompatible wastes include generation of extreme heat, fire, explosion, and generation of toxic gases.

6.3.3.10.2. General requirements for ignitable, reactive, or incompatible wastes. The HWSA manager must take precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste must be separated and protected from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat producing chemical reactions), and radiant heat. While ignitable or reactive waste is being handled, the HWSA personnel must confine smoking and open flame to specially designated locations. "No Smoking" signs, or the appropriate icon, must be conspicuously placed wherever there is a hazard from ignitable or reactive waste. In areas where access by non-English speaking persons is expected, the "No Smoking" legend must be written in English and in any other language predominant in the area. Water reactive waste cannot be stored in the same area as flammable and combustible liquid.

6.3.3.11. Closure and Closure Plans

6.3.3.11.1. Closure. At closure of an HWSA, HW and HW waste residues must be removed from the containment system, including remaining containers, liners, and bases. Closure should be done in a manner which eliminates or minimizes the need for future maintenance or the potential for future releases of HW and according to the Closure Plan.

6.3.3.11.2. Closure Plan. Closure plans will be developed before a new HWSA is opened. Each existing HWSA will also develop a Closure Plan. The Closure Plan will be implemented concurrent with the decision to close the HWSA. The Closure Plan will include: estimates of the storage capacity of the HW, steps to be taken to remove or decontaminate all waste residues, and estimate of the expected date for closure.

6.3.4. Use and Management of Containers

6.3.4.1. Container Handling and Storage. To protect human health and the environment, the following guidelines will apply when handling and storing HW containers.

6.3.4.1.1. Containers holding HW will be in good condition, free from severe rusting, bulging, holes, or structural defects.

6.3.4.1.2. Containers used to store HW, including overpack containers, must be compatible with the materials stored.

6.3.4.1.3. Management of Containers

6.3.4.1.3.1. A container holding HW must always be closed during storage, except when it is necessary to add or remove waste.

6.3.4.1.3.2. A container holding HW must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak. Portable containers, in particular, shall not be kept in common areas.

6.3.4.1.3.3. Containers of flammable liquids must be grounded when transferring flammable liquids from one container to the other.

6.3.4.1.4. Containers holding HW will be marked with a HW marking, and a label indicating the hazard class of the waste contained (flammable, corrosive, etc.).

6.3.4.1.5. Areas where containers are stored must be inspected weekly for leaking and deteriorating containers as well as deterioration of the containment system caused by corrosion or other factors. Secondary containment systems will be inspected for defects and emptied of accumulated releases or retained storm water.

6.3.4.2. Containment. Container storage areas must have a secondary containment system meeting the following:

6.3.4.2.1. Must be sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

6.3.4.2.2. The secondary containment system must have sufficient capacity to contain 10% of the volume of stored containers or the volume of the largest container, whichever is greater.

6.3.4.2.3. Storage areas that store containers holding only wastes that do not contain free liquids need not have a containment system as described in subparagraph 6.3.4.2.1., provided the storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or the containers are elevated or are otherwise protected from contact with accumulated liquid.

6.3.4.2.4. Rainwater captured in secondary containment areas should be inspected and/or tested prior to release. The inspection or testing must be reasonably capable of detecting contamination by the HW in the containers. Contaminated water shall be treated as HW until determined otherwise.

6.3.4.3. <u>Special Requirements for Ignitable or Reactive Waste</u>. Areas that store containers holding ignitable or reactive waste must be located at least 15 meters (50 feet) inside the installation's boundary.

6.3.4.4. <u>Special Requirements for Incompatible Wastes</u>

6.3.4.4.1. Incompatible wastes and materials must not be placed in the same container.

6.3.4.4.2. Hazardous waste must not be placed in an unwashed container that previously held an incompatible waste or material.

6.3.4.4.3. A storage container holding HW that is incompatible with any waste or other materials stored nearby in other containers, piles, open tanks, or surface impoundments, must be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

6.3.5. <u>Recordkeeping Requirements</u>

6.3.5.1. <u>Turn-in Documents</u>. Turn-in documents, e.g., DD 1348-1A or manifests, must be maintained for 3 years.

6.3.5.2. <u>Hazardous Waste Log</u>. A written HW log will be maintained at the HWSA to record all HW handled and should consist of the following:

6.3.5.2.1. Name/address of generator;

6.3.5.2.2. Description (physical/ chemical) and hazard class of the hazardous waste;

6.3.5.2.3. Number and types of containers;

6.3.5.2.4. Quantity of hazardous waste;

6.3.5.2.5. Date stored;

6.3.5.2.6. Storage location; and

6.3.5.2.7. Disposition data, to include: rates and periods of collection, dates received, sealed, and transported, method of transport and transporter used, and method of treatment. In Abu Dhabi, the final destination of the HW shall also be recorded for a minimum of 3 years.

6.3.5.3. The HW log will be available to emergency personnel in the event of a fire or spill. Logs will be maintained until closure of the installation.

6.3.5.4. Inspection Logs. Records of inspections should be maintained for a period of 3 years.

6.3.5.5. Manifests. Manifests of incoming and outgoing hazardous wastes will be retained for a period of 3 years.

6.3.5.6. Waste Analysis/Characterization Records. These records will be retained until 3 years after closure of the HWSA.

6.3.5.7. The installation will maintain records, identified in subparagraphs 6.3.5.1., 6.3.5.5., and 6.3.5.6. for all HWAPs on the installation.

6.3.5.8. Additional Record-keeping Requirements in Abu Dhabi. The following additional record-keeping requirements were identified in Abu Dhabi:

6.3.5.8.1. Records regarding the source of HW shall be included in the HW log (Section 6.3.5.2.).

6.3.5.8.2. Installations shall maintain consignment numbers and waste transfer notes for a period of 4 years.

6.3.6. Contingency and emergency Plan

6.3.6.1. Each installation will have a contingency plan that describes actions to be taken to contain and clean up spills and releases of HW in accordance with the provisions of Chapter 18, "Spill Prevention and Response Planning."

6.3.6.2. A current copy of the installation contingency plan must be:

6.3.6.2.1. Maintained at each HWSA and HWAP, (HWAPs need maintain only portions of the contingency plan that are pertinent to their facilities and operation); and

6.3.6.2.2. Submitted to all police departments, fire departments, hospitals, and emergency response teams identified in the plan, and upon which the plan relies to provide emergency services. Contingency Plans should be available in both English and the language of the host nation.

6.3.6.3. Each installation will have an emergency response plan to mitigate planned impacts during the production, handling, transport and storage of hazardous wastes.

6.3.6.4. A copy of the installation emergency response plan shall be submitted to the LEC.

6.3.7. Tank Systems. The following criteria apply to all storage tanks containing HW. See Chapter 19, "Underground Storage Tanks," for criteria dealing with underground storage tanks containing POLs and hazardous substances.

6.3.7.1. Application. The requirements of this subparagraph apply to HWSAs that use tank systems for storing or treating HW. Tank systems that are used to store or treat HW that contain no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in subparagraph 6.3.7.4., Containment and Detection of Releases. Tank systems, including sumps that serve as part of a secondary containment system to collect or contain releases of HW, are exempted from the requirements in subparagraph 6.3.7.4.

6.3.7.2. Assessment of the Integrity of an Existing Tank System. For each existing tank system that does not have secondary containment meeting the requirements of subparagraph 6.3.7.4., installations must determine annually whether the tank system is leaking or is fit for use. Installations must obtain, and keep on file at the HWSA, a written assessment of tank system integrity reviewed and certified by a competent authority.

6.3.7.3. Design and Installation of New Tank Systems or System Components. Managers of HWSAs installing new tank systems or system components must obtain a written assessment, reviewed and certified by a competent authority attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating HW. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

6.3.7.4. Containment and Detection of Releases. To prevent the release of HW or hazardous constituents to the environment, secondary containment that meets the requirements of this subparagraph must be:

6.3.7.4.1. Provided for all new tank systems or components, prior to their being put into service;

6.3.7.4.2. Provided for those existing tank systems when the tank system annual leak test detects leakage;

6.3.7.4.3. Provided for tank systems that store or treat HW by 1 January 1999;

6.3.7.4.4. Designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquid until the collected material is removed; and

6.3.7.4.5. Constructed to include one or more of the following: a liner external to the tank, a vault, or double-walled tank.

6.3.7.5. General Operating Requirements

6.3.7.5.1. Hazardous wastes or treatment reagents must not be placed in a tank system if they could cause the tank, its ancillary equipment, or the containment system to rupture, leak, corrode, or otherwise fail.

6.3.7.5.2. The installation must inspect and log at least once each operating day:

6.3.7.5.2.1. The above-ground portions of the tank system, if any, to detect corrosion or releases of waste;

6.3.7.5.2.2. Data gathered from monitoring and leak detection equipment (e.g., pressure or temperature gauges, monitoring wells) to ensure that the tank system is being operated according to its design; and

6.3.7.5.2.3. The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system (e.g., dikes) to detect erosion or signs of releases of HW (e.g., wet spots, dead vegetation).

6.3.7.5.3. The installation must inspect cathodic protection systems to ensure that they are functioning properly. The proper operation of the cathodic protection system must be confirmed within 6 months after initial installation and annually thereafter. All sources of impressed current must be inspected and/or tested, as appropriate, or at least every other month. The installation manager must document the inspections in the operating record of the HWSA.

6.3.7.6. Response to Leaks or Spills and Disposition of Leaking or Unfit-For-Use Tank Systems. A tank system or secondary containment system from which there has been a leak or spill, or that is unfit for use, must be removed from service immediately and repaired or closed. Installations must satisfy the following requirements:

6.3.7.6.1. Cessation of use; prevention of flow or addition of wastes. The installation must immediately stop the flow of HW into the tank system or secondary containment system and inspect the system to determine the cause of the release.

6.3.7.6.2. Containment of visible releases to the environment. The installation must immediately conduct an inspection of the release and, based on that inspection:

6.3.7.6.2.1. Prevent further migration of the leak or spill to soil or surface water;

6.3.7.6.2.2. Remove and properly dispose of any contaminated soil or surface water;

6.3.7.6.2.3. Remove free product to the maximum extent possible; and

6.3.7.6.2.4. Continue monitoring and mitigating for any additional fire and safety hazards posed by vapors or free products in subsurface structures.

6.3.7.6.3. Make required notifications and reports.

6.3.7.7. Closure. At closure of a tank system, the installation must remove or decontaminate HW residues, contaminated containment system components (liners, etc.), contaminated soil to the extent practicable, and structures and equipment.

6.3.8. Standards for the Management of Used Oil and Lead-Acid Batteries

6.3.8.1. Used Oil Burned for Energy Recovery. Used oil fuel may be burned only in the following devices:

6.3.8.1.1. Industrial furnaces.

6.3.8.1.2. Boilers that are identified as follows:

6.3.8.1.2.1. Industrial boilers located on the site of a facility engaged in a manufacturing process where substances are transformed into new products, including the component parts of products, by mechanical or chemical processes;

6.3.8.1.2.2. Utility boilers used to produce electric power, steam, heated or cooled air, or other gases or fluids;

6.3.8.1.2.3. Used oil-fired space heaters provided that:

6.3.8.1.2.3.1. The heater burns only used oil that the installation generates;

6.3.8.1.2.3.2. The heater is designed to have a maximum capacity of not more than 0.5 million BTU per hour; and

6.3.8.1.2.3.3. The combustion gases from the heater are properly vented to the ambient air.

6.3.8.2. Used Oil Disposal in Dubai. Used oil shall be disposed of by the following means in Dubai:

6.3.8.2.1. As domestic waste (See Chapter 7, "Solid Waste") for concentrations below those listed in Table 6.1.

6.3.8.2.2. As hazardous waste in accordance with the disposal and treatment methods in Table 6.2 for concentrations above those listed in Table 6.1.

6.3.8.3. Prohibitions on Dust Suppression or Road Treatment. Used oil, HW, or used oil contaminated with any HW will not be used for dust suppression or road treatment.

6.3.8.4. Lead-acid batteries that are to be recycled will be managed as hazardous material. Lead-acid batteries that are not recycled will be managed as HW.

6.3.9. Hazardous Waste Training

6.3.9.1. Application. Personnel and their supervisors who are assigned duties involving actual or potential exposure to HW must successfully complete an appropriate training program prior to assuming those duties. Personnel assigned to such duty after the effective date of this Guide must work under direct supervision until they have completed appropriate training. Additional guidance is contained in DoDI 6050.05 (DoD Hazardous Communication (HAZCOM) Program).

6.3.9.2. Refresher Training. All personnel performing HW duties must successfully complete annual refresher HW training.

6.3.9.3. Training Contents and Requirements. The training program must:

6.3.9.3.1. Include sufficient information to enable personnel to perform their assigned duties and fully comply with pertinent HW requirements.

6.3.9.3.2. Be conducted by qualified trainers who have completed an instructor training program in the subject, have comparable academic credentials, or experience.

6.3.9.3.3. Be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems.

6.3.9.3.4. Address the following areas, in particular for personnel whose duties include HW handling and management:

6.3.9.3.4.1. Emergency procedures (response to fire/explosion/spills; use of communications/alarm systems; body and equipment clean up);

6.3.9.3.4.2. Drum/container handling/storage; safe use of HW equipment; proper sampling procedures;

6.3.9.3.4.3. Employee Protection, to include Personal Protective Equipment (PPE), safety and health hazards, hazard communication, worker exposure; and

6.3.9.3.4.4. Recordkeeping, security, inspections, contingency plans, storage requirements, and transportation requirements.

6.3.9.4. Documentation of Training. Installations must document all HW training for each individual assigned duties involving actual or potential exposure to HW. Updated training records on personnel assigned duties involving actual or potential exposure to HW must be kept by the HWSA manager or the responsible installation office and retained for at least three years after termination of duty of these personnel.

6.3.10. Hazardous Waste Disposal

6.3.10.1. All DoD HW should normally be disposed of through the DLA Disposition Services. A decision not to use the DLA Disposition Services for HW disposal may be made in accordance with DoDD 4001.1, "Installation Management," dated 04 September 1986 to best accomplish the installation mission, but should be concurred with by the component chain of command to ensure that installation contracts and disposal criteria are at least as protective as criteria used by the DLA Disposition Services. Installations shall coordinate with the LEC to determine approved HW disposal sites. In Abu Dhabi, installations shall ensure that any third-party contracted for HW disposal is an approved Environmental Service Provider.

6.3.10.2. The DoD Components must ensure that wastes generated by DoD operations and considered hazardous under either U.S. law or UAE law are not disposed of in the host nation unless the disposal is conducted in accordance with FGS and the following:

6.3.10.2.1. When HW cannot be disposed of in accordance with FGS within the host nation, it will either be retrograded to the United States or, if permissible under international agreements, transferred to another country outside the United States where it can be disposed of in an environmentally sound manner and in compliance with FGS applicable to the country of disposal, if any exist. Transshipment of HW to a country other than the United States for disposal must be approved by, at a minimum, the DUSD(I&E).

6.3.10.2.2. The determination of whether particular DoD-generated HW may be disposed of in a host nation will be made by the EEA, in coordination with the unified combatant commander, the Director of Defense Logistics Agency, other relevant DoD Components, and the Chief of the U.S. Diplomatic Mission.

6.3.10.3. <u>Disposal Procedures</u>

6.3.10.3.1. The determination of whether HW may be disposed of in a host nation must include consideration of whether the means of treatment and/or containment technologies employed in the UAE program, as enacted and enforced, effectively mitigate the hazards of such waste to human health and the environment, and must consider whether the UAE program includes:

6.3.10.3.1.1. An effective system for tracking the movement of HW to its ultimate destination.

6.3.10.3.1.2. An effective system for granting authorization or permission to those engaged in the collection, transportation, storage, treatment, and disposal of HW.

6.3.10.3.1.3. Appropriate standards and limitations on the methods that may be used to treat and dispose of HW.

6.3.10.3.1.4. Standards designed to minimize the possibility of fire, explosion, or any unplanned release or migration of HW or its constituents to air, soil, surface, or groundwater.

6.3.10.3.2. The EEA must also be satisfied, either through reliance on the UAE regulatory system and/or provisions in the disposal contracts, that:

6.3.10.3.2.1. Persons and facilities in the waste management process have demonstrated the appropriate level of training and reliability; and

6.3.10.3.2.2. Effective inspections, monitoring, and recordkeeping will take place.

6.3.10.4. UAE facilities that either store, treat, or dispose of DoD-generated waste must be evaluated and approved by the host nation as being in compliance with their regulatory requirements. This evaluation and approval may consist of having a valid permit or HN equivalent for the HW that will be handled.

6.3.10.5. Hazardous waste will be recycled or reused to the maximum extent practical. Safe and environmentally acceptable methods will be used to identify, store, prevent leakage, and dispose of HW, to minimize risks to health and the environment.

6.3.10.5.1. The following HW in particular shall be recycled, re-used or recovered:

6.3.10.5.1.1. Re-use of some HW as fuel for power generation

6.3.10.5.1.2. Recovery and re-use of organic solvents in subsequent recovery operations

6.3.10.5.1.3. Recycling and re-use of certain organic materials in HW

6.3.10.5.1.4. Re-use of metals, non-metals, and their compounds

6.3.10.5.1.5. Recycling of metals, non-metals, and their compounds

6.3.10.5.1.6. Recycling and recovery of acids and bases

6.3.10.5.1.7. Recovery of used oils

6.3.10.5.1.8. Re-use of used oils post-refining

6.3.10.5.2. Non-recyclable or non-reusable wastes shall be isolated, physically and chemically treated, incinerated, and finally stored in a permanent container.

6.3.10.6. Land Disposal Requirements. Hazardous wastes will only be land-disposed when there is a reasonable degree of certainty that there will be no migration of hazardous constituents from the disposal site for as long as the wastes remain hazardous. Hazardous waste may be land-disposed only in facilities meeting the following criteria:

6.3.10.6.1. The land disposal facility has a liner and a leachate collection system. The liner will be of natural or man-made materials and restrict the downward or lateral escape of HW, hazardous constituents, or leachate. The permeability of such liners will be no greater than 10^{-7} cm/sec;

6.3.10.6.2. The land disposal facility has a groundwater monitoring program capable of determining the facility's impact on the quality of water in the aquifers underlying the facility; and

6.3.10.6.3. The requirements of subparagraphs 6.3.10.6.1. or 6.3.10.6.2., above, may be waived for a particular land disposal facility by the EEA if a written determination is made by a qualified geologist or geotechnical engineer that there is a low potential for migration of HW, hazardous constituents, or leachate from the facility to water supply wells, irrigation wells, or surface water. This determination will be based on an analysis of local precipitation, geologic conditions, physical properties, depth to groundwater, and proximity of water supply wells or surface water, as well as use of alternative design and operating practices. Methods for preventing migration will be at least as effective as liners and leachate collection systems required in subparagraph 6.3.10.6.1.

6.3.10.7. Incinerator Standards. This subparagraph applies to incinerators that incinerate HW as well as boilers and industrial furnaces that burn HW for any recycling purposes.

6.3.10.7.1. Incinerators used to dispose of HW must be licensed or permitted by a competent HN authority or-approved by the EEA. This license, permit, or approval must comply with the criteria listed in subparagraph 6.3.10.7.2.

6.3.10.7.2. A license, permit, or EEA approval for incineration of HW must require the incinerator to be designed to include appropriate equipment as well as to be operated according to management practices (including proper combustion temperature, waste feed rate, combustion gas velocity, and other relevant criteria) to effectively destroy hazardous constituents and control harmful emissions. A permitting, licensing, or approval scheme that would require an incinerator to achieve the standards set forth in subparagraph 6.3.10.7.2.1. and either subparagraphs 6.3.10.7.2.2. or 6.3.10.7.2.3. is acceptable.

6.3.10.7.2.1. Incinerators shall comply with the following design standards:

6.3.10.7.2.1.1. Incineration plant shall consist of two chambers

6.3.10.7.2.1.2. It shall be located at least 5 km (3.11 miles) away from the nearest residential, commercial, industrial, or agricultural areas or the water environment (rivers, dams, basins etc.)

6.3.10.7.2.1.3. Incinerator temperature should be no less than 900°C (1,652°F) and period of incineration should be no less than 3 seconds at such a temperature

6.3.10.7.2.1.4. Incinerator should be equipped with a control mechanism to minimize air emissions resulting from the incineration process

6.3.10.7.2.1.5. Incinerator capacity should be sufficient to incinerate HW within 24 hours

6.3.10.7.2.1.6. Incinerator volume should be sufficient to accommodate the HW and all operations to be carried out at the installation, according to the nature of the activities

6.3.10.7.2.1.7. Except where the incinerator is designed for such waste, plastic and rubber materials shall be segregated for recycling and not incinerated to prevent the release of hazardous air emissions

6.3.10.7.2.1.8. Air pollutant emissions as a result of combustion shall not exceed the limits listed in Table 6.3

6.3.10.7.2.2. The incinerator achieves a destruction and removal efficiency of 99.99% for the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste. The incinerator must minimize carbon monoxide in stack exhaust gas, minimize emission of particulate matter, and emit no more than 1.8 Kg (4 pounds) of hydrogen chloride per hour.

6.3.10.7.2.3. The incinerator has demonstrated, as a condition for obtaining a license, permit, or EEA approval, the ability to effectively destroy the organic hazardous constituents that represent the greatest degree of difficulty of incineration in each waste or mixture of waste to be burned. For example, this standard may be met by requiring the incinerator to conduct a trial burn, submit a waste feed analysis and detailed engineering description of the facility, and provide any other information that may be required to enable the competent ~~HN~~ UAE authority or the EEA to conclude that the incinerator will effectively destroy the principal organic hazardous constituents of each waste to be burned.

6.3.10.8. Treatment Technologies. The following treatment technologies may be used to reduce the volume or hazardous characteristics of wastes. Wastes categorized as hazardous on the basis of section AP1.1. and which, after treatment as described herein, no longer exhibit any hazardous characteristic, may be disposed of as solid waste. Treatment residues of wastes categorized as hazardous under any other section of Appendix 1 will continue to be managed as HW under the criteria of this Guide, including those for disposal. The treatment technologies listed below are provided as baseline treatment/disposal technologies for use in determining suitability of ~~HN~~ UAE disposal alternatives. These technologies should not be implemented without consultation with the EEA, or the Combatant Commander, if there is no EEA.

6.3.10.8.1. Organics

6.3.10.8.1.1. Incineration in accordance with the requirements of subparagraph 6.3.10.7.1.

6.3.10.8.1.2. Fuel substitution where the units are operated such that destruction of hazardous constituents are at least as efficient, and hazardous emissions are no greater than those produced by incineration.

6.3.10.8.1.3. Biodegradation. Wastes are degraded by microbial action. Such units will be operated under aerobic or anaerobic conditions so that the concentrations of a representative compound or indicator parameter (e.g., total organic carbon) have been substantially reduced in concentration. The level to which biodegradation must occur and the process time vary depending on the HW being biodegraded.

6.3.10.8.1.4. Recovery. Wastes are treated to recover organic compounds. This will be done using, but not limited to, one or more of the following technologies: distillation; thin film evaporation; steam stripping; carbon adsorption; critical fluid extraction; liquid extraction; precipitation/crystallization, or phase separation techniques, such as decantation, filtration, and centrifugation when used in conjunction with one of the above techniques.

6.3.10.8.1.5. Chemical Degradation. The wastes are chemically degraded in such a manner to destroy hazardous constituents and control harmful emissions. Non-useable or non-recyclable wastes shall be physically and chemically treated.

6.3.10.8.2. Heavy Metals

6.3.10.8.2.1. Stabilization or Fixation. Wastes are treated in such a way that soluble heavy metals are fixed by oxidation/reduction, or by some other means that renders the metals immobile in a landfill environment.

6.3.10.8.2.2. Re-Use or Recovery. Wastes are treated to recover the metal fraction by thermal processing, precipitation, exchange, carbon absorption, or other techniques that yield non-hazardous levels of heavy metals in the residuals. Some metals and their compounds shall be re-used (where appropriate).

6.3.10.8.3. Reactives. Any treatment that changes the chemical or physical composition of a material so it no longer exhibits the characteristic for reactivity defined in Appendix 1.

6.3.10.8.4. Corrosives. Corrosive wastes as defined in paragraph AP1.1.3, will be neutralized to a pH value between 6.0 and 9.0. Other acceptable treatments include recovery, incineration, chemical or electrolytic oxidation, chemical reduction, or stabilization.

6.3.10.8.5. Batteries. Mercury, nickel-cadmium, lithium, and lead-acid batteries will be processed in accordance with subparagraphs C6.3.10.8.2.1. or C6.3.10.8.2.2. to stabilize, fix or recover heavy metals, as appropriate, and in accordance with subparagraph C6.3.10.8.4. to neutralize any corrosives before disposal.

6.3.10.9. DoD generators of HW shall not treat HW at the point of generation except for elementary neutralization. This shall not preclude installations from treating HW in accord with subparagraphs 6.3.10.7. and 6.3.10.8.

6.3.10.10. Treatment and disposal locations for HW shall comply with the following requirements:

6.3.10.10.1. Located at least 5 km (3.11 miles) away from residential and populated areas

6.3.10.10.2. Able to handle the quantity of hazardous waste expected to be treated

6.3.10.10.3. Surrounded by a brick fence no less than 2.5 m (8.2 feet) in height

6.3.10.10.4. Easily accessible to all vehicles transporting HW

6.3.10.10.5. Equipped with a water source, telephone line, and toilets

6.3.10.10.6. Equipped with all mechanical equipment to facilitate the treatment process

6.3.10.10.7. Equipped with HW storage areas, incinerator and a suitable ash disposal area, if applicable

6.3.11. Hazardous Waste Approval. Installations may require approval for the transport off installation and treatment or disposal of hazardous wastes. Contact the LEC to determine approval requirements. An installation's records for hazardous wastes shall be kept for a period of five years from the date of commencement of the handling activity to include production, storage, transport, treatment and disposal.

Table 6.1. Hazardous Waste Exemption Table for Dubai

Waste Component	Leached Fraction (g/m^3)	Concentration (mg/kg)
Heavy Metals		
Arsenic	5	500
Cadmium	0.5	50
Chromium	5	3000
Copper	10	1000
Cobalt	-	500
Lead	5	3000
Mercury	0.1	10
Nickel	2	1000
Tin	-	500
Selenium	1.0	100
Zinc	50	5000
Total Heavy Metals	-	10000
Inorganic		
Cyanides	10	500
Fluorides [1]	100	5000
Asbestos containing Wastes (excluding Asbestos Cement Products)	-	10000 (1%)
Organic		
Phenols	-	50
Petroleum Hydrocarbons		
>C9	-	20,000 (2%)
<C9	-	20,000 (0.2%)
Organochlorine compounds [3]	-	10
PCBs	-	5
Non-chlorinated Pesticides	-	50

Notes:

1 Excluding calcium fluoride

2 All asbestos cement products are classified as non-hazardous. See Chapter 15, Asbestos.

3 Excluding PCBs.

Table 6.2. Acceptable Treatment/ Disposal Methods for Oily Products in Dubai

Oily Waste Type	Treatment or Disposal Operations (Dubai Waste Acceptance Code)	Additional Treatment/ Alternative Disposal Options
Liquid waste oil	Recovery of oil at oil-water separator system (in case of waste oil in liquid phase) (R1)	Oil segregation at source; or to Dubai Municipality-permitted waste oil recycling facilities.
Oily sludge	Recovery of oil and treatment of sludge (in case of oil sludge) (R2)	To a privately-owned waste oil treatment facility with valid license from Dubai Municipality
Oily wastewater	Recovery of oil and treatment of sludge (in case of oil sludge) (R2) or Treatment by physico-chemical process other than evaporation by natural means (T1)	R1/T1 at IHWTDF if free oil falls < 25% by volume; R1 at privately-owned but DM-licensed facility if free oil is > 25 % v/v
Used oil filters	Storage – final deposit into secure landfill with single-lined cell (S3)	Drained free oil and contained solid waste in sealed drums.

Table 6.3. Maximum Allowable Emission Limits of Air Pollutants Emitted from Hazardous Waste Incinerators in the UAE

Substance	Max. Allowable Emission Limits (mg/Nm^3 unless otherwise specified)
Total Suspended Particles (TSP)	10 (daily average) 30 (half-hourly average)
Carbon Monoxide (CO)	50 (daily average) 100 (half-hourly average)
Nitrogen Oxides (NOx) (expressed as Nitrogen Dioxide (NO_2))	200 (daily average) 400 (half-hourly average)
Sulfur Dioxide (SO_2)	50 (daily average) 200 (half-hourly average)
Hydrogen Chloride (HCl)	10 (daily average) 60 (half-hourly average)
Hydrogen Fluoride (HF)	1 (daily average) 4 (half-hourly average)
Total Volatile Organic Compounds (VOC) (expressed as Total Organic Carbon (TOC))	10 (daily average) 20 (half-hourly average)
Cadmium and its compounds (expressed as Cd)	Total (0.1)
Thallium and its compounds (expressed as Tl)	
Mercury and its compounds (expressed as Hg)	0.1
Lead and its compounds (expressed as Pb)	Total (1)
Chrome and its compounds (expressed as Cr)	
Copper and its compounds (expressed as Cu)	
Manganese and its compounds (expressed as Mn)	
Mercury and its compounds (expressed as Hg)	
Cobalt and its compounds (expressed as Co)	
Antimony and its compounds (expressed as Sb)	
Arsenic and its compounds (expressed as As)	
Tin and its compounds (expressed as Sn)	
Vanadium and its compounds (expressed as V)	
Dioxins and Furans	0.1 (ng TEQ/m^3)

CHAPTER 7

SOLID WASTE

7.1. SCOPE

This Chapter contains criteria to ensure that solid wastes are identified, classified, collected, transported, stored, treated, and disposed of safely and in a manner protective of human health and the environment. These criteria apply to residential and commercial solid waste generated at the installation level. These criteria are part of integrated waste management. Policies concerning the recycling portion of integrated waste management are found in DoDI 4715.4 ("Pollution Prevention") and service solid waste management manuals. The criteria in this Chapter deal with general solid waste. Criteria for specific types of solid waste that require special precautions are located in Chapter 6, "Hazardous Waste," Chapter 8, "Medical Waste Management," Chapter 11, "Pesticides," and Chapter 14, "Polychlorinated Biphenyls."

7.2. DEFINITIONS

7.2.1. Bulky Waste. Large items of solid waste such as household appliances, furniture, large auto parts, trees, branches, stumps, and other oversize wastes whose large size precludes or complicates their handling by normal solid wastes collection, processing, or disposal methods.

7.2.2. Carry-out Collection. Collection of solid waste from a storage area proximate to the dwelling unit(s) or establishment where generated.

7.2.3. Collection. The act of consolidating solid wastes (or materials that have been separated for the purpose of recycling) from various locations.

7.2.4. Collection Frequency. The number of times collection is provided in a given period of time.

7.2.5. Commercial Solid Waste. All types of solid wastes generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial wastes.

7.2.6. Compactor Collection Vehicle. A vehicle with an enclosed body containing mechanical devices that convey solid waste into the main compartment of the body and compress it into a smaller volume of greater density.

7.2.7. Construction and Demolition Waste. The waste building materials, packaging, and rubble resulting from construction, remodeling, repair and demolition operations on pavements, houses, commercial buildings, and other structures.

7.2.8. Curb Collection. Collection of solid waste placed adjacent to a street.

7.2.9. Cover Material. Material that is used to cover compacted solid wastes in a land disposal site.

7.2.10. Daily Cover. Soil that is spread and compacted or synthetic material that is placed on the top and side slopes of compacted solid waste at least at the end of each operating day to control vectors, fire, moisture, and erosion and to assure an aesthetic appearance. Mature compost or other natural material may be substituted for soil if soil is not reasonably available in the vicinity of the landfill and the substituted material will control vectors, fire, moisture, and erosion and will assure an aesthetic appearance.

7.2.11. Environmental Service Providers. Parties operating in the field of collection, transport, storage, recycling, processing and disposal of wastes.

7.2.12. Final Cover. A layer of soil, mature compost, other natural material (or synthetic material with an equivalent minimum permeability) that is applied to the landfill after completion of a cell or trench, including a layer of material that will sustain native vegetation, if any.

7.2.13. Food Waste. The organic residues generated by the handling, storage, sale, preparation, cooking, and serving of foods, commonly called garbage.

7.2.14. Generation. The act or process of producing solid waste.

7.2.15. Hazardous Waste. Refer to Chapter 6, "Hazardous Waste."

7.2.16. Industrial Solid Waste. The solid waste generated by industrial processes and manufacturing.

7.2.17. Institutional Solid Waste. Solid waste generated by educational, health care, correctional, and other institutional facilities.

7.2.18. Land Application Unit. An area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment or disposal.

7.2.19. Lower Explosive Limit. The lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25°C (77°F) and atmospheric pressure.

7.2.20. Municipal Solid Waste (MSW). Normally, residential and commercial solid waste generated within a community, not including yard waste. (See also definition in Chapter 2, "Air Emissions.")

7.2.21. Municipal Solid Waste Landfill (MSWLF) Unit. A discrete area of land or an excavation, on or off an installation, that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile. An MSWLF unit also may receive other types of wastes, such as commercial solid waste and industrial waste.

7.2.22. Open Burning. Burning of solid wastes in the open, such as in an open dump.

7.2.23. Open Dump. A land disposal site at which solid wastes are disposed of in a manner that does not protect the environment, is susceptible to open burning, and is exposed to the elements, vectors, and scavengers.

7.2.24. Residential Solid Waste. The wastes generated by normal household activities, including, but not limited to, food wastes, rubbish, ashes, and bulky wastes.

7.2.25. Rubbish. A general term for solid waste, excluding food wastes and ashes, taken from residences, commercial establishments, and institutions.

7.2.26. Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

7.2.27. Satellite Vehicle. A small collection vehicle that transfers its load into a larger vehicle operating in conjunction with it.

7.2.28. Scavenging. The uncontrolled and unauthorized removal of materials at any point in the solid waste management system.

7.2.29. Service Solid Waste Management Manual. Naval Facility Manual of Operation (NAVFAC MO) 213, Air Force Regulation (AFR) 91-8, Army TM 5-634 ("Solid Waste Management"), or their successor documents.

7.2.30. Sludge. The accumulated semi-liquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

7.2.31. Solid Wastes. Garbage, refuse, sludge, and other discarded materials, including solid, semi-solid, liquid, and contained gaseous materials resulting from industrial and commercial operations and from community activities. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluent, dissolved materials in irrigation return flows, or other common water pollutants.

7.2.32. Solid Waste Storage Container. A receptacle used for the temporary storage of solid waste while awaiting collection.

7.2.33. Stationary Compactor. A powered machine that is designed to compact solid waste or recyclable materials and that remains stationary when in operation.

7.2.34. Storage. The interim containment of solid waste after generation and prior to collection for ultimate recovery or disposal.

7.2.35. Street Wastes. Material picked up by manual or mechanical sweepings of alleys, streets, and sidewalks; wastes from public waste receptacles; and material removed from catch basins.

7.2.36. Transfer Station. A site at which solid wastes are concentrated for transport to a processing facility or land disposal site. A transfer station may be fixed or mobile.

7.2.37. Vector. A carrier that is capable of transmitting a pathogen from one organism to another.

7.2.38. Yard Waste. Grass and shrubbery clippings, tree limbs, leaves, and similar organic materials commonly generated in residential yard maintenance (also known as green waste).

7.3. CRITERIA

7.3.1. DoD solid wastes will be treated, stored, and disposed of in facilities that have been evaluated against paragraphs 7.3.12., 7.3.14., 7.3.15 and 7.3.16. These evaluated facilities will be used to the maximum extent practical.

7.3.2. Installations will cooperate with UAE officials, to the extent possible, in the solid waste management planning process.

7.3.3. Installations will develop and implement a solid waste management strategy to reduce solid waste disposal. This strategy could include recycling, composting, and waste minimization efforts.

7.3.4. All solid wastes or materials that have been separated for the purpose of recycling will be stored in such a manner that they do not constitute a fire, health or safety hazard or provide food or harborage for vectors, and will be contained or bundled to avoid spillage.

7.3.5. Storage of bulky wastes will include, but will not be limited to, removing all doors from large household appliances and covering the items to reduce both the problems of an attractive nuisance, and the accumulation of solid waste and water in and around the bulky items. Bulky wastes will be screened for the presence of ozone depleting substances as defined in Chapter 2, "Air Emissions," or hazardous constituents as defined in Chapter 6, "Hazardous Waste." Readily detachable or removable hazardous waste will be segregated and disposed of in accordance with Chapters 6, 13, and 14 of this Guide.

7.3.6. In the design of all buildings or other facilities that are constructed, modified, or leased after the effective date of this Guide, there will be provisions for storage in accordance with these guidelines that will accommodate the volume of solid waste anticipated. Storage areas will be easily cleaned and maintained, and will allow for safe, efficient collection.

7.3.7. Storage containers should be leak-proof, waterproof, and vermin-proof, including sides, seams and bottoms, and be durable enough to withstand anticipated usage and environmental conditions without rusting, cracking, or deforming in a manner that would impair serviceability. Storage containers should have functional lids.

7.3.7.1. In Dubai, contact the LEC to determine specifications for storage containers.

7.3.8. Containers should be stored on a firm, level, well-drained surface that is large enough to accommodate all of the containers and that is maintained in a clean, spillage-free condition.

7.3.9. Recycling programs will be instituted on DoD installations in accordance with the policies in DODI 4715.4, "Pollution Prevention." In addition, they shall also comply with the following:

7.3.9.1. Waste shall be recycled in approved facilities;

7.3.9.2. In Jebel Ali:

7.3.9.2.1. Recycle materials whenever possible, including buying materials with recycled content.

7.3.9.2.2. If recycling or reclamation is not practical, dispose of wastes in an environmentally acceptable manner.

7.3.9.2.3. Identify recycling/reuse opportunities during waste audit proceedings.

7.3.9.2.4. Recycle process water, scrap metal, glass, paper, plastics and aluminum goods.

7.3.9.2.5. Recover all solvents.

7.3.10. Installations will not initiate new or expand existing waste landfill units without approval of the Combatant Commander with responsibility for the area where the landfill would be located and only after justification that unique circumstances mandate a new unit. In Abu Dhabi, new landfill units may also require approval. Contact the LEC regarding the location of existing landfills sites and approval procedures for establishing new sites or use of existing ones.

7.3.11. New DoD MSWLF units will be designed and operated in a manner that incorporates the following broad factors:

7.3.11.1. Location restrictions with regard to airport safety (i.e., bird hazards), floodplains, wetlands, aquifers, seismic zones, and unstable areas;

7.3.11.2. Procedures for excluding hazardous waste;

7.3.11.3. Cover material criteria (e.g., daily cover), disease vector control, explosive gas control, air quality criteria (e.g., no open burning), access requirements, liquids restrictions, and record keeping requirements; and

7.3.11.4. Inspection program.

7.3.11.5. Liner and leachate collection system designed consistent with location to prevent groundwater contamination that would adversely affect human health.

7.3.11.6. A groundwater monitoring system unless the installation operating the landfill, after consultation with the LEC, determines that there is no reasonable potential for migration of hazardous constituents from the MSWLF to the uppermost aquifer during the active life of the facility and the post-closure care period.

7.3.12. Installations operating MSWLF units will:

7.3.12.1. Use standard sanitary landfill techniques of spreading and compacting solid wastes and placing daily cover over disposed solid waste at the end of each operating day.

7.3.12.2. Establish criteria for unacceptable wastes based on site-specific factors such as hydrology, chemical and biological characteristics of the waste, available alternative disposal methods, environmental and health effects, and the safety of personnel.

7.3.12.3. Implement a program to detect and prevent the disposal of hazardous wastes, infectious wastes, PCBs, and wastes determined unsuitable for the specific MSWLF unit.

7.3.12.4. Investigate options for composting of MSW as an alternative to landfilling or treatment prior to landfilling. In Abu Dhabi, following sorting of mixed non-hazardous waste at transfer stations in the waste treatment facility, garden organic waste is composted with other compatible waste types to produce soil improver. In Jebel Ali, source reduction, including reuse, to reduce waste disposal and handling costs, shall also be considered as a method to avoid the costs of recycling, municipal composting, landfilling and combustion.

7.3.12.5. Prohibit open burning, except for infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, or debris from emergency clean-up operations.

7.3.12.6. Develop procedures for dealing with yard waste and construction debris that keeps it out of MSWLF units to the maximum extent possible (e.g., composting, recycling).

7.3.12.7. Operate the MSWLF unit in a manner to protect the health and safety of personnel associated with the operation. In Abu Dhabi, landfill sites shall implement programs for the management and control of wind-borne litter, dusts, leachates, and landfill gases.

7.3.12.8. Maintain conditions that are unfavorable for the harboring, feeding, and breeding of disease vectors.

7.3.12.9. Ensure that methane gas generated by the MSWLF unit does not exceed 25% of the lower explosive limit for methane in structures on or near the MSWLF.

7.3.12.10. Operate in an aesthetically acceptable manner. In Abu Dhabi, a suitable buffer distance shall be maintained between sensitive receptors (i.e., residential areas, parks, schools and commercial areas (e.g. shopping centers)) and sites for the management or disposal of mixed non-hazardous solid wastes to avoid potential impacts.

7.3.12.11. Operate in a manner to protect aquifers.

7.3.12.12. Control public access to landfill facilities. In Abu Dhabi, fencing shall be provided around sites for the management/disposal of mixed solid wastes to prohibit unauthorized access of people, livestock, and wildlife.

7.3.12.13. Prohibit the disposal of bulk or non-containerized liquids if possible.

7.3.12.14. Maintain records on the preceding criteria. In Abu Dhabi, generators and waste treatment facilities are required to keep records of waste produced, generation process and the amounts generated and transported to waste treatment/storage facilities.

7.3.12.15. During closure and post-closure operations, installations will:

7.3.12.15.1. Install a final cover system that is designed to minimize infiltration and erosion.

7.3.12.15.2. Ensure that the infiltration layer is composed of a minimum of 46 cm (18 inches) of earthen material, geotextiles, or a combination thereof, that have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present, or a permeability no greater than .00005 cm/sec, whichever is less.

7.3.12.15.3. Ensure that the final layer consists of a minimum of 21 cm (8 inches) of earthen material that is capable of sustaining native plant growth.

7.3.12.15.4. If possible, revegetate the final cap with native plants that are compatible with the landfill design, including the liner.

7.3.12.15.5. Prepare a written Closure Plan that includes, at a minimum, a description of the monitoring and maintenance activities required to ensure the integrity of the final cover, a description of the planned uses of the site during the post-closure period, plans for continuing (during the post-closure period) leachate collection, groundwater monitoring, and methane monitoring, and a survey plot showing the exact site location. The plan will be kept as part of the installation's permanent records. The post-closure period will be a minimum of 5 years.

7.3.13. Open burning will not be the regular method of solid waste disposal. Where burning is the method, incinerators meeting air quality requirements of Chapter 2, "Air Emissions," will be used.

7.3.14. A composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4, "Wastewater") will comply with the following criteria:

7.3.14.1. Operators must maintain a record of the characteristics of the waste composted, sewage sludge, and other materials, such as nutrient or bulking agents being composted, including the source and volume or weight of the material.

7.3.14.1.1. Access to the facility must be controlled. All access points must be secured when the facility is not in operation.

7.3.14.1.2. By-products, including residuals and materials that can be recycled, must be stored to prevent vector intrusion and aesthetic degradation. Materials that are not composted must be removed periodically.

7.3.14.1.3. Run-off water that has come in contact with composted waste, materials stored for composting, or residual waste must be diverted to a leachate collection and treatment system.

7.3.14.1.4. The temperature and retention time for the material being composted must be monitored and recorded.

7.3.14.1.5. Periodic analysis of the compost must be completed for the following parameters: percentage of total solids, volatile solids as a percentage of total solids, pH, ammonia, nitrate, nitrogen, total phosphorous, cadmium, chromium, copper, lead, nickel, zinc, mercury, and PCBs.

7.3.14.1.6. Compost must be produced by a process to further reduce pathogens. Two such acceptable methods are:

7.3.14.1.6.1. Windrowing, which consists of an unconfined composting process involving periodic aeration and mixing to maintain aerobic conditions during the composting process; and

7.3.14.1.6.2. The enclosed vessel method, which involves mechanical mixing of compost under controlled environmental conditions. The retention time in the vessel must be at least 72 hours with the temperature maintained at 55°C (131°F). A stabilization period of at least 7 days must follow the decomposition period.

7.3.14.2. In Abu Dhabi, compost shall be produced at waste management facilities handling non-hazardous mixed wastes.

7.3.14.2.1. Waste shall be sorted at transfer stations into garden organic wastes, recyclables, food wastes, and non-compostable wastes.

7.3.14.2.2. Soil improver shall be produced by composting garden organic waste with the other waste types, excluding non-compostable wastes.

7.3.15. <u>Classification and Use of Compost from DoD Composting Facilities</u>. Compost produced at a composting facility that is located on a DoD installation and that processes annually more than 5000 tons of sludge from a domestic wastewater treatment plant (see Chapter 4,"Wastewater") must be classified as "Class A" or "Class B" based on the criteria below and, depending on this classification, shall be subject to the restrictions on certain uses.

7.3.15.1. Class A compost must be stored until the compost is matured, i.e., 60 % decomposition has been achieved. Class A compost may contain contaminant levels no greater than the levels indicated below. The compost must be stabilized and contain no greater amounts of inert material than indicated. Allowable average contaminant concentrations in milligrams per kilogram on a dry weight basis are:

PCB	1
Cadmium	10
Chromium	1,000
Copper	500
Lead	500
Mercury	5
Nickel	100
Zinc	1,000

7.3.15.2. Class B compost consists of any compost generated that fails to meet Class A standards.

7.3.15.3. Compost distribution and end use:

7.3.15.3.1. Class A compost may be distributed for unrestricted use, including agricultural applications.

7.3.15.3.2. Class B compost may not be distributed for agricultural applications.

7.3.16. Approvals. Installations shall contact the LEC to determine approval requirements.

7.3.17. Waste Contractors. In Abu Dhabi only approved service providers will be used for transport, storage, treatment and disposal.

CHAPTER 8

MEDICAL WASTE

8.1. SCOPE

This Chapter contains criteria for the management of medical waste at medical, dental, research and development, and veterinary facilities generated in the diagnosis, treatment, or immunization of human beings or animals or in the production or testing of biologicals subject to certain exclusions. This waste also includes mixtures of medical waste and hazardous waste. It does not apply to what would otherwise be household waste.

8.2. DEFINITIONS

8.2.1. Infectious Agent. Any organism (such as a virus or bacterium) that is capable of being communicated by invasion and multiplication in body tissues and capable of causing disease or adverse health impacts in humans.

8.2.2. Infectious Hazardous Waste. Mixtures of infectious medical waste and hazardous waste to include solid waste such as fluids from a parasitology laboratory.

8.2.3. Infectious Medical Waste. Solid waste produced by medical, dental treatment, nursing, therapeutic, or veterinary facilities, pharmaceuticals or manufacturing activities, tests, research or teaching purposes, sample extraction or storage, that is specially managed because it has the potential for causing disease in humans and may pose a risk to both individuals or community health if not managed properly, and that includes the following classes:

8.2.3.1. Microbiology waste, including cultures and stocks of etiologic agents which, due to their species, type, virulence, or concentration, are known to cause disease in humans.

8.2.3.2. Pathology waste, including human tissues and organs, amputated limbs or other body parts, fetuses, placentas, and similar tissues from surgery, delivery, or autopsy procedures. Animal carcasses, body parts, blood, and bedding from contaminated animals are also included.

8.2.3.3. Human blood and blood products (including serum, plasma, and other blood components), items contaminated with liquid or semi-liquid blood or blood products and items saturated or dripping with blood or blood products, and items caked with blood or blood products, which are capable of releasing these materials during handling.

8.2.3.4. Potentially infectious materials, including human body fluids such as semen, vaginal secretions, cerebrospinal fluid, pericardial fluid, pleural fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

8.2.3.5. Sharps, including hypodermic needles, syringes, biopsy needles, and other types of needles used to obtain tissue or fluid specimens, needles used to deliver intravenous solutions, scalpel blades, pasteur pipettes, specimen slides, cover slips, glass petri plates, and broken glass potentially contaminated with infectious waste.

8.2.3.6. Infectious waste from isolation rooms, but only including those items that were contaminated or likely to have been contaminated with infectious agents or pathogens, including excretion exudates and discarded materials contaminated with blood.

8.2.3.7. Any other contagious, chemical or radioactive wastes.

8.2.4. Noninfectious Medical Waste. Solid waste created that does not require special management because it has been determined to be incapable of causing disease in humans or which has been treated to render it noninfectious.

8.2.5. Solid Waste. Any solid waste as defined in Chapter 7, "Solid Waste."

8.2.6. Treatment. Any method, technique, or process designed to change the physical, chemical, or biological character or composition of any infectious hazardous or infectious waste so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume. Treatment methods for infectious waste must eliminate infectious agents so that they no longer pose a hazard to persons who may be exposed.

8.3. CRITERIA

8.3.1. Infectious-medical waste will be separated, from other solid waste at the point of origin in accordance with the classification system in Table 8.1.

8.3.2. Mixtures of infectious medical wastes and hazardous wastes will be handled as infectious hazardous waste under DoD 4160.21-M (Defense Materiel Disposition Manual) and are the responsibility of the generating DoD Component. Priority will be given to the hazard that presents the greatest risk. DLA-DS has no responsibility for this type of property until it is rendered noninfectious as determined by the appropriate DoD medical authority.

8.3.3. Solid waste that is classified as a hazardous waste in accordance with Appendix 1 will be managed in accordance with the criteria in Chapter 6, "Hazardous Waste."

8.3.4. Mixtures of other solid waste and infectious medical waste will be handled as infectious medical waste.

8.3.5. Radioactive medical waste will be managed in accordance with Service Directives.

8.3.6. Infectious medical waste will be segregated, transported, and stored in bags or receptacles a minimum of 3 mils thick having such durability, puncture resistance, and burst strength as to prevent rupture or leaks during ordinary use. For medical waste to be disposed of off installation, the required form and durability of containers varies between the waste groups shown in Table 8.1. The storage bag criteria for the waste groups are included in Table 8.2. Additionally, in Dubai and Jebel Ali, cytotoxic waste shall be stored in purple bags.

8.3.7. All bags or receptacles used to segregate, transport or store infectious medical waste will be clearly marked with the universal biohazard symbol and the word "BIOHAZARD" in English and Arabic, and will include markings that identifies the generator, date of generation, and the contents. Medical waste destined for off-installation disposal shall be labeled in accordance with the requirements specific to their waste group (Table 8.3). In addition, bags used in sterilization shall carry a label stating clearly whether the contents are treated or not (e.g., sterilization stripe), as well as the place of waste generation and disposal.

8.3.7.1. In Dubai and Jebel Ali, labels on sharps containers shall also be marked with the name of the waste-generating institution and with "DANGER-USED SHARPS."

8.3.8. Sharps will only be discarded into rigid receptacles. Needles will not be clipped, cut, bent, or recapped before disposal.

8.3.9. Infectious medical waste will be transported and stored to minimize human exposure, and will not be placed in chutes or dumbwaiters.

8.3.10. Infectious medical waste will not be compacted unless converted to noninfectious medical waste by treatment as described in paragraph 8.3.18. Containers holding sharps will not be compacted.

8.3.11. All anatomical pathology waste (i.e., large body parts) must be placed in containers lined with plastic bags that comply with paragraph 8.3.6., and may only be disposed of in a landfill or by burial in a designated area after being treated for disposal by incineration or cremation.

8.3.12. Blood, blood products, and other liquid infectious wastes will be handled as follows:

8.3.12.1. Bulk blood and blood products (Group C wastes) shall be sterilized prior to disposal and shall only be disposed of at facilities approved by the LEC.

8.3.12.2. Suction canister waste from operating rooms will either be-decanted into a clinical sink (if approved) or will be sealed into leak-proof containers and incinerated at approved facilities. Other disposal methods may be approved. Contact the LEC to coordinate approval.

8.3.13. All personnel handling infectious medical waste will wear appropriate protective apparel or equipment such as gloves, coveralls, masks, and goggles sufficient to prevent the risk of exposure to infectious agents or pathogens.

8.3.14. If infectious medical waste cannot be treated on-site, it will be managed during storage as follows:

8.3.14.1. Infectious medical waste will be maintained in a nonputrescent state, using refrigeration as necessary.

8.3.14.2. Infectious medical waste with multiple hazards (i.e., infectious hazardous waste or infectious radioactive waste) will be segregated from the general infectious waste stream when additional or alternative treatment is required.

8.3.15. Storage sites must be:

8.3.15.1. Specifically designated;

8.3.15.2. Constructed to prevent entry of insects, rodents, and other pests and of suitable temperature to prevent the proliferation of bacteria;

8.3.15.3. Prevent access by unauthorized personnel; and

8.3.15.4. Marked on the outside with the universal biohazard symbol and the word "BIOHAZARD" in both English and Arabic.

8.3.16. Bags and receptacles containing infectious medical waste must be placed into rigid or semi-rigid, leak-proof containers before being transported off-site.

8.3.16.1. Additional requirements in Jebel Ali and Dubai. Containers used to transport medical waste must be suitable for handling at the treatment facility. The following specifications shall apply:

8.3.16.1.1. Containers may be 240-liter waste bins. In the case of smaller generators, up to 1.5 m^3 (53 ft^3) trolleys with dimensions not exceeding 1.2m L x 0.725m W x 1.6m H (3.9ft L x 2.4ft W x 5.2ft H), where the trolley has a removable front panel.

8.3.16.1.2. Containers shall be dedicated to the collection of medical wastes only and should not be used for moving other items.

8.3.16.1.3. Containers shall be easily cleaned and disinfected by the steam sterilization system that will be used in the medical waste treatment facility for the cleaning of the containers prior to their collection and re-use.

8.3.17. Installations shall comply with the following pre-transport requirements for medical waste:

8.3.17.1. Ensure that approved transporters are used for handling and transportation of medical waste. Approval requirements for DoD-owned vehicles are included in Section 8.3.22.

8.3.17.2. For Dubai and Jebel Ali, ensure that the following forms are turned over with waste to transporter:

8.3.17.2.1. Medical Waste Generation Record (Medform 1)

8.3.17.2.2. Medical Waste Disposal Record (Medform 2)

8.3.17.3 Medical waste shall only be disposed of at approved facilities.

8.3.18. Infectious medical waste must be treated in accordance with Table 8.4, "Treatment and Disposal Methods for Infectious Medical Waste," and the following before disposal:

8.3.18.1. Sterilizers must maintain the temperature at 121°C (250°F) for at least 30 minutes at 103 kPa (15 psi).

8.3.18.2. The effectiveness of sterilizers must be checked at least weekly using *Bacillus stearo thermophilus* spore strips or an equivalent biological performance test.

8.3.18.3. Incinerators used to treat medical waste must be designed and operated to maintain a minimum temperature and retention time sufficient to destroy all infectious agents and pathogens, and must meet applicable criteria in Chapter 2, "Air Emissions."

8.3.18.3.1. Additional requirements in Sharjah. The following additional criteria apply in Sharjah:

8.3.18.3.1.1. The incinerator shall be capable of treating up to at least 4 tons/day (4.4 tons/day) of infectious medical, medical and related industry wastes.

8.3.18.3.1.2. Incinerators shall be equipped with appropriate flue gas cleaning and emission purifying devices such as fabric filters to reduce toxic and hazardous emissions.

8.3.18.3.1.3. Permissible plastic content requirements shall be in the range of 30-35%.

8.3.18.3.1.4. The incinerator shall be of a natural gas firing system or electrical, with provision of standby (electric) power in case of system failure.

8.3.18.4. Ash or residue from the incineration of infectious medical waste must be assessed for classification as hazardous waste in accordance with the criteria in Chapter 6, "Hazardous Waste." Ash that is determined to be hazardous waste must be managed in accordance with Chapter 6. All other residue will be disposed of in a landfill that complies with the criteria of Chapter 7, "Solid Waste."

8.3.18.5. Chemical disinfection must be conducted using procedures and compounds approved by appropriate DoD medical authority for use on any pathogen or infectious agent suspected to be present in the waste.

8.3.19. Installations will develop contingency plans for treatment or disposal of infectious medical waste should the primary means become inoperable.

8.3.20. Spills of infectious medical waste will be cleaned up as soon as possible in accordance with the following:

8.3.20.1. Response personnel must comply with paragraph 8.3.13.

8.3.20.2. Blood, body fluid, and other infectious fluid spills must be removed with an absorbent material that must then be managed as infectious medical waste.

8.3.20.3. Surfaces contacted by infectious medical waste must be washed with soap and water and chemically decontaminated in accordance with subparagraph 8.3.18.5.

8.3.20.4. In Dubai and Jebel Ali, in the event of an off-site spill or road accident, operators of DoD vehicles transporting medical waste shall immediately notify the responsible installation to relay to the Competent Authority within two hours by telephone or radio stating the location and nature of the accident.

8.3.21. Installations will keep records of the following information concerning infectious medical waste for at least five years from the date of commencement of the handling activity including the production, storage, transport, treatment and disposal of such substances and wastes:

8.3.21.1. Type of waste;

8.3.21.2. Amount of waste (volume or weight);

8.3.21.3. Treatment, if any, including date of treatment;

8.3.21.4. Disposition, including date of disposition, and if the waste was transferred to UAE facilities, and receipts acknowledging subparagraphs 8.3.21.1. - 8.3.21.3. for each transfer;

8.3.21.5. Collection average (average of waste collected from site on an annual basis); and,

8.3.21.6. Transportation records, including method of transport and duration.

8.3.22. Medical Waste Approval. Installations may require approval to operate a waste treatment unit or transport medical waste. Contact the LEC to determine approval requirements.

Table 8.1. Medical Waste Classification System

Group	Waste Type
Group A	Bandages, dressings, dirty linens, and other contaminated waste such as other textiles resulting from the treatment of infectious diseases. Contaminated and not contaminated human tissue, animal residuals, and any other contaminated or likely contaminated medical materials
Group B	Injections, syringes, surgical instruments, all types of medical containers, vessels, medical materials, broken glass and all other sharp instruments, equipment and items
Group C	Hematology, histology, and microbiology labs, mortuary wastes which are not included in Group A or B
Group D	Pharmaceutical and chemical waste with the same description as medical waste
Group E	Sheets used on patient beds to cover the disposable vessels (cleaning pads etc.)
Group F	Waste resulting from radioactive materials, and all other processes involving radioactive isotopes (these shall be subject to international classification standards)

Table 8.2. Medical Waste Storage Criteria

Group	Storage Criteria
Group A	Heavy duty red polyethylene bags
Group B	Sharp materials boxes which are widely-known to be strong yellow, plastic polyethylene containers of significant thickness which shall not be filled to more than 75% capacity
Group C	Waste to be sterilized prior to disposal e.g. all laboratory waste dresses, covers, linens, vessels containing human tissue, blood, bacteria etc.: Blue transparent bags which should not be filled to more than 65% capacity Rest of Group C wastes: Yellow medium durability polyethylene bags which should not be filled to more than 65% capacity
Group D	Cellulose and toxic materials excluding "sharp materials": Yellow heavy duty polyethylene bags which shall not be filled to more than 65% capacity Pharmaceutical wastes: Yellow medium durability polyethylene bags which shall not be filled with more than their capacity.
Group E	A clinical material e.g. covers of vessels where human fluids are kept excluding those which are infectious: Yellow medium durability polyethylene bags which shall not be filled to more than 65% capacity. Bags shall be isolated from other waste types if not incinerated at the place of production
Group F	Special containers suitable to store the waste type until its disposal

Table 8.3. Medical Waste Labeling Criteria

Group	Required Labels
Group A	Infectious for incineration only
Group B	Sharp materials for incineration only
Group C	Medical waste to be sterilized before disposal: to be labeled as such Remaining medical waste in this group: Medical waste for incineration only
Group D	Pharmaceutical wastes: Medical waste for incineration only Toxic cellulous drugs, medicines and contaminated materials: Cellulose toxic waste for incineration only Chemical waste: ingredients and hazards of the chemical waste
Group E	Group "E" medical waste at the neck of each bag Infectious for incineration only
Group F	No special labeling requirements

Table 8.4. Treatment and Disposal Methods for Infectious Medical Waste

Type of Medical Waste	Method of Treatment	Method of Disposal
Group A		
Pathological	[1] Incineration	MSWLF
Other Group A waste	Incineration	-
Group B		
Sharps in sharps containers	Incineration	MSWLF
Other Group B waste	Incineration	-
Group C		
Microbiological	Incineration	MSWLF
Bulk blood & suction canister waste	Incineration	MSWLF
Other Group C waste	Incineration	-
Group D		
Pharmaceutical waste	Incineration	-
Toxic cellulose waste	Incineration	-
Group E	Incineration or any other method approved by Authority	-
Group F	-	In accordance with International Codes of Practice

Notes

[1] Anatomical pathology waste (i.e., large body parts) must be treated either by incineration or cremation prior to disposal.

CHAPTER 9

PETROLEUM, OIL, AND LUBRICANTS

9.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from the storage, transport and distribution of petroleum products. Criteria for underground storage tanks (UST) containing POL or hazardous material products are addressed in Chapter 19, "Underground Storage Tanks." POL spill prevention and response planning criteria are contained in Chapter 18, "Spill Prevention and Response Planning."

9.2. DEFINITIONS

9.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria, that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid, but excludes equipment in which oil is used solely for motive power.

9.2.2. Below Ground Storage Container. Completely buried POL storage containers, including deferred USTs that are exempt from all criteria in Chapter 17, "Underground Storage Tanks." For purposes of this paragraph, ONLY below ground storage containers that are exempt from requirements of Chapter 17 are counted toward the aggregate thresholds in subparagraph 9.2.7.2. below [in below ground storage container capacity of 159,091 liters (42,000 gallons) or greater].

9.2.3. Loading/ Unloading Racks. Location where tanker trucks/rail cars are loaded and unloaded by pipes, pumps, and loading arms.

9.2.4. Loading/ Unloading Areas. Any location where POL is authorized to be loaded or unloaded to or from a POL storage container.

9.2.5. Pipeline Facility. Includes new and existing pipes, pipeline rights of way, auxiliary equipment (e.g., valves and manifolds), and buildings or other facilities used in the transportation of POL.

9.2.6. POL. Refined petroleum, oils, and lubricants, including, but not limited to, petroleum, fuel, lubricant oils, synthetic oils, mineral oils, animal fats, vegetable oil, sludge, and POL mixed with wastes other than dredged spoil.

9.2.7. POL Facility. An installation with either:

9.2.7.1. An aggregate aboveground storage container capacity (excluding below ground storage containers) of 5,000 liters (1,320 gallons) or greater; or

9.2.7.2. An aggregate below ground storage container capacity of 159,091 liters (42,000 gallons) or greater; or

9.2.7.3. A pipeline facility as identified in the "Pipeline Facility" description paragraph 9.2.5.

9.2.8. POL Storage Container. POL containers with capacities > 208 liters (55 gallons) (mobile/portable and fixed; and above and below ground storage containers). USTs required to meet all requirements of Chapter 19 are EXCLUDED from the definition of POL storage containers.

9.3. CRITERIA

9.3.1. Applicability. The below criteria apply only at POL Facilities as defined in paragraph 9.2.7.

9.3.2. General POL Storage Container Criteria

9.3.2.1. Inspection and Testing. Inspection and testing shall be conducted on all POL storage containers in accordance with recognized industry standards.

9.3.2.2. Secondary Containment. POL storage containers must be provided with a secondary means of containment (e.g., dike) capable of holding the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation and expansion of product. Alternatively, POL storage containers that are equipped with adequate technical spill and leak prevention options (such as overfill alarms and flow shutoff or restrictor devices) may provide secondary containment by use of a double wall container. Below ground storage containers may meet this criterion by use of a leak barrier with a leak detection pipe and basin. A licensed technical authority may waive this secondary containment criterion for below ground storage containers.

9.3.2.3. Permeability. Permeability for containment areas will be a maximum of 10^{-7} cm/sec.

9.3.2.4. Containment Area Drainage. Drainage of stormwater from containment areas will be controlled by a valve that is locked closed when not in active use. Stormwater will be inspected for petroleum sheen before being drained from containment areas. If petroleum sheen is present it must be collected with sorbent materials prior to drainage, or treated using an oil-water separator. Disposal of sorbent material exhibiting the hazardous characteristics in Appendix 1 will be in accordance with Chapter 6, "Hazardous Waste."

9.3.2.5. Valves and Piping. All aboveground valves, piping, and appurtenances associated with POL storage containers shall be periodically inspected in accordance with recognized industry standards.

9.3.3. Additional POL Storage Container Criteria

9.3.3.1. Testing. Buried piping associated with POL storage containers shall be tested for integrity and leaks at the time of installation, modification, construction, relocation, or replacement. New buried piping must be protected against corrosion in accordance with recognized industry standards.

9.3.3.2. Storage Container Design. POL storage containers shall be designed or modernized in accordance with good engineering practice to prevent unintentional discharges by use of overflow prevention devices.

9.3.3.3. Completely and Partially Buried Metallic POL Storage Containers. These must be protected from corrosion in accordance with recognized industry standards.

9.3.4. Storage Container Wastes. POL container cleaning wastes frequently have hazardous characteristics (as defined in Appendix 1) and must be handled and disposed of in accordance with requirements of Chapter 6, "Hazardous Waste." POL container waste and handling procedures include:

9.3.4.1. POL container cleaning wastes (sludge and wash waters) must be disposed of in accordance with the criteria of Chapter 6, unless sampling and testing confirms the waste does not exhibit hazardous waste characteristics.

9.3.4.2. POL container bottom waters, which are periodically drained, must be collected and disposed of in accordance with Chapter 6, unless sampling and testing determine that the waste does not exhibit hazardous waste characteristics.

9.3.5. General Transport and Distribution Criteria

9.3.5.1. Loading/Unloading Racks and Areas

9.3.5.1.1. Secondary Containment. Loading/unloading racks shall be designed to handle discharges of at least the maximum capacity of any single compartment of a rail car or tank truck loaded or unloaded at the loading/unloading rack.

9.3.5.1.2. Departing Vehicle Warning Systems. Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system at loading/unloading racks to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

9.3.5.1.3. Vehicle Inspections. Prior to filling and prior to departure of any tank car or tank truck, closely inspect for discharges from the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

9.3.5.1.4. Loading/ Unloading Areas. Provide appropriate containment and/or diversionary structures (dikes, berms, culverts, spill diversion ponds, etc.) or equipment (sorbent materials, wiers, booms, other barriers, etc.) at loading/unloading areas to prevent a discharge of POL, which reasonably could be expected to cause a sheen on waters of the host nation defined in Chapter 4, "Wastewater."

9.3.5.2. POL Pipeline Facilities

9.3.5.2.1. Provisions for Testing and Maintenance. All pipeline facilities carrying POL must be tested and maintained in accordance with recognized industry standards, including:

9.3.5.2.1.1. Each pipeline operator handling POL will prepare and follow a procedural manual for operations, maintenance, and emergencies.

9.3.5.2.1.2. Each new pipeline facility and each facility in which pipe has been replaced or relocated must be tested in accordance with recognized industry standards, without leakage before being placed in service.

9.3.5.2.1.3. All new POL pipeline facilities must be designed and constructed to meet recognized industry construction standards.

9.3.5.3. Additional Transport Requirements

9.3.5.3.1. Requirements for the safe transport of POL and other hazardous material are included in Section 5.3.3. of Chapter 5, "Hazardous Material."

9.3.5.3.2. Placarding Requirements in Dubai. In addition to the placard requirements included in Chapter 5, "Hazardous Material", placards shall include the name "Petroleum Fuel" (1270), hazard class level 3 label, and hazardous chemical code applicable for mixed loads.

9.3.6. Personnel Training. At a minimum, all personnel handling POL shall be trained annually in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; general facility operations; the applicable contents of the facility Spill Plan; and the training requirements for handling hazardous material as included in Chapter 5, "Hazardous Material."

9.3.7. Approvals. Installations may require approval for the handling of POL classified as hazardous material (see Chapter 5) or hazardous waste (see Chapter 6). Contact the LEC to determine approval requirements.

CHAPTER 10

PESTICIDES

10.1. SCOPE

This chapter contains criteria regulating the use, storage, and handling of pesticides, but does not address the use of these materials by individuals acting in an unofficial capacity in a residence or garden. The disposal of pesticides is covered in Chapter 6, "Hazardous Waste," and Chapter 7, "Solid Waste."

10.2. DEFINITIONS

10.2.1. Certified Pesticide Applicators. Personnel who apply pesticides or supervise the use of pesticides and have been formally certified in accordance with DoD 4150.07-M (Volume 1: DoD Pest Management Training) (which accepts HN certification in appropriate circumstances). Local nationals applying pesticides listed in Table 10.2 shall also hold a valid UAE authorization.

10.2.2. Integrated Pest Management (IPM). A planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods, including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control and, where necessary, the judicious use of least-hazardous pesticides.

10.2.3. Pests. Arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds, undesirable vegetation, and other organisms (except for microorganisms that cause human or animal disease) that adversely affect the well-being of humans or animals; attack real property, supplies, equipment, or vegetation; or are otherwise undesirable.

10.2.4. Pest Management Consultant. Professional DoD pest management personnel located at component headquarters, field operating agencies, major commands, facilities engineering field divisions or activities, or area support activities who provide technical and management guidance for the conduct of installation pest management operations. Some pest management consultants may be designated by their component as certifying officials.

10.2.5. Pesticide. Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests.

10.2.6. Pesticide Waste. Materials subject to pesticide disposal restrictions including:

10.2.6.1. Any pesticide that has been identified by the pest management consultant as cancelled under U.S. or UAE authority;

10.2.6.2. Any pesticide that does not meet specifications is contaminated, has been improperly mixed, or otherwise unusable, whether concentrated or diluted;

10.2.6.3. Any material used to clean up a pesticide spill; or

10.2.6.4. Any containers, equipment, or material contaminated with pesticides. Empty pesticide containers that have been triple rinsed are NOT considered hazardous waste, and can be disposed of as normal solid waste.

10.2.7. Registered Pesticide. A pesticide registered and approved for sale or use within the United States or the host nation.

10.3. CRITERIA

10.3.1. All pesticide applications, excluding arthropod skin and clothing repellents, will be recorded using DD Form 1532-1, "Pest Management Maintenance Report," or a computer generated equivalent. These records will be archived for permanent retention in accordance with specific service procedures. The Pest Management Maintenance Report has been assigned Report Control Symbol DD-A&T(A&AR)1080 in accordance with DoD 8910-M, "DoD Procedures for Management of Information Requirements."

10.3.2. Installations will implement and maintain a current pest management plan that includes measures for all installation activities and satellite sites that perform pest control. This written plan will include IPM procedures for preventing pest problems in order to minimize the use of pesticides and the following specific requirements prior to use of pesticides:

10.3.2.1. Informing health and veterinary units of the type of substances to be used

10.3.2.2. Provision of necessary first-aid kits

10.3.2.3. Issuance of public warnings to keep away from spraying areas

10.3.2.4. Adequate training of employees involved in spraying activities

10.3.2.5. No spraying by aircraft except in emergency cases as approved by the Competent Authority and assuring all precautions to minimize harmful impacts on humans and animals. The plan must be reviewed and approved in writing by the appropriate pest management consultant.

10.3.3. All pesticide applications will be made by certified pesticide applicators, with the following exceptions:

10.3.3.1. New DoD employees who are not certified may apply pesticides during an apprenticeship period not to exceed 2 years and only under the supervision of a certified pesticide applicator;

10.3.3.2. Arthropod skin and clothing repellents; and

10.3.3.3. Pesticides applied as part of an installation's self-help program.

10.3.4. All pesticide applicators will be included in a medical surveillance program to monitor the health and safety of persons occupationally exposed to pesticides.

10.3.5. All pesticide applicators will be provided with personal protective equipment appropriate for the work they perform and the types of pesticides to which they may be exposed.

10.3.6. Installations will only use registered pesticides that are on the list approved by the Armed Forces Pest Management Board (AFPMB) that have UAE approved equivalents (i.e., same manufacturer and same formulations), or UAE registered pesticides approved in writing by the appropriate pest management consultant. This may be documented as part of the approval of the pest management plan. The list of prohibited pesticides in the UAE is included in Table 10.1. Pesticides listed in Table 10.2 may only be applied by certified pesticide applicators.

10.3.7. Pesticides will be included in the installation spill contingency plan. (See Chapter 16, "Spill Prevention and Response Planning.")

10.3.8. Pest management facilities, including mixing and storage areas, will comply with AFPMB Technical Guide 17 "Military Handbook Design of Pest Management Facilities."

10.3.9. All pesticide applications will be in accordance with guidance given on the pesticide label. Labels will bear the appropriate use instructions and precautionary message based on the toxicity category of the pesticide ("danger," "warning," or "caution"). If foreign nationals will be using the pesticides, the precautionary messages and use instructions will be in English and in the prevalent local languages.

10.3.9.1 Pesticide applicators shall comply with the relevant labeling requirements included in Chapter 5, "Hazardous Material" for hazardous material.

10.3.9.2. Additional Requirements in Dubai and Jebel Ali. In Dubai and Jebel Ali, the distinctive symbol for the pesticide, in accordance with format and design criteria included in Chapter 5, "Hazardous Material," shall be included. Furthermore, pesticide labels are required to bear the technical name of the pesticide in Jebel Ali.

10.3.10. MSDSs and labels for all pesticides will be available at the storage and holding facility.

10.3.11. Pesticide storage areas will contain a readily visible current inventory of all items in storage, including items awaiting disposal, and should be regularly inspected and secured to prevent unauthorized access.

10.3.11.1. Additional Requirements in Abu Dhabi. A special inventory of all biological agents shall also be maintained and it shall include details as to their use, transfer within/ between facilities, inactivation and disposal as well as information regarding the personnel approved to handle biological agents.

10.3.12. Unless otherwise restricted or canceled, pesticides in excess of installation needs will be redistributed within the supply system or disposed of in accordance with procedures outlined below:

10.3.12.1. The generator of pesticide wastes will determine whether or not the waste is hazardous, in accordance with Chapter 6 of this Guide.

10.3.12.2. Pesticide waste determined to be hazardous waste will be disposed of in accordance with the criteria for hazardous waste disposal in Chapter 6 of this Guide. Discharge standards for pesticides in wastewater are also included in Chapter 4 of this Guide.

10.3.12.2.1. Additional Requirements in Dubai. The treatment of extremely harmful or volatile pesticides requires stabilization or fixation in a solid matrix followed by landfilling.

10.3.12.3. Pesticide waste that is determined not to be a hazardous waste will be disposed of in accordance with the label instructions, through DRMO, as a solid waste. Pesticide containers shall be crushed or the top and bottom portions shall be removed to prevent reuse.

10.3.13. Approvals. Installations handling pesticides classified as hazardous material (see Chapter 5) or hazardous waste (see Chapter 6) shall contact the LEC to determine approval requirements.

Table 10.1. Prohibited Pesticides

A11.1.1. The pesticides listed in the table below are prohibited for import and trade in the UAE.

أسباب الحظر Reasons for Banning	الاستعمال Use	درجة السمية الجرعة (القاتلة للفئران) Oral LD 50 (Rats)		الاسم العام للمادة الفعالة Common Name of Active Ingredient	م
		mg a.i/kg. Body wt	Class		
High acute mammalian toxicity, persistence in the environment, possible human carcinogen السمية الحادة الشديدة للثدييات، يبقى في البيئة لفترة طويلة ويمكن أن يسبب سرطان للإنسان	Insecticide مبيد حشري	38-67	Class I	Aldrin الدرين	1
Carcinogenic to animals, persistence and bio-accumulation, adverse environmental effects مسرطن للحيوانات، يبقى لفترة طويلة في البيئة بدون أن يتحلل كما أنه يتراكم في جسم الإنسان والحيوان وله تأثيرات ضارة على البيئة	Insecticide مبيد حشري	-	Class II	BHC, HCH (1,2,3,4,5,6-Hexachlorocyclohexane) سداسي كلوريد سايكلو هكسين	2
Risks for human and animal health and the environment, long persistence and bio-accumulation له مخاطر على صحة الإنسان والحيوان والبيئة، يبقى لفترة طويلة في البيئة بدون أن يتحلل ويتراكم في جسم الإنسان والحيوان	Insecticide مبيد حشري	69	Class I	Camphochlor كامفوكلور	3
Acute inhalation toxicity, only liquid formulation to be banned السمية الحادة عالية عن طريق الاستنشاق، تمنع التجهيزات السائلة فقط ويسمح بالمحببات	Soil Insecticide Nematicide مبيد لحشرات التربة والنيماتودا	8	Class I, II	Carbofuran كاربوفيوران	4
Carcinogenic to rodents, persistence and bio-accumulation in the environment مسرطن للقوارض، يبقى لفترة طويلة في البيئة بدون أن يتحلل ويتراكم في جسم الإنسان والحيوان	Termiticide لمكافحة الأرضة ووقاية الأخشاب	367-515	Class II	Chlordane كلوردين	5
Carcinogenic to rodents, persistence and bio-accumulation in the environment مسرطن للقوارض، يبقى لفترة طويلة في البيئة بدون أن يتحلل ويتراكم في جسم الإنسان والحيوان	Insecticide مبيد حشري	114-140	Class II	Chlordecone كلورديكون	6

Accumalation in humans, probably carcinogenic, persistence in the environment يتراكم في جسم الإنسان، من الممكن أن يسبب سرطان، يبقى في البيئة لفترة طويلة بدون أن يتحلل	**Insecticide** مبيد حشري	113	**Class III**	**DDT (dichloro-diphey trichloroethane)** د.د.ت	7
High acute toxicity for man and animals السمية الحادة الشديدة للإنسان والحيوان	**Systemic Insecticide** مبيد حشري جهازي	2.5-6	Class I	**Demetion-O+ Demetion-S** ديميتون او و اس	8
High acute toxicity for man and animals السمية الحادة الشديدة للإنسان والحيوان	**Systemic Insecticide** مبيد حشري جهازي	30	Class I	**Demetion-S-methyl** ديميتون اس ميثايل	9
Not acceptable in public health formulations for use inside houses and other structures because of its probable carcinogenic and mutagenic effect, may only be used in small percentages in tablets or strips for isect pheromone traps غير مصرح باستخدامه في مستحضرات الصحة العامة داخل المنازل والمنشآت الأخرى لاحتمال إحداثه السرطانات والاختلالات الوراثية ، يمكن إستخدامه بنسب منخفضة جداً في أقراص أو شرائط لمصائد الحشرات	**Insecticide** مبيد حشري	50	Class I	**Dichlorovos (DDVP)** دايكلورفوس	10
Persistence in the environment, Bio-accumalation in food, possible human carcinogen يبقى لفترة طويلة في البيئة بدون أن يتحلل ، يتراكم في المواد الغذائية ويمكن أن يسبب سرطان للإنسان	**Insecticide** مبيد حشري	37-87	Class I	**Dieldrin** دايلدرين	11
High acute toxicity السمية الحادة الشديدة	Sys.Insect/ Acaricide مبيد حشري/ مبيد العناكب - جهازي	4	Class I	Disulfoton دايسلفوتون	12
High acute toxicity, high persistence and potential for bio-accumalation السمية الحادة الشديدة جداً، يبقى لفترة طويلة في البيئة بدون أن يتحلل. وله قدرة على التراكم في الأنظمة البيولوجية	**Insecticide** مبيد حشري	22.7-160	Class I	Endosulfan اندوسلفان	13
High acute toxicity, Central Nervous System Depressant and hepatotoxin, no antidote السمية الحادة الشديدة، مثبط للجهاز العصبي وسام للكبد ولا يوجد مضاد له في حال التسمم	**Insecticide** مبيد حشري	7-15	Class I	Endrin اندرين	14
Very high acute toxicity to man and animal, quickly absorbed through the skin, its vapours highly toxic السمية الحادة الشديدة جداً للإنسان والحيوان، يُمتص بسرعة عن طريق الجلد، أبخرته سامة جداً	**Insecticide** مبيد حشري	1.2-2	Class I	**Ethyl pyrophosphate (TEPP)** ايثايل بايروفوسفيت	15

Causes damage to the eye, very toxic by oral route and absorption through the skin, harmful if inhaled, causes carcinogenic effects to humans يسبب تلفاً للعين إذ لامسها، سام جداً عن طريق الابتلاع بالفم أو الامتصاص عبر الجلد وعند الاستنشاق، يحدث تأثيرات مسرطنة عند الإنسان	Insecticide مبيد حشري	67	Class I	Flueythrinate فلوسيثرينيت	16
Persistence in the environment, Bio-accumalation in food and the human body, probably carcinogenic to man and there is evidence that it encourages the growth of tumours caused by other factors يبقى لفترة طويلة في البيئة بدون أن يتحلل ، يتراكم في المواد الغذائية وفي جسم الإنسان ، يمكن أن يسبب سرطان للإنسان وهناك دليل على أنه قد يساعد على نمو الأورام السرطانية التي تسببها عوامل أخرى	Insecticide مبيد حشري	88-125	Class II	Gamma HCH جاما اتش سي اتش	17
Carcinogenic to rodents, persistance and environment contamination مسرطن للقوارض، يبقى لفترة طويلة بدون أن يتحلل ويلوث البيئة	Termiticide لمكافحة الأرضة ووقاية الأخشاب	147-220	Class II	Heptachlor هبتاكلور	18
Superseded ابطل إنتاجه	Insecticide مبيد حشري	-	-	Kelevan كليفان	19
High acute toxcity, delayed neurotoxicity to humans and to laboratory animals السمية الحادة الشديدة، يحدث سمية عصبية متأخرة عند الإنسان والحيوان	Insecticide مبيد حشري	52.8	Class II	Leptophos ليبتوفوس	20
Highly toxic to mammals, there could always be health problems in misuse شديد السمية للثدييات، يمكن أن يسبب بعض المشاكل الصحية إذا أسيء استخدامه	Insecticide مبيد حشري	30	Class I	Methamidophos ميثاميدوفوس	21
Highly toxic to man and animals, all formulations to be banned شديد السمية للإنسان والحيوان، تمنع كل مستحضراته	Insecticide مبيد حشري	17-24	Class I	Methomyl ميثوميل	22
Long residual action (long persistence), bioaccumaltion يبقى لفترة طويلة بدون أن يتحلل ويتراكم في الأنظمة البيولوجية	Insecticide مبيد حشري	6000	Class IV	Methoxychlor ميثوكسيكلور	23
Poisonous if swallowed, inhaled or absorbed through the skin سام إذا تم ابتلاعه أو استنشاقه أو امتصاصه عبر الجلد	Systemic Insecticide مبيد حشري جهازي	3-12	Class I	Mevinphos مفينفوس	24
Persistence and bio-accumalation in food, superseded يبقى لفترة طويلة بدون أن يتحلل ويتراكم في المواد الغذائية ابطل إنتاجه	Insecticide مبيد حشري	306	Class II	Mirex مايركس	25

High acute toxicity by oral, dermal and inhalation routes causing life threatening symptoms السمية الحادة الشديدة عند الابتلاع أو الاستنشاق أو الامتصاص عن طريق الجلد مسبباً أعراض خطرة على الحياة	**Systemic Insecticide** مبيد حشري جهازي	**14**	**Class I**	**Monocrotophos** مونوكروتوفوس	**26**
Very high acute oral toxicity السمية الحادة الشديدة عن طريق الابتلاع	**Soil Insecticide/ Nematicide** مبيد لحشرات التربة والنيماتودا	**5.4**	**Class I**	**Oxamyl** اوكساميل	**27**
Highly toxic to man and animals شديد السمية للإنسان والحيوان	**Systemic Insecticide** مبيد حشري جهازي	**65-80**	**Class I**	**Oxydemeton-methyl** اوكسي ديميتون ميثايل	**28**
Highly toxic to man and animals شديد السمية للإنسان والحيوان	**Systemic Insecticide** مبيد حشري جهازي	**100**	**Class II**	**Oxydeprofos** اوكسي ديبروفوس	**29**
High acute toxicity by oral, dermal and inhalation routes causing life threatening symptoms, classified as class C carcinogen السمية الحادة الشديدة عند الابتلاع أو الاستنشاق أو الامتصاص عن طريق الجلد مسبباً أعراض خطرة على الحياة، تم تصنيفه بالفئة ج كمسبب للسرطان	**Insecticide** مبيد حشري	**2**	**Class I**	**Parathion** باراثيون	**30**
Very high acute toxicity السمية الحادة الشديدة جداً	**Insecticide** مبيد حشري	**6**	**Class I**	**Parathion-methyl** باراثيون ميثيل	**31**
Poisonous if swallowed, inhaled or absorbed through the skin سام إذا تم ابتلاعه أو استنشاقه أو امتصاصه عبر الجلد	**Systemic Insecticide** مبيد حشري جهازي	**17-30**	**Class I**	**Phosphamidon** فوسفاميدون	**32**
Poisonous if swallowed, inhaled or absorbed through the skin – superseded سام إذا تم ابتلاعه أو استنشاقه أو امتصاصه عبر الجلد بطل إنتاجه	**Systemic Insecticide** مبيد حشري جهازي	**-**	**-**	**Schradan** شرادان	**33**
Very toxic to mammals and highly phytotoxic,used in insect baits and for timber preservation شديد السمية للثدييات والنباتات، يستعمل كطعم للحشرات بهدف وقاية وحفظ الأخشاب من الحشرات الناخرة	**Insecticide** مبيد حشري	**180**	**Class II**	**Sodium Floride** فلوريد الصوديوم	**34**
Carcinogenic risk for humans, discontinued by manufacturing company مخاطر تسبب السرطان للإنسان بطل إنتاجه	**Insecticide** مبيد حشري	**220**	**Class II**	**Strobane** ستروبين	**35**
Superseded بطل إنتاجه	**Insecticide** مبيد حشري	**-**	**-**	**Telodrin** تيلودرين	**36**

Probably human carcinogen احتمال إحداث سرطان للإنسان	Acaricide مبيد للعناكب	340	Class II	Chlordimeform كلورديميفورم	37
Risks of cancer to humans, sterility of human males مخاطر الإصابة بالسرطان عند الإنسان أو العقم عند الذكور.	Acaricide مبيد للعناكب	2,784-3,880	Class III	Chlorobenzilate كلوروبنزاليت	38
Tetratogenic effects in mammals إحداث تشوهات خلقية في اللبائن	Acaricide مبيد للعناكب	540	Class III	Cyhexaine سايهكسانين	39
Potential bio-accumalation combined with persistence in the environment, may contain DDT as a contaminent (in the manufacturing process) له مقدرة على التراكم في الأنظمة البيولوجية بالإضافة إلى عدم التحلل في البيئة ويمكن أن يحتوي على د.د.ت كمادة ملوثة من خلال عملية التصنيع	Acaricide مبيد للعناكب	570-595	Class II, III	Dicofol دايكوفول	40
Evidence of genetic disturbances and foetal defects, increase of tumour growth formed in laboratory mice by other factors إحداث تغييرات واختلالات وراثية وتشوهات خلقية للأجنة وزيادة نمو الأورام السرطانية التي تسببها عوامل أخرى في فئران المختبر	Systemic fungicide مبيد فطري جهازي	10,000	Class IV	Benomyl بينوميل	41
Probably carcinogenic to humans احتمال إحداث سرطانات للإنسان	Fungicide مبيد فطري	5000-6000	Class IV	Captafol كابتافول	42
Chronic adminstration has been associated with tumour formation in the kidney and forestomach of laboratory rats and mice الاستعمال لفترة طويلة يسبب سرطان في الكلى والمعدة لفئران المختبر	Fungicide مبيد فطري	10,000	Class I, II	Chlorothalonil كلوروثالونيل	43
Carcinogenic to laboratory animals, persistence and bio-accumalation مسرطن لحيوانات المختبر ويبقى لفترة طويلة بدون أن يتحلل ويتراكم في الأنظمة الحيوية وله تأثيرات بيئية ضارة	Fungicide (seed dressing) مبيد فطري لوقاية البذور	40,000	Class IV	Hexachlorobenzene (HCB) هكساكلوروبنزين	44
At high levels may cause birth defects in test animals, a trace contaminant and a degradation product (ethylenethiourea) causes thyroideffects, tumours and birth defects in laboartory animals, moreover, this fungicide has long withholding periods of about one month في جرعات عالية ربما يسبب تشوهات في حيوانات التجارب ونتيجة للتحلل ربما يحتوي المبيد كميات قليلة من مادة ethylenethiourea والتي لها تأثيرات ضارة على الغدة الدرقية بالإضافة إلى الإصابة بالسرطان والتشوهات الخلقية في حيوانات التجارب كما أن لهذا المبيد فترة فعالية تمتد لمدة شهر تقريباً	Fungicide مبيد فطري	5000	Class IV	Mancozeb مانكوزيب	45

At high levels may cause birth defects in test animals, a trace contaminant and a degradation product (ethylenethiourea) causes thyrodeffects, tumours and birth defects in laboartory animals في جرعات عالية ربما يسبب تشوهات في حيوانات التجارب ونتيجة التحلل ربما يحتوي المبيد كميات قليلة من مادة ethylenethiourea والتي لها تأثيرات ضارة على الغدة الدرقية بالإضافة إلى الإصابة بالسرطان والتشوهات الخلقية في حيوانات التجارب	Fungicide مبيد فطري	7990	Class IV	Maneb مانيب	46
High acute toxicity, accumalation of residues in aquatic foods السمية الحادة الشديدة وتراكم في الأطعمة البحرية والتي تدخل في غذاء الإنسان	Fungicide & Herbicide مبيد فطري و حشائش	50-100	Class I	Mercury Compounds (e.g Phenyl mercury acetate) كل مركبات الزئبق	47
Combination of several severe chronic toxicity effects إحداث العديد من التأثيرات السامة الحادة والمزمنة	Fungicide مبيد فطري	1000	Class III	Thiram ثيرام	48
At high levels may cause birth defects in test animals, a trace contaminant and a degradation product (ethylenethiourea) causes thyrodeffects, tumours and birth defects in laboartory animals في جرعات عالية ربما يسبب تشوهات في حيوانات التجارب ونتيجة التحلل ربما يحتوي المبيد كميات قليلة من مادة ethylenethiourea والتي لها تأثيرات ضارة على الغدة الدرقية بالإضافة إلى الإصابة بالسرطان والتشوهات الخلقية في حيوانات التجارب	Fungicide مبيد فطري	-	Class IV	Zineb زاينب	49
Combination of several severe chronic toxicity effects إحداث العديد من التأثيرات السامة الحادة والمزمنة	Fungicide مبيد فطري	1000	Class I	Ziram زيرام	50
Risk of carcinogenic effects in humans مخاطر الإصابة بالسرطان عند الإنسان	Herbicide مبيد حشائش	5000	Class III	Amitrole, Aminotripole اميترول و امينوتريبول	51
Possible carcinogenic effects to humans إمكانية إحداث تأثيرات سرطانية للإنسان	Herbicide مبيد حشائش	1869-3080	Class III	Atrazine اترازين	52
Possible carcinogenic effects to humans إمكانية إحداث تأثيرات سرطانية للإنسان	Herbicide مبيد حشائش	182-380	Class II	Cyanazine سياناززين	53
High acute toxicity, teratogenic and carcinogenic effects, may cause sterility to human males السمية الحادة الشديدة ومخاطر إحداث تشوهات خلقية وسرطانية بالإضافة إلى إمكانية إصابة الذكور بالعقم	Herbicide مبيد حشائش	40-60	Class I	Dinoseb داينوسيب	54

High acute toxicity, teratogenic and carcinogenic effects, may cause sterility to human males السمية الحادة الشديدة ومخاطر إحداث تشوهات خلقية وسرطانية بالإضافة إلى إمكانية إصابة الذكور بالعقم	Herbicide مبيد حشائش	40-60	Class I	Dinoseb Salts (e.g Dinoseb Acetate) داينوسيب	55
Risks of mutagenic, teratogenic and carcinogenic effects مخاطر إحداث إختلالات وسرطنات وتشوهات خلقية	**Herbicide** مبيد حشائش	2630	Class III	Nitrofen نايتروفين	56
High acute toxicity, no antidote السمية الحادة الشديدة ولا يوجد له مضاد عند التسمم	Herbicide مبيد حشائش	150	Class II	Paraquatباراكوات	57
Possible carcinogenic effects to humans إمكانية إحداث تأثيرات سرطنية للإنسان	Herbicide مبيد حشائش	5000	Class IV	Simazine سيمازين	58
Possible teratogenic, carcinogenic effects to humans, long persistence and bio-accumulation إمكانية إحداث تأثيرات سرطانية وتشوهات خلقية عند الإنسان ويبقى في البيئة لفترة طويلة بدون أن يتحلل ويتراكم في الأنظمة البيولوجية	Herbicide مبيد حشائش	500	Class III	2,4,5-T (2,4,5-trichlorophenoxy acetic acid)	59
High acute toxicity, exception are the organic arsenicals, which are of low toxicity, used as selective herbicides السمية الحادة الشديدة يستثنى من ذلك مركبات الزرنيخ العضوية وهي قليلة السمية وتستخدم كمبيدات حشائش	Rodenticide مبيد قوارض	-	-	Arsenic Compounds مركبات الزرنيخ	60
High acute toxicity to man and other animals السمية الحادة الشديدة للإنسان والحيوانات الأخرى	Rodenticide مبيد قوارض	15	Class I	Fluoroacetamide فلوروسيتامايد	61
Odourless, tasteless and fast acting, chiefly in the heart. Discontinued by the manufacturing company عديم الرائحة والطعم وسريع المفعول وله تأثير ضار على القلب وقد أوقف إنتاجه	Rodenticide مبيد قوارض	0.22	Class I	Sodium Fluoroacetate صوديوم فلوروسيتات	62
High acute toxicity, slow-acting cumulative poison السمية الحادة الشديدة ، سم بطيء المفعول وذلك لتراكمه في الأنسجة	Rodenticide مبيد قوارض	16	Class I	Thallium Sulfate سلفات الثاليوم	63
High acute toxicity in all handling operations السمية الحادة الشديدة في كل مراحل التداول	Rodenticide مبيد قوارض	45.7	Class I	Zinc Phosphide زنك فوسفايد	64
High acute toxicity السمية الحادة الشديدة	Sys. Insecticdie/Nematacide جهازي نيماتودي وحشري	1	Class I	Aldicarb الديكارب	65

Highly toxic by inhalation, and toxic by ingestion, can cause injury to the heart سام جداً عند الاستنشاق والابتلاع بالفم ويمكن ان يحدث أضرار في القلب	لتطهير التربة والمكان من الحشرات والنيماتودا والفطريات والحشائش	250	Class I	Chloropicrin كلوروبكرين	66
May cause sterility to human males احتمال إحداث عقم عند الذكور للإنسان	Soil Sterilant معقم للتربة من النيماتودا والحشرات	17-300	Class I	Dibromochloropropane (DBCP) دايبروموكلوروبروبين	67
Potential carcinogen to humans, may cause sterility to males, persistence in ground water إمكانية إحداث السرطان للإنسان والعقم للذكور، يبقى في المياه الجوفية لفترة طويلة دون أن يتحلل	Soil Sterilant معقم للتربة من النيماتودا والحشرات	146	Class I	Ethylene dibromide (EDB) ايثيلين ديبرومايد	68
Adverse liver and kidney effects, possible carcinogenic to humans له تأثيرات ضارة على الكبد واحتمال أن يسبب سرطانات للإنسان	لوقاية الاخشاب من الفطريات والحشرات المنخرة ومبيد قواقع مائية	50-500	Class I	Pentachlorophenol (PCP) بنتاكلوروفينول	69

Table 10.2. Restricted Pesticides

A11.2.1. The pesticides listed in the table below are prohibited for import or trade in the UAE without approval and close supervision during use.

اسباب الحظر Reasons for Restricting	الاستعمال Use	درجة السمية: الجرعة (القاتلة للفئران) Oral LD 50 (Rats) mg a.i/kg. Body wt	Class	الاسم العام للمادة الفعالة Common Name of Active Ingredient	م
On exposure to atmoshperic moisture. phosphine gas (PH3) is released. a poisonous gas with adverse effect on the lungs. life-threating at 2.0 ppm بتعرضه للرطوبة الجوية ينطلق منه غاز الفوسفين وهو غاز سام يضر بالرئتين عند الاستنشاق ويهدد الحياة عندما يصل الى ٢ جزء في المليون	Insecticide مبيد حشري	-	Class I	Aluminum Phosphide فوسفيد الالمنيوم	1
Poisonous gas with adverse effects on the lungs, on the heart and on the central nervous system غاز سام ضار بالرئتين والقلب وله تأثير ضار على الجهاز العصبي المركزي	Soil Sterilant معقم للتربة من النيماتودا والحشرات	214	Class I	Methyl Bromide بروميد الميثل	2
Intensely poisonous. lethal dose to man is 30-60 mg/kg شديد السمية والجرعة القاتلة للانسان تبلغ ٣٠-٦٠ ملغ/كيلوغرام	مبيد للفقاريات	-	Class I	Stryechine ستريشينين	3

CHAPTER 11

HISTORIC & CULTURAL RESOURCES

11.1. SCOPE

This Chapter contains criteria for required plans and programs needed to ensure proper protection and management of historic and cultural resources, such as properties on the World Heritage List or on the UAE list equivalent to the U.S. National Register of Historic Places.

11.2. DEFINITIONS

11.2.1. Adverse Effect. Changes that diminish the quality or significant value of historic or cultural resources.

11.2.2. Archeological Resource. Any material remains of prehistoric or historic human life or activities. Such resources include, but are not limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, human skeletal remains, or any portion of any of the foregoing items.

11.2.3. Cultural Mitigation. Specific steps designed to lessen the adverse effects of a DoD action on a historical or cultural resource, including:

11.2.3.1. Limiting the magnitude of the action

11.2.3.2. Relocating the action in whole or in part

11.2.3.3. Repairing, rehabilitating, or restoring the affected resources, affected property; and

11.2.3.4. Recovering and recording data from cultural properties that may be destroyed or substantially altered

11.2.4. Historic and Cultural Resources Program. Identification, evaluation, documentation, curation, acquisition, protection, rehabilitation, restoration, management, stabilization, maintenance, recording, and reconstruction of historic and cultural resources and any combination of the foregoing.

11.2.5. Historic or Cultural Resources. Physical remains of any prehistoric or historic district, site, building, structure, or object significant in world, national or local history, architecture, archeology, engineering, or culture. The term includes artifacts, archeological resources, records, and material remains that are related to such a district, site, building, structure, or object, and also includes natural resources (plants, animals, landscape features, etc.) that may be considered important as a part of a country's traditional culture and history. The term also includes any property listed on the World Heritage List or the UAE equivalent of the National Register of Historic Places. UAE lists of properties should be evaluated to determine if they are equivalent with the National Register of Historic Places prior to application.

11.2.6. Inventory. To determine the location of historic and cultural resources that may have world, national, or local significance.

11.2.7. Material Remains. Physical evidence of human habitation, occupation, use, or activity, including the site, loci, or context in which such evidence is situated including:

11.2.7.1. Surface or subsurface structures

11.2.7.2. Surface or subsurface artifact concentrations or scatters

11.2.7.3. Whole or fragmentary tools, implements, containers, weapons, clothing, and ornaments

11.2.7.4. By-products, waste products, or debris resulting from manufacture or use

11.2.7.5. Organic waste

11.2.7.6. Human remains

11.2.7.7. Rock carvings, rock paintings, and intaglios

11.2.7.8. Rock shelters and caves

11.2.7.9. All portions of shipwrecks; or

11.2.7.10. Any portion or piece of any of the foregoing

11.2.8. Preservation. The act or process of applying measures to sustain the existing form, integrity, and material of a building or structure, and the existing form and vegetative cover of a site. It may include initial stabilization work where necessary, as well as ongoing maintenance of the historic building materials.

11.2.9. Protection. The act or process of applying measures designed to affect the physical condition of a property by safeguarding it from deterioration, loss, attack, or alteration, or to cover or shield the property from danger or injury. In the case of buildings and structures, such treatment is generally temporary and anticipates future historic preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

11.3. CRITERIA

11.3.1. U.S. installation commanders shall take into account the effect of any action on any property listed on the World Heritage List or on the UAE's equivalent of the National Register of Historic Places for purposes of avoiding or mitigating any adverse effects.

11.3.2. Installations shall have access to the World Heritage List and the UAE equivalent of the National Register of Historic Places. Contact the LEC for UAE equivalent.

11.3.3. U.S. installation commanders shall ensure that personnel performing historic or cultural resource functions have the requisite expertise in world, national, and local history and culture. This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in historic or cultural resources management.

11.3.3.1. In Abu Dhabi, contact the LEC regarding historic or cultural resource service personnel requirements such as archaeological surveying.

11.3.4. Installations shall, after coordination with the LEC, prepare, maintain, and implement a cultural resources management plan that contains information needed to make appropriate decisions about cultural and historic resources identified on the installation inventory, and for mitigation of any adverse effects.

11.3.5. Installations shall, after coordination with the LEC, and if financially and otherwise practical:

11.3.5.1. Inventory historic and cultural resources in areas under DoD control. The inventory shall be developed from a records search and visual survey.

11.3.5.1.1. In Abu Dhabi, installations shall contact the LEC regarding inventory of historic and cultural resources prior to conducting such an inventory.

11.3.5.2. Establish measures sufficient to protect known historic or cultural resources until appropriate mitigation or preservation can be completed.

11.3.5.3. Establish measures sufficient to protect known archeological resources until appropriate mitigation or preservation can be completed

11.3.6. U.S. installation commanders shall establish measures to prevent DoD personnel from disturbing or removing historic or cultural resources without permission of the host nation.

11.3.7. U.S. installation commanders shall ensure that planning for major actions includes consideration of possible effects on historic or cultural resources.

11.3.8. If potential historic or cultural resources not previously inventoried are discovered in the course of a DoD action, the newly discovered items will be preserved and protected pending a decision on final disposition by the installation commander. The decision on final disposition will be made by the installation commander after coordination with the UAE installation commander or similar appropriate UAE authorities. Consult the LEC prior to providing information to the Competent Authority.

Chapter 12

Natural Resources and Endangered Species

12.1. SCOPE

This Chapter establishes criteria for required plans and programs needed to ensure proper protection, enhancement, and management of natural resources and any species (flora or fauna) declared endangered or threatened by either the U.S. or UAE governments.

12.2. DEFINITIONS

12.2.1. Adverse Effect. Changes that diminish the quality or significant value of natural resources. For biological resources, adverse effects include significant decreases in overall population diversity, abundance, and fitness.

12.2.2. Conservation. Planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural resources.

12.2.3. UAE-Protected Species. Any species of flora or fauna listed or designated by UAE, because continued existence of the species is, or is likely to be, threatened, and is therefore subject to special protection from destruction or adverse modification of associated habitat.

12.2.4. Management Plan. A document describing natural resources, their quantity, condition, and actions to ensure their conservation and good stewardship.

12.2.5. Natural Resources. All living and inanimate materials supplied by nature that are of aesthetic, ecological, educational, historical, recreational, scientific, or other value.

12.2.6. Natural Resources Management. Actions taken that combine science, economics, and policy, to study, manage, and restore natural resources to strike a balance with the needs of people and the ability of the ecosystem to support soil, water, forest, fish, wildlife, and coastal resources.

12.2.7. Significant Land or Water Area. Land or water area that is normally ≥ 202 hectares (500 acres) outside the cantonment area; areas of smaller size are included if they have natural resources that are especially vulnerable to disturbance.

12.2.8. Threatened and Endangered Species. Any species of fauna or flora, listed in Table 12.1 "Selected Endangered and Threatened Species." This also includes any species of fauna or flora listed on an equivalent UAE protected species list.

12.3. CRITERIA

12.3.1. Installations that have land and water areas shall take reasonable steps to protect and enhance known endangered or threatened species and UAE-protected species and their habitat.

12.3.2. Installations shall maintain, or have access to, Table 12.1, "Selected Endangered and Threatened Species," and a current list of UAE protected areas. Table 12.1 is included in this Chapter. The LEC shall be consulted as needed regarding the determination of additional threatened, protected or endangered species in UAE. Red Data lists for Abu Dhabi are also available as a supplementary source of information from the LEC as needed.

12.3.3. Installations with significant land or water areas shall, after coordination with the UAE installation commander or LEC, develop natural resources management plans.

12.3.4. Installations with natural resources management plans shall, after coordination with the UAE installation commander or LEC, and if financially and otherwise practical, and in such a way that there is no net loss of mission capability:

12.3.4.1. Conduct a survey to determine the presence of any threatened or endangered species or UAE-protected species, or support UAE surveys.

12.3.4.2. Implement natural resources management plans.

12.3.5. The LEC and the U.S. Ambassador will be notified of the discovery of any endangered or threatened species and UAE-protected species not previously known to be present on the installation.

12.3.6. Installations shall maintain grounds to meet designated mission use and ensure harmony with the natural landscape and/or the adjacent UAE facilities where practical.

12.3.7. Installations shall ensure that personnel performing natural resource functions have the requisite expertise in the management of their discipline (i.e., endangered or threatened species, UAE-protected species, wetlands, soil stabilization). This may be in-house, contract, or through consultation with another agency. Government personnel directing such functions must have training in natural resources management.

12.3.8. Installations shall place emphasis on the maintenance and protection of habitats favorable to the reproduction and survival of indigenous flora and fauna.

12.3.8.1. Nature Reserve Areas. Works, activities and acts which may lead to damage or deterioration of the natural environment, cause harm to wild or marine life, or affect their aesthetic value shall be prohibited in reserve areas including:

12.3.8.1.1. Hunting, transporting, killing or harming wild and marine creatures or undertaking activities leading to their eradication;

12.3.8.1.2. Damaging or destroying geological or geographical formations or areas considered natural habitat to animal and plant species as a result of increase or growth of such species;

12.3.8.1.3. Introducing foreign species into the reserve;

12.3.8.1.4. Polluting the soil, water or air of the reserve;

12.3.8.1.5. Military maneuvers and shooting practices;

12.3.8.1.6. Cutting trees or eroding soil;

12.3.8.1.7. Amusements, recreation and sports functions which can kill or harm or have negative impact on natural life; and,

12.3.8.1.8. All activities that can disturb the natural balance of such reserves.

12.3.8.2. Installations are prohibited from setting up establishments, buildings or constructing roads, driving vehicles or practicing any agricultural, industrial or commercial activities in reserve areas without permission. Consult the LEC to obtain approval.

12.3.8.3. Installations are prohibited from practicing any activities, acts or works in areas surrounding the reserves if such practices affect the environment of the reserves or their natural phenomena, without permission. Consult the LEC to obtain approval.

12.3.9. Land and vegetative management activities will be consistent with current conservation and land use principles (e.g., ecosystem protection, biodiversity conservation, and mission-integrated land use).

12.3.10. Installations shall utilize protective vegetative cover or other standard soil erosion/sediment control practices to control dust, stabilize sites, and avoid silting of streams.

Table 12.1. Select Endangered and Threatened Species

Common Name	Scientific Name	OCONUS Country of Listing
Mammals		
Cheetah	Acinonyx jubatus	Africa to India
Dugong	Dugong dugon	East Africa to southern Japan, including U.S.A. (Trust Territories)
Gazelle, sand	Gazella subgutturosa marica	Jordan, Arabian Peninsula
Gazelle, Saudi Arabian	Gazella dorcas saudiya	Israel, Iraq, Jordan, Syria, Arabian Peninsula
Oryx, Arabian	Oryx, leucoryx	Arabian Peninsula
Whales	Not specified	UAE
Marine mammals	Not specified	UAE
Birds		
Falcon, Eurasian peregrine	Falco peregrinus peregrinus	Europe, Eurasia south to Africa and Mideast
Ibis, northern bald	Geronticus eremita	Southern Europe
Reptiles		
Crocodile, Nile	Crocodylus niloticus	Africa, Middle East
Monitor, desert	Varanus griseus	North Africa to Aral Sea, through Central Asia to Pakistan, Northwest India
Sea turtle, green	Chelonia mydas	circumglobal in tropical and temperate seas and oceans
Sea turtle, loggerhead	Caretta caretta	Circumglobal in tropical and temperate seas and oceans
Sea turtle, olive ridley	Lepidochelys olivacea	Circumglobal in tropical and temperate seas
Sea turtle, hawksbill	Eretmochelys imbricate	Tropical seas
Sea turtle, Kemp's ridley	Lepidochelys kempii	Tropical and temperate seas in Atlantic basin, incl. Gulf of Mexico
Sea turtle, leatherback	Dermochelys coriacea	Tropical, temperate and subpolar seas
Other Sea Life		
Oysters	Not specified	UAE
Coral Reefs	Not specified	UAE
Sponges	Not specified	UAE

Note: This table does not include a complete list of UAE-designated threatened and endangered species. The Competent Authority shall be consulted as needed regarding the determination of additional threatened, protected or endangered species in UAE.

CHAPTER 13

POLYCHLORINATED BIPHENYLS

13.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from the handling, use, storage, and disposal of polychlorinated biphenyls (PCB). These criteria include specific requirements for most uses of PCBs, including, but not limited to, transformers, capacitors, heat transfer systems, hydraulic systems, electromagnets, switches and voltage regulators, circuit breakers, reclosers, and cables.

13.2. DEFINITIONS

13.2.1. Capacitor. A device for accumulating and holding a charge of electricity and consisting of conducting surfaces separated by a dielectric.

13.2.2. Chemical Waste Landfill. A landfill at which a high level of protection against risk of injury to human health or the environment from migration of deposited PCBs to land, water, or the atmosphere is provided by incorporating special methods for locating, engineering, and operating the landfill.

13.2.3. Hazardous Material. Any material - solid, liquid or gas - that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table 5.1, "Typical Hazardous Materials Characteristics," the material is listed in Table AP1.4., "List of Hazardous Waste/Substances/Materials," or the material falls into one of the following hazard classes. Munitions are excluded.

13.2.3.1. Explosives (Class 1)

13.2.3.2. Compressed or Liquefied Gases (Class 2)

13.2.3.3. Flammable Liquids (Class 3)

13.2.3.4. Flammable Solids (Class 4)

13.2.3.5. Oxidizing Agents (Class 5)

13.2.3.6. Toxic materials (Class 6)

13.2.3.7. Radioactive Materials (Class 7)

13.2.3.8. Corrosive Materials (Class 8)

13.2.3.9. Miscellaneous Dangerous Goods (Class 9)

13.2.4. In or Near Commercial Buildings. Within the interior of, on the roof of, attached to the exterior wall of, in the parking area serving, or within 30 meters (98.43 feet) of a non-industrial, non-substation building.

13.2.5. Incinerator. An engineered device using controlled-flame combustion to thermally degrade PCBs and PCB items. Examples include rotary kilns, liquid injection incinerators, cement kilns, and high temperature boilers.

13.2.6. Leak or Leaking. Any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

13.2.7. Mark. The descriptive name, instructions, cautions, or other information applied to PCBs and PCB items, or other objects subject to this Guide.

13.2.8. Marked. PCB items and PCB storage areas and transport vehicles marked by applying a legible mark by painting, fixation of an adhesive label, or by any other method that meets these criteria.

13.2.9. Non-PCB Transformers. Any transformer that contains < 50 ppm PCB.

13.2.10. PCB Article. Any manufactured article, other than a PCB container, that contains PCBs and whose surface(s) has been in direct contact with PCB. This includes capacitors, transformers, electric motors, pumps, and pipes.

13.2.11. PCB Article Container. Any package, can, bottle, bag, barrel, drum, tank, or other device used to contain PCB articles or PCB equipment, and whose surface(s) has not been in direct contact with PCBs.

13.2.12. PCB Container. Any package, can, bottle, bag, barrel, drum, tank, or other device that contains PCBs or PCB articles, and whose surface(s) has been in direct contact with PCBs.

13.2.13. PCB-Contaminated Electrical Equipment. Any electrical equipment including, but not limited to, transformers, capacitors, circuit breakers, reclosers, voltage regulators, switches, electromagnets, and cable, that contain ≥ 50 ppm PCB, but < 500 ppm PCB.

13.2.14. PCB Equipment. Any manufactured item, other than a PCB container or a PCB article container, which contains a PCB article or other PCB equipment, and includes microwave ovens, electronic equipment, and fluorescent light ballasts and fixtures.

13.2.15. PCB Item. Any PCB article, PCB article container, PCB container, or PCB equipment that deliberately or unintentionally contains or has as a part of it any PCB, or PCBs at a concentration of ≥ 50 ppm.

13.2.16. PCB Transformer. Any transformer that contains ≥ 500 ppm PCB.

13.2.17. Restricted Access Area. Areas where access by unauthorized personnel is controlled by fences, other man-made structures, or naturally occurring barriers such as mountains, cliffs, or rough terrain.

13.2.18. Substantial Contact Area. An area that is subject to public access on a routine basis or which could result in substantial dermal contact by employees.

13.2.19. PCB Large High Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates at ≥ 2,000 volts (alternating current (ac) or direct current (dc)).

13.2.20. PCB Large Low Voltage Capacitor. A capacitor that contains 1.36 kg (3 lbs.) or more of dielectric fluid and which operates < 2,000 volts (ac or dc).

13.3. CRITERIA

13.3.1. General

13.3.1.1. The installation spill contingency plan will address PCB items, including temporary storage items. Chapter 18, "Spill Prevention and Response Planning," provides criteria on how to prepare these plans.

13.3.1.2. Spills of PCB liquids at concentrations of ≥ 50 ppm will be responded to immediately upon discovery and cleaned up in accordance with the following:

13.3.1.2.1. Surfaces that are located in substantial contact areas will be cleaned to 10 micrograms (μg) per 100 square centimeters (cm^2).

13.3.1.2.2. Surfaces in all other contact areas will be cleaned to 100 μg per 100 cm^2.

13.3.1.2.3. Contaminated soil located in restricted access areas will be removed until the soil tests no higher than 25 ppm PCBs and will be backfilled with clean soil containing <1 ppm PCBs. Restricted access areas in which PCB spills have been cleaned up shall have annotated on installation real property records the level of PCBs remaining in the soil, including the extent, date and type of sampling, and a reference to any reports documenting the site conditions.

13.3.1.2.4. Contaminated soil located in unrestricted access areas will be removed to a minimum depth of 25.4 cm (10 inches) or until the soil tests no higher than 10 ppm PCBs, whichever is deeper, and will be backfilled with clean soil containing < 1 ppm PCBs.

13.3.1.3. All PCB transformers, PCB large high voltage capacitors, PCB containers, and certain PCB items containing PCBs at concentrations ≥ 50 ppm (i.e., electric motors using PCB coolants, hydraulic systems using PCB hydraulic fluid, and heat transfer systems using PCBs), as well as any PCB article containers used to store the preceding items, must be prominently marked in English and Arabic. The marking must identify the item as containing PCBs, warn against improper disposal and handling, and provide a phone number in case of spills or if questions arise about disposal. This marking criteria also applies to rooms, vaults, and storage areas containing PCB transformers or storing PCBs or PCB items for disposal. Marking and additional storage criteria for

PCB containers and storage areas are included in Chapter 5, "Hazardous Material." In addition, the following PCB items must be marked at the time of items' removal from use if not already marked: PCB large low voltage capacitors and equipment containing a PCB transformer or PCB large high voltage capacitor.

13.3.1.4. Each installation having PCB items will maintain a written inventory that includes a current list by type of all marked PCB items in use and PCB items (whether or not marked) placed into storage for disposal or disposed of for that year. Inventory records should be maintained for a period of time at least 3 years after disposal of the last item on the list. Inventory record-keeping requirements for hazardous chemical substance storage are included in Chapter 5, "Hazardous Material."

13.3.1.5. Disposal of PCB items will only be through the servicing DLA Disposition Services in accordance with DoD 4160.21-M, "Defense Materiel Disposition Manual" or paragraph 13.3.5 of this Guide.

13.3.1.6. All periodic inspections as required in this Chapter will be documented at the installation. Records of inspections and maintenance history will be maintained for three years after disposal of the transformer.

13.3.2. PCB Transformers (≥ 500 ppm PCB)

13.3.2.1. PCB transformers that are in use or in storage for reuse will not be used in any application that poses a risk of contamination to food or feed.

13.3.2.2. All PCB transformers, including those in storage for reuse, will be registered with the servicing fire department.

13.3.2.3. PCB transformers in use in or near commercial buildings or located in sidewalk vaults will be equipped with electrical protection to minimize transformer failure that would result in the release of PCBs.

13.3.2.4. PCB transformers removed and stored for reuse will only be returned to their original application and location and will not be used at another location unless there is no practical alternative; and any such alternative use will not exceed one year.

13.3.2.5. PCB transformers will be serviced as follows:

13.3.2.5.1. Transformers classified as PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing < 500 ppm PCB;

13.3.2.5.2. Any servicing of PCB transformers requiring removal of the transformer coil is prohibited;

13.3.2.5.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of in accordance with paragraph 13.3.5.

13.3.2.5.4. PCB transformers may be serviced with dielectric fluid at any PCB concentration. However, the dielectric fluid from a PCB transformer will not be mixed with the dielectric fluid from PCB-contaminated electrical equipment;

13.3.2.5.5. Regardless of PCB concentration, dielectric fluids containing < 500 ppm PCBs that are mixed with fluids containing ≥ 500 ppm PCBs will not be used as dielectric fluid in any electrical equipment. The entire mixture must be considered to be > 500 ppm PCBs; and

13.3.2.5.6. Dielectric fluids containing ≥ 500 ppm PCBs will not be used as dielectric fluid in any transformers classified as PCB-contaminated electrical equipment.

13.3.2.6. All in-service PCB transformers (> 500 ppm) will be inspected at least every 3 months except that PCB transformers with impervious, undrained secondary containment capacity of 100 % of dielectric fluid or PCB transformers tested and found to contain < 60,000 ppm PCBs will be inspected at least every 12 months.

13.3.2.7. If any PCB transformer is involved in a fire and was subjected to heat and/or pressure sufficient to result in violent or nonviolent rupture, the installation will take measures to control water runoff, such as blocking floor drains. Runoff water will be tested and treated if required.

13.3.2.8. Leaking PCB transformers shall be repaired or replaced within 48 hours or as soon as possible after discovery of the leak. Leaking PCB transformers not repaired or replaced will be inspected daily. Leaking PCB fluid will be containerized.

13.3.2.9. All transformers will be considered and treated as PCB transformers unless information to the contrary exists.

13.3.2.10. Transformer Prohibitions in Jebel Ali. Transformers or equipment containing PCBs or PCB-contaminated oil shall not be installed in Jebel Ali. Existing equipment containing PCBs or PCB-contaminated oil shall be phased out and disposed of. Consult the LEC regarding the phase-out schedule.

13.3.3. Other PCB Items

13.3.3.1. Electromagnets, switches, and voltage regulators that may contain PCBs at any concentration are serviced as follows:

13.3.3.1.1. PCB-contaminated electrical equipment will only be serviced with dielectric fluid containing <500 ppm PCB;

13.3.3.1.2. Servicing any electromagnet, switch, or voltage regulator with a PCB concentration of ≥ 500 ppm that requires the removal and rework of the internal components is prohibited;

13.3.3.1.3. PCBs removed during servicing will be captured and either reused as dielectric fluid or disposed of properly;

13.3.3.1.4. PCBs from electromagnets, switches, and voltage regulators with a PCB concentration of ≥ 500 ppm will not be mixed with or added to dielectric fluid from PCB-contaminated electrical equipment; and

13.3.3.1.5. Dielectric fluids containing ≥ 500 ppm will not be used as dielectric fluid in any electromagnet, switch, or voltage regulator classified as PCB-contaminated electrical equipment.

13.3.3.2. Capacitors containing PCBs at any concentration must be managed as follows:

13.3.3.2.1. Use and storage for reuse of PCB large high-voltage capacitors and PCB large low-voltage capacitors that pose an exposure risk to food or feed is prohibited;

13.3.3.2.2. Use of PCB large high-voltage and PCB large low-voltage capacitors is prohibited unless the capacitor is used within a restricted-access electrical substation or in a contained and restricted-access indoor installation. The indoor installation will not have public access and will have an adequate roof, walls, and floor to contain any release of PCBs; and

13.3.3.3. Any PCB item removed from service will be marked with the date it is removed from service.

13.3.4. Storage

13.3.4.1. PCBs and PCB items at concentrations ≥ 50 ppm that are to be stored before disposal will be stored in a facility that will assure the containment of PCBs, including:

13.3.4.1.1. Roofs and walls of storage buildings that exclude rainfall;

13.3.4.1.2. A containment berm, at least 15.24 cm (6 inches) high, sufficient to contain twice the internal volume of the largest PCB article, or 25 % of the total internal volume of all PCB articles or containers stored, whichever is greater;

13.3.4.1.3. Drains, valves, floor drains, expansion joints, sewer lines, or other openings constructed to prevent any release from the bermed area;

13.3.4.1.4. Continuous, smooth, and impervious flooring material;

13.3.4.1.5. To the maximum extent possible, a new PCB storage area will be located to minimize the risk of release due to seismic activity, floods, or other natural events. For facilities located where there is a high possibility of such risks, the installation spill prevention and control plan will address the risk, and

13.3.4.1.6. Compliance with additional storage requirements in Chapter 5 of this Guide.

13.3.4.2. The following items may be stored temporarily in an area, subject to weekly inspection, that does not comply with the above requirements for up to 30 days from the date of removal from service:

13.3.4.2.1. Non-leaking PCB items, marked to indicate whether it is a PCB article or PCB equipment;

13.3.4.2.2. Leaking PCB articles and PCB equipment placed in a non-leaking PCB container that contains sufficient absorbent material to absorb fluid contained in the PCB article or equipment;

13.3.4.2.3. PCB containers in which non-liquid PCBs have been placed; and

13.3.4.2.4. PCB containers in which PCBs at a concentration between 50-499 ppm have been placed, and whose containers are marked to indicate there is < 500 ppm PCB.

13.3.4.3. Non-leaking and structurally undamaged large high-voltage PCB capacitors and PCB-contaminated electric equipment that have not been drained of free-flowing dielectric fluid may be stored on pallets, or raised platforms, next to a storage area meeting the criteria of paragraph 14.3.4. if they are inspected weekly.

13.3.4.4. All other PCB storage areas will be inspected at least monthly.

13.3.4.5. Containers used for the storage of PCBs will be at least as secure as those required for their transport for disposal by the servicing DLA-DS.

13.3.5. Disposal. PCB wastes are considered to be hazardous waste and shall be disposed of in accordance with the requirements of Chapter 6, "Hazardous Waste." In addition, installations shall also comply with the following disposal requirements for specific PCB waste products:

13.3.5.1. Installations that generate PCB waste of ≥ 50 ppm PCB will maintain an audit trail for the wastes at least as stringent as that required under the criteria in Chapter 6, "Hazardous Waste." Installations will coordinate with the LEC to obtain host nation concurrence for in-country PCB disposal as for HW disposal.

13.3.5.2. PCB-contaminated dielectric fluid with concentrations > 500 ppm will only be disposed in an incinerator with 99.9 % combustion efficiency.

13.3.5.3. PCB-contaminated dielectric fluid with concentrations ≥ 50 ppm, but < 500 ppm, will only be disposed as follows:

13.3.5.3.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.3.2. In a high-efficiency boiler that is rated at a minimum of 14.54 W (50 MBtu/hr) and is fueled by natural gas, oil, or coal.

13.3.5.4. Rags, soil, and other debris with PCBs at concentrations of ≥ 50 ppm will be disposed of:

13.3.5.4.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.4.2. In a chemical waste landfill.

13.3.5.5. PCB transformers will be disposed of:

13.3.5.5.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.5.2. In a chemical waste landfill, provided the transformers, and all their inner workings, are first drained of all free-flowing liquids.

13.3.5.6. PCB capacitors will be disposed of as follows:

13.3.5.6.1. PCB capacitors will be disposed of in an incinerator with 99.9 % combustion efficiency, except,

13.3.5.6.2. Intact non-leaking small PCB capacitors may be disposed of in a solid waste landfill unless large quantities (more than 45.36 kg (100 pounds)) are identified at the same time.

13.3.5.7. PCB hydraulic machines containing PCBs may be disposed of as municipal solid waste if:

13.3.5.7.1. The machines containing PCBs at concentrations of ≥ 50 ppm are drained of all free-flowing liquid.

13.3.5.7.2. The machines containing PCB liquid of ≥ 1,000 ppm are flushed prior to disposal with a solvent containing < 50 ppm PCB.

13.3.5.8. PCB-contaminated electrical equipment, except capacitors, will be disposed of as municipal solid waste only after draining all free-flowing liquid.

13.3.5.9. PCB articles, other than those already described, will be disposed of:

13.3.5.9.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.9.2. In a chemical waste landfill, provided the articles are first drained of all free-flowing liquids.

13.3.5.10. PCB containers with concentrations of ≥ 500 ppm may be disposed of:

13.3.5.10.1. In an incinerator with 99.9 % combustion efficiency; or

13.3.5.10.2. In a chemical waste landfill, provided the containers are first drained of all free-flowing liquids.

13.3.5.11. Where PCB fluids, items, or articles are disposed of in a high-temperature boiler, the following procedures will be followed:

13.3.5.11.1. The boiler must be rated at a minimum of 14.65 W (50 million BTU hours);

13.3.5.11.2. If the boiler uses natural gas or oil as the primary fuel, the carbon monoxide concentration in the stack must be ≤ 50 ppm and the excess oxygen is at least 3 % when PCBs are being burned;

13.3.5.11.3. If the boiler uses coal as the primary fuel, the carbon monoxide concentration in the stack is ≤ 100 ppm and the excess oxygen is at least 3 % when PCBs are being burned;

13.3.5.11.4. The mineral oil dielectric fluid does not comprise more than 10 %, by volume, of the total fuel feed rate;

13.3.5.11.5. The mineral oil dielectric fluid is not fed into the boiler unless the boiler is operating at its normal operating temperature and is not fed during start up or shut down operations;

13.3.5.11.6. The performance of the boiler is continuously monitored for carbon monoxide and excess oxygen percentage in the stack gas while burning mineral oil dielectric fluid or, for boilers burning < 112,500 liters (30,000 gallons) of mineral oil dielectric fluid per year, monitoring is performed at least every 60 minutes;

13.3.5.11.7. The primary fuel feed rates, mineral oil dielectric fluid feed rates, and the total quantities of both primary fuel and mineral oil dielectric fluid fed to the boiler are measured and recorded at least every 15 minutes; and

13.3.5.11.8. The flow of mineral oil dielectric fluid is stopped if the criteria respecting carbon monoxide or excess oxygen are exceeded.

13.3.5.12. Where PCB fluids, items or articles are disposed of in an incinerator, the following procedures will be followed:

13.3.5.12.1. Combustion criteria shall maintain the introduced liquids for a 2-second dwell time at 1,200°C, plus or minus 100°C (2,200°F +/- 212°F), and 3 % excess oxygen in the stack gas or maintenance of the introduced liquids for a 1-1/2 second dwell time at 1,600°C, plus or minus 100°C (3,050°F +/- 212°F) and 2 % excess oxygen in the stack gas;

13.3.5.12.2. Combustion efficiency, measured by the ratio of the concentration of carbon dioxide to the total concentration of both carbon dioxide and carbon monoxide, will be maintained at least 99.9 %;

13.3.5.12.3. The rate and quantity of PCBs that are fed to the combustion system shall be measured and recorded at regular intervals not greater than 15 minutes;

13.3.5.12.4. The temperatures of the incineration process shall be continuously measured and recorded;

13.3.5.12.5. The flow of PCBs to the incinerator shall stop automatically if temperature criteria are not met;

13.3.5.12.6. Monitoring is conducted sufficient to determine that an incinerator to be used for disposal the first time will operate within the criteria above; and

13.3.5.12.7. Continuous monitoring is conducted during incineration of PCBs for oxygen and carbon monoxide and periodic monitoring for carbon dioxide.

13.3.5.13. PCB containers used to contain only PCBs at a concentration < 500 ppm may be disposed of as municipal solid waste only after draining all free-flowing liquid.

13.3.5.14. Retrogrades of PCB Items. DoD-generated PCB items manufactured in the United States will be returned to the United States for delivery to a permitted disposal facility if host country or third country disposal is not possible, is prohibited, or would not be managed in an environmentally sound manner. Ensure that all PCB items and equipment are marked in accordance with criteria in subparagraph C13.3.1.3.

13.3.5.15. PCB Incineration. Incineration of PCB wastes shall comply with hazardous waste incineration criteria in Chapter 6, "Hazardous Waste."

13.3.5.16. Disposal Requirements in Dubai. The following additional disposal requirements are in effect for the Dubai Emirate:

13.3.5.16.1. PCB waste components in a non-hazardous inert matrix of 500 mg/kg (500 ppm) or less are permitted for disposal to general landfill (provided limited environmental impacts are expected).

13.3.5.16.2. PCB waste of concentrations greater than this limit shall be disposed of as hazardous waste in accordance with Chapter 6, "Hazardous Waste."

13.3.5.17. Disposal Requirements in Jebel Ali. . No PCB waste is permitted for disposal to sewer systems in Jebel Ali.

13.3.6. Elimination of PCB Products

13.3.6.1. Installations shall minimize the use of PCBs and PCB items without degrading mission performance.

13.3.6.2. Installations shall not purchase or otherwise take control of PCBs or PCB items for use.

13.3.6.3. All procurement of transformers or any other equipment containing dielectric or hydraulic fluid shall be accompanied by a manufacturer's certification that the equipment contains no detectable PCBs (< 2 ppm) at the time of shipment.

13.3.6.4. Such newly procured transformers and equipment shall have permanent labels affixed stating they are PCB-free (no detectable PCBs).

13.3.7. Approvals. Installations handling PCBs classified as hazardous material (see Chapter 5) or hazardous waste (see Chapter 6) shall contact the LEC to determine approval requirements.

Chapter 14

Asbestos

14.1. SCOPE

This Chapter contains criteria to control and abate threats to human health and the environment from asbestos, and describes management of asbestos during removal and disposal. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from asbestos exposure, refer to DoDI 6055.1, "DoD Safety and Occupational Health (SOH) Program" and DoDI 6055.5, "Industrial Hygiene and Occupational Health" and concomitant service instructions.

14.2. DEFINITIONS

14.2.1. Adequately Wet. Sufficiently mix or penetrate with liquid to prevent the release of particulates. If visible emissions coming from ACM are observed, then that material has not been adequately wetted. However, the absence of visible emissions is not sufficient evidence of being adequately wet.

14.2.2. Asbestos. Generic term used to describe six distinctive varieties of fibrous mineral silicates, including chrysotile, amosite, crocidolite, tremolite asbestos, anthrophylite asbestos, actinolite asbestos, and any other of these materials that have been chemically treated and/or altered.

14.2.3. Asbestos-Containing Material (ACM). Any material containing more than one percent asbestos by weight.

14.2.4. Friable Asbestos. Any material containing more than one percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

14.2.5. Category I Nonfriable ACM. Means asbestos containing packings, gaskets, resilient floor covering, and asphalt roofing products containing > 1 % asbestos.

14.2.6. Category II Nonfriable ACM. Means any material, excluding Category I nonfriable ACM, containing > 1 % asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

14.2.7. Hazardous Material. Any material - solid, liquid or gas - that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table 5.1, "Typical Hazardous Materials Characteristics," the material is listed in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," or the material falls into one of the following hazard classes. Munitions are excluded.

14.2.7.1. Explosives (Class 1)

14.2.7.2. Compressed or Liquefied Gases (Class 2)

14.2.7.3. Flammable Liquids (Class 3)

14.2.7.4. Flammable Solids (Class 4)

14.2.7.5. Oxidizing Agents (Class 5)

14.2.7.6. Toxic materials (Class 6)

14.2.7.7. Radioactive Materials (Class 7)

14.2.7.8. Corrosive Materials (Class 8)

14.2.7.9. Miscellaneous Dangerous Goods (Class 9)

14.2.8. Regulated ACM. Means (a) Friable asbestos material, (b) Category I nonfriable ACM that has become friable, (c) Category I nonfriable ACM that will be or has been subjected to sanding grinding, cutting, or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation operations.

14.3. CRITERIA. Installations shall contact the LEC to determine approval requirements for activities involving the handling, removal or disturbance of asbestos.

14.3.1. Installations will appoint an asbestos program manager to serve as the single point of contact for all asbestos-related activities.

14.3.2. Installations will prepare and implement an asbestos management plan. As a minimum, the plan will include the following:

14.3.2.1. An ACM inventory, conducted by sample and analysis or visual determination;

14.3.2.2. A notification and education program to tell workers, tenants, and building occupants where potentially friable ACM is located, and how and why to avoid disturbing the ACM; all persons affected should be properly informed;

14.3.2.3. Regular ACM surveillance to note, assess, and document any changes in the ACM's condition;

14.3.2.4. Work control/permit systems to control activities that might disturb ACM;

14.3.2.5. Operations and maintenance (O&M) work practices to avoid or minimize fiber release during activities affecting ACM;

14.3.2.6. Record keeping to document O&M activities related to asbestos identification management and abatement;

14.3.2.7. Training for the asbestos program manager as well as custodial and maintenance staff;

14.3.2.8. Procedures to assess and prioritize identified hazards for abatement;

14.3.2.9. Procedures to prevent the use of ACM in new construction;

14.3.2.10. Asbestos emission limits in working areas (Table 14.1); and

14.3.2.11. Procedures for appropriate monitoring programs.

14.3.3. Prior to demolition or renovation of a facility, the installation will make a determination whether or not the activity will remove or disturb ACM, and will record this determination on the project authorization document (e.g., work order).

14.3.4. Prior to demolition or renovation of a facility that involves removing or disturbing friable ACM, a written assessment of the action will be prepared and furnished to the installation commander. A copy of the assessment will also be kept on permanent file.

14.3.5. Installations will remove friable ACM when the ACM poses a threat to release airborne asbestos fibers and cannot be reliably repaired or isolated.

14.3.5.1. Additional Requirements in Dubai. Dubai requirements for friable thermal or acoustic insulation removal are as follows:

14.3.5.1.1. All external openings from the work area shall be adequately sealed to prevent the escape of asbestos dust, where dust is liable to escape from areas.

14.3.5.1.2. Wet stripping shall be adopted to eliminate air-borne fibers.

14.3.5.1.3. Dry stripping is associated with very high level of asbestos and should be used only where:

14.3.5.1.3.1. Wet methods cannot be used

14.3.5.1.3.2. Live electrical apparatus is present

14.3.5.1.3.3. Hot metal is present

14.3.5.1.4. A dust extraction system shall be in place.

14.3.6. Before disturbing or demolishing a facility or part of a facility, installations will remove all regulated ACM.

14.3.7. When disposing of asbestos waste, installations will adequately wet all ACM waste, seal it in a leak-proof container, and properly dispose of it. Containers will be labeled in English and the Arabic language: "DANGER - CONTAINS ASBESTOS FIBERS - AVOID CREATING DUST -

CANCER AND LUNG DISEASE HAZARD." Permanent records documenting the disposal action and site will be maintained.

14.3.7.1. Asbestos Waste Disposal in Dubai. Wastes containing asbestos at concentrations < 10,000 mg/kg (< 1 %) (excluding asbestos cement products) are permitted for disposal in the domestic waste stream. All asbestos cement products are classified as non-hazardous. Asbestos cement sheets or dry solids shall be disposed of as land fill material at solid waste building materials disposal sites in Dubai (at Aweer/ Al Qusais). All other asbestos wastes shall be disposed as hazardous waste in accordance with Chapter 6, "Hazardous Waste." Installations shall comply with the following requirements for waste handling and disposal:

14.3.7.1.1. Asbestos wastes shall be deposited into a single-lined landfill, with any loose material being dampened and contained in sealed bags first.

14.3.7.1.2. No asbestos waste in the land-fill site shall be left uncovered at the end of a working day.

14.3.7.1.3. Deposited wet waste shall be covered in the same way as dry waste to prevent escape of asbestos dust upon drying.

14.3.7.1.4. Contaminated protective clothing shall be segregated and cleaned separately.

14.3.7.1.5. Other asbestos wastes shall be disposed at an appropriate disposal site coordinated through the LEC.

14.3.8. DoD schools will comply with applicable requirements of 15 U.S.C. 2643(l) and implementing regulations in 40 CFR Part 763, Subpart E, "Asbestos-Containing Materials in Schools."

Table 14.1. Maximum Allowable Emission Limits for Asbestos Types in Working Areas

Substance Chemical Abstracts Service (CAS) No.	Threshold Limit Values (TLV)	Units of Measurement	Efficiency
Amosite 12172-73-5	0.5	f/cc	C1[1]
Chrysotile 12001-29-5	2	f/cc	C1
Crocidolite 12001-28-4	0.2	f/cc	C1
Other forms	2	f/cc	C1

Notes: [1]"C1" stands for Carcinogenic.

CHAPTER 15

LEAD-BASED PAINT

15.1. SCOPE

This Chapter contains criteria to establish and implement a lead hazard management program to identify, control, or eliminate lead-based paint hazards, through interim controls or abatement, in child-occupied facilities and military family housing, in a manner protective of human health and the environment. Policy requirements for a comprehensive Occupational Health and Safety program are not covered in this Chapter. To protect personnel from lead exposure, refer to DoDI 6055.1 "DoD Safety and Occupational Health", DoDI 6055.5 "Industrial Hygiene and Occupational Health", and concomitant service instructions.

15.2. DEFINITIONS

15.2.1. Abatement. Any set of measures designed to permanently eliminate lead-based paint or lead-based paint hazards. Abatement includes the removal of lead-based paint and lead contaminated dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of components or fixtures painted with lead-based paint, and the removal or covering of lead-contaminated soil. Abatement also includes all preparation, cleanup, disposal, and post-abatement clearance activities associated with such measures.

15.2.2. Accessible Surface. An interior or exterior surface painted with lead-based paint that is accessible for a young child to mouth or chew.

15.2.3. Bare Soil. Soil, including sand, not covered by grass, sod, or other live ground covers, or by wood chips, gravel, artificial turf, or similar covering.

15.2.4. Child-Occupied Facility. A facility, or portion of a facility, visited regularly by the same child, 6 years of age or under, on at least two different days within any week, provided that each day's visit lasts at least 3 hours and the combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours. Child-occupied facilities may include, but are not limited to, day-care centers, preschools, playgrounds, and kindergarten classrooms.

15.2.5. Clearance. Visual evaluation and testing (collection and analysis of environmental samples) conducted after lead-based paint hazard reduction activities, interim controls, and standard treatments to determine that the work is complete and no lead-contaminated bare soil or lead-contaminated settled dust exist in a facility frequented by children under the age of 6.

15.2.6. Deteriorated Paint. Any interior or exterior paint or other coating that is peeling, chipping, chalking, cracking, or is otherwise damaged or separated from the substrate.

15.2.7. Elevated Blood Lead Level. A confirmed concentration of lead in whole blood of 20 µg/dl (micrograms of lead per deciliter) for a single test, or 15-19 µg/dl in two tests taken at least 3 months apart.

15.2.8. Encapsulation. The application of any covering or coating that acts as a barrier between the lead-based paint and the environment. Encapsulation may be used as a method of abatement if it is designed to be permanent.

15.2.9. Enclosure. The use of rigid, durable construction materials that are mechanically fastened to the substrate to act as a barrier between lead-based paint and the environment. Enclosure may be used as a method of abatement if it is designed to be permanent.

15.2.10. Evaluation. A visual evaluation, risk assessment, risk assessment screen, paint inspection, paint testing, or a combination of risk assessment and paint inspection to determine the presence of deteriorated paint, lead-based paint, or a lead-based paint hazard.

15.2.11. Friction Surface. An interior or exterior surface that is subject to abrasion or friction, including but not limited to, window, floor, and stair surfaces.

15.2.12. Hazardous Material. Any material - solid, liquid or gas - that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table 5.1, "Typical Hazardous Materials Characteristics," the material is listed in Table AP1.4., "List of Hazardous Waste/Substances/Materials," or the material falls into one of the following hazard classes. Munitions are excluded.

15.2.12.1. Explosives (Class 1)

15.2.12.2. Compressed or Liquefied Gases (Class 2)

15.2.12.3. Flammable Liquids (Class 3)

15.2.12.4. Flammable Solids (Class 4)

15.2.12.5. Oxidizing Agents (Class 5)

15.2.12.6. Toxic materials (Class 6)

15.2.12.7. Radioactive Materials (Class 7)

15.2.12.8. Corrosive Materials (Class 8)

15.2.12.9. Miscellaneous Dangerous Goods (Class 9)

15.2.13. Hazard Reduction. Measures designed to reduce or eliminate human exposure to lead-based paint hazards through various methods, including interim controls or abatement or a combination of the two.

15.2.14. Impact Surface. An interior or exterior surface that is subject to damage by repeated sudden force, such as certain parts of doorframes.

15.2.15. Interim Controls. A set of measures designed to temporarily reduce human exposure or likely exposure to lead-based paint hazards. Interim controls include, but are not limited to, repairs, occasional and ongoing maintenance, painting, temporary containment, specialized cleaning, clearance, ongoing activities, and the establishment and operation of management and resident education programs.

15.2.16. Lead-Based Paint. Paint or other surface coatings that contain lead equal to or exceeding 1.0 milligram per cm^2, or 0.5 % by weight or 5,000 ppm by weight.

15.2.17. Lead-based paint hazard includes paint-lead-hazard, dust-lead hazard or soil-lead hazard as identified below:

15.2.17.1. Paint-lead hazard. A paint-lead hazard is any of the following:

15.2.17.1.1. Any lead-based paint on a friction surface that is subject to abrasion and where the lead dust levels on the nearest horizontal surface underneath the friction surface (e.g., the window sill, or floor) are equal to or greater than the dust-lead hazard levels identified in the definition for dust-lead hazard (previously defined as lead-contaminated dust) – see below.

15.2.17.1.2. Any damaged or otherwise deteriorated lead-based paint on an impact surface that is caused by impact from a related building component (such as a doorknob that knocks into a wall or a door that knocks against its doorframe).

15.2.17.1.3. Any chewable lead-based painted surface on which there is evidence of teeth marks.

15.2.17.1.4. Any other deteriorated lead-based paint in any residential building or child-occupied facility or on the exterior of any residential building or child-occupied facility.

15.2.17.2. Dust-lead hazard (previously defined as lead-contaminated dust). Surface dust in a residential dwelling or child-occupied facility that contains a mass-per-area concentration of lead equal to or exceeding 40 $\mu g/ft^2$ on floors or 250 $\mu g/ft^2$ on interior window sills based on wipe samples.

15.2.17.3. Soil-lead hazard (previously defined as lead-contaminated soil). Bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 ppm ($\mu g/g$) in a play area, or an average of 1,200 ppm of bare soil in the rest of the yard based on soil samples.

15.2.18. Lead-Based Paint Inspection. A surface-by-surface investigation to determine the presence of lead-based paint, and the provision of a report explaining the results of the investigation.

15.2.19. Permanent. An expected design life of at least 20 years.

15.2.20. Reevaluation. A visual evaluation of painted surfaces and limited dust and soil sampling conducted periodically following lead-based paint hazard reduction where lead-based paint is still present.

15.2.21. Replacement. A strategy of abatement that entails removing building components that have surfaces coated with lead-based paint (such as windows, doors, and trim) and installing new components free of lead-based paint.

15.2.22. Risk Assessment. An on-site investigation to determine the existence, nature, severity, and location of lead-based paint hazards and the provision of a report explaining the results of the investigation and options for reducing lead-based paint hazards.

15.2.23. Risk Assessment Screen. A sampling protocol that is used in dwellings that is in relatively good condition and where the probability of finding lead-based hazards is low. The protocol involves inspecting such dwellings and collecting samples from representative locations on the floor, interior window sills, and window troughs to determine whether conducting a risk assessment is warranted.

15.3. CRITERIA

15.3.1. Installations will:

15.3.1.1. Develop and implement a multi-disciplinary lead-based paint hazard management program to identify, evaluate, and reduce lead-based paint hazards in child-occupied facilities and military family housing.

15.3.1.2. Manage identified lead-based paint hazards through interim controls or abatement.

15.3.1.3. Identify lead-based paint hazards in child-occupied facilities and military family housing using any or all of the following methods:

15.3.1.3.1. Lead-based paint risk assessment screen. If screen identifies dust-lead levels >25 μg/ft^2 for floors, >125 μg/ft^2 for interior window sills, a lead-based paint risk assessment should be performed.

15.3.1.3.2. Lead-based paint risk assessments.

15.3.1.3.3. Routine facility inspection for fire and safety.

15.3.1.3.4. Occupant, facility manager, and worker reports of deteriorated paint.

15.3.1.3.5. Results of childhood blood lead screening or reports of children identified to have elevated blood lead levels.

15.3.1.3.6. Lead-based paint reevaluations.

15.3.1.3.7. Review of construction, painting, and maintenance histories.

15.3.1.4. Ensure occupants and worker protection measures are taken during all maintenance, repair, and renovation activities that disturb areas known or assumed to have lead-based paint.

15.3.1.5. Disclose the presence of any known lead-based paint or lead-based paint hazards to occupants of child-occupied facilities and military family housing and provide information on lead-based paint hazard reduction. In addition, inform occupants of military family housing, prior to conducting remodeling or renovation projects, of the hazards associated with these activities, and provide information on protecting family members from the hazards of lead-based paint.

15.3.1.6. Ensure that all personnel involved in lead-based activities, including paint inspection, risk assessment, specification or design, supervision, and abatement, are properly trained.

15.3.1.7. Dispose of lead-contaminated waste that meets the definition of a hazardous waste in accordance with Chapter 6, "Hazardous Waste," paragraph 6.2.5.

15.3.2. Approvals. Installations handling lead-contaminated waste classified as hazardous waste (see Chapter 6) shall contact the LEC to determine approval requirements.

CHAPTER 16

SPILL PREVENTION AND RESPONSE PLANNING

16.1. SCOPE

This Chapter contains criteria to plan for, prevent, control, and report spills of POL and hazardous substances. It is DoD policy to prevent spills of these substances due to DoD activities and to provide for prompt, coordinated response to contain and clean up spills that might occur. Remediation beyond that required for the initial response is conducted pursuant to DoDI 4715.8, "Environmental Remediation for DoD Activities Overseas."

16.2. DEFINITIONS

16.2.1. Aboveground Storage Container. POL storage containers, exempt from UST criteria that are normally placed on or above the surface of the ground. POL storage containers located above the floor and contained in vaults or basements, bunkered containers, and also partially buried containers are considered aboveground storage containers. For the purposes of this Chapter, this includes any mobile or fixed structure, tank, equipment, pipe, or pipeline (other than a vessel or a public vessel) used in oil well drilling operations, oil production, oil refining, oil storage, oil gathering, oil processing, oil transfer, and oil distribution. This also includes equipment in which oil is used as an operating fluid but excludes equipment in which oil is used solely for motive power.

16.2.2. Decontamination Wastes. Waste materials generated during the decontamination of equipment and personnel used during spill response including but not limited to purging water, rinsing water, plastic containers, rags, gloves, and other personal protective equipment.

16.2.3. Hazardous Material. Any material - solid, liquid or gas - that is capable of posing an unreasonable risk to health, safety, or the environment if improperly handled, stored, issued, transported, labeled, or disposed because it displays a characteristic listed in Table 5.1, "Typical Hazardous Materials Characteristics," the material is listed in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," or the material falls into one of the following hazard classes. Munitions are excluded.

16.2.3.1. Explosives (Class 1)

16.2.3.2. Compressed or Liquefied Gases (Class 2)

16.2.3.3. Flammable Liquids (Class 3)

16.2.3.4. Flammable Solids (Class 4)

16.2.3.5. Oxidizing Agents (Class 5)

16.2.3.6. Toxic materials (Class 6)

16.2.3.7. Radioactive Materials (Class 7)

16.2.3.8. Corrosive Materials (Class 8)

16.2.3.9. Miscellaneous Dangerous Goods (Class 9)

16.2.4. Hazardous Substance. Any substance having the potential to do serious harm to human health or the environment if spilled or released in reportable quantity. A list of these substances and the corresponding reportable quantities is contained in Appendix 1, "Characteristics of Hazardous Waste and Lists of Hazardous Waste and Hazardous Material." Hazardous substances do not include:

16.2.4.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous substance above.

16.2.4.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

16.2.5. Facility Incident Commander (FIC) (previously known as the Installation On-scene Coordinator). The official who coordinates and directs DoD control and cleanup efforts at the scene of a POL or hazardous substance spill due to DoD activities on or near the installation. This official is designated by the installation commander.

16.2.6. Facility Response Team (FRT) (previously known as the Installation Response Team). A team performing emergency functions as defined and directed by the FIC.

16.2.7. Oil. Oil of any kind or in any form, including, but not limited to, petroleum, fuel POL, lube oils, animal fats, vegetable oil, sludge, POL refuse, and POL mixed with wastes other than dredged spoil.

16.2.8. POL. Refined petroleum, oils, and lubricants. (See also definition in Chapter 9, "Petroleum, Oil, and Lubricants.")

16.2.9. Sector Regulatory Authority. Refers to regulatory bodies other than the Competent Authority such as water and electricity authorities, telecommunications, etc.

16.2.10. Significant Spill. An uncontained release to the land or water in excess of any of the following quantities:

16.2.10.1. For hazardous wastes or hazardous substances identified as a result of inclusion in Table AP1.T4., "List of Hazardous Waste/Substances/Materials," any quantity in excess of the reportable quantity listed in that table;

16.2.10.2. For POL or liquid or semi-liquid hazardous material, hazardous waste or hazardous substances, in excess of 400 liters (110 gallons);

16.2.10.3. For other solid hazardous material in excess of 225 Kg (500 pounds);

16.2.10.4. For combinations of POL and liquid, semi-liquid, and solid hazardous materials, hazardous waste or hazardous substance, in excess of 340 Kg (750 pounds); or

16.2.10.5. If a spill is contained inside an impervious berm, or on a nonporous surface, or inside a building and is not volatilized and is cleaned up, the spill is considered a contained release and is not considered a significant spill.

16.2.11. Worst Case Discharge. The largest foreseeable discharge from the facility, under adverse weather conditions, as determined using as a guide the worst case discharge planning volume criteria in Appendix 2, "Determination of Worst Case Discharge Planning Volume."

16.3. CRITERIA

16.3.1. Spill Prevention Control and Reporting Plan Requirement. All DoD installations will prepare, maintain, and implement a Spill Prevention and Response Plan, which provides for the prevention, control, and reporting of all spills of POL and hazardous substances. The plan will provide measures to prevent, and to the maximum extent practicable, to remove a worst case discharge from the facility. The plan should be kept in a location easily accessible to the FIC and FRT. In Abu Dhabi, the plan shall be developed in consultation with relevant emergency services and support agencies.

16.3.1.1. The plan will be updated at least every 5 years or:

16.3.1.1.1. Within 6 months of any significant changes to operations.

16.3.1.1.2. When there have been two significant spills to navigable waters in any 12-month period;

16.3.1.1.3. When there has been a spill of 3,785 liters (1,000 gallons) or greater.

16.3.1.2. The plan shall be certified by an appropriately licensed or certified technical authority ensuring that the plan considers applicable industry standards for spill prevention and environmental protection, that the plan is prepared in accordance with good engineering practice, and is adequate for the facility. Technical changes (i.e., non-administrative) to the plan require recertification. Contact the LEC to determine approval requirements for Spill Response Plans for activities involving the handling of oil and fuel adjacent to the creek, shores or harbors in Dubai.

16.3.2. Prevention Section. The prevention section of the plan will, at a minimum, contain the following:

16.3.2.1. Name, title, responsibilities, duties, and telephone number of the designated FIC and an alternate. The following additional information shall be included in oil spill response plans in Dubai:

16.3.2.1.1. Communication links and the information to be given to various bodies

16.3.2.1.2. Responsibilities to appointed personnel/ officers for:

16.3.2.1.2.1. Management of emergency response at the incident

16.3.2.1.2.2. Coordinating personnel and equipment

16.3.2.1.2.3. Provision of expert advice

16.3.2.1.2.4. Organizing support activities

16.3.2.1.2.5. Legal/ government entity contact

16.3.2.2. General information on the installation including name, type or function, location and address, charts of drainage patterns, designated water protection areas, maps showing locations of facilities described in subparagraph 16.3.2.3, critical water resources, land uses, and possible migration pathways. Plans in Dubai shall also include the means to protect critical resources.

16.3.2.3. An inventory of storage, handling, and transfer sites that could possibly produce a significant spill. For each listing, using maps as appropriate, a prediction of the direction and rate of flow should be included, as well as the total quantity of POL or hazardous substances that might be spilled as a result of a major failure. Plans in Dubai shall clearly describe the activities covered by the plan and any likely incidents involved.

16.3.2.4. An inventory of all POL and hazardous substances at storage, handling, and transfer facilities described in subparagraph 16.3.2.3.

16.3.2.5. Procedures for the periodic integrity testing of all aboveground storage containers, including visual inspection and where deemed appropriate, another form of nondestructive testing. The frequency and type of inspection and testing must take into account container size and design (floating/fixed roof, skid-mounted, elevated, cut-and cover, partially buried, vaulted above-ground, etc.) and industry standards.

16.3.2.6. Procedures for periodic inspection for all above ground valves, piping, and appurtenances associated with POL storage containers, in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," subparagraph 9.3.2.5.

16.3.2.7. Arrangements for Emergency Services. The plan will describe arrangements with installation and/or local police departments, fire departments, hospitals, contractors, and emergency response teams to coordinate emergency services.

16.3.2.7.1. Additional Requirements in Dubai. In particular, contact information for Civil Defense shall also be included in the plan.

16.3.2.8. Means to Contact Emergency Services. The plan will include a telephone number or other means to contact the appropriate emergency service provider (e.g., installation fire department) on a 24-hour basis.

16.3.2.9. A detailed description of the facility's prevention, control, and countermeasures, including structures and equipment for diversion and containment of spills, for each site listed in the inventory. Measures should permit, as far as practical, reclamation of spilled substances. Chapters governing hazardous materials, hazardous waste, POL, underground storage tanks, pesticides, and PCBs provide specific criteria for containment structure requirements.

16.3.2.10. When secondary containment is not feasible for any container listed in the inventory, the plan shall include a detailed explanation of measures that will be taken to prevent spills (e.g., pre-booming, integrity testing, frequent inspection), as determined by the licensed or certified technical authority.

16.3.2.11. A list of all emergency equipment (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment) at each site listed in the inventory where this equipment is required. This list will be kept up-to-date. In addition, the plan will include the location and a physical description of each item on the list, and a brief outline of its capabilities.

16.3.2.11.1. Additional Requirements in Dubai. Details of the personnel responsible for equipment maintenance are also required.

16.3.2.12. An evacuation plan for each site listed in the inventory, where there is a possibility that evacuation would be necessary. This plan will describe signal(s) to be used to begin evacuation, evacuation routes, alternate evacuation routes (in cases where the primary routes could be blocked by releases of hazardous waste or fires), and a designated meeting place.

16.3.2.13. A description of deficiencies in spill prevention and control measures at each site listed in the inventory, to include corrective measures required, procedures to be followed to correct listed deficiencies and any interim control measures in place. Corrective actions must be implemented within 24 months of the date of plan preparation or revision.

16.3.2.14. Written procedures for:

16.3.2.14.1. Operations to preclude spills of POLs and hazardous substances;

16.3.2.14.2. Inspections; and

16.3.2.14.3. Record keeping requirements.

16.3.2.15. Site-specific procedures should be maintained at each site on the facility where significant spills could occur.

16.3.3. Spill Control Section. The control section of the plan (which may be considered a contingency plan) will identify resources for cleaning up spills at installations and activities, and to provide assistance to other agencies when requested. At a minimum, this section of the plan will contain:

16.3.3.1. Provisions specifying the responsibilities, duties, procedures, and resources to be used to contain and clean up spills.

16.3.3.2. A description of immediate response actions that should be taken when a spill is first discovered.

16.3.3.2.1. Additional Requirements in Dubai and Jebel Ali. Plans will contain the following additional information:

16.3.3.2.1.1. LEC and Competent Authority contact information

16.3.3.2.1.2. Details of the following post-spill procedure:

16.3.3.2.1.2.1. Immediate consultation of the appropriate material safety data sheet.

16.3.3.2.1.2.2. Do not flush hazardous material into drainage system or sewer

16.3.3.2.1.2.3.. The following equipment shall be utilized to control spills: personal protective equipment, empty drums, self-adhesive paper labels for marking drums, absorbent material i.e., sand or sawdust, detergent solution, brooms, shovels, drum spanners, metal funnels, wooden wedges for plugging holes in drums, and chemical resistant sealant.

16.3.3.2.1.2.4. Release of toxic or poisonous gases will be dealt with appropriate ventilation and respiratory protective system dependent on the gas.

16.3.3.2.1.2.5. Spilled solids shall be cleaned with an industrial vacuum cleaner.

16.3.3.2.1.2.6. Liquid spills should be absorbed into a suitable dustless solid absorbent such as sand or saw dust. Saw dust should not be used with flammable or oxidizing liquids of UN Hazard Classes 3 and 5.

16.3.3.2.2. Oil Spill Response Requirements in Dubai. The Competent Authority shall be contacted immediately upon significant spill, off-installation spill, or on-installation spill that threatens off-installation resources. The Spill Response Plan shall discuss likely combating options specific to the nature of spills likely to be encountered. In addition, installations shall note the following procedures for control of oil spills:

16.3.3.2.2.1. Mechanical containment of oil spills in creeks, harbors and shallow waters (20 meters (65.6 feet) or less or within 1,609 meters (1 mile) of such depths) shall be conducted.

16.3.3.2.2.2. Dispersants may only be used with prior approval. Contact the LEC to coordinate approval. Specific approval is required for their use on beach and rocky shore habitats.

16.3.3.2.2.3. Only Regional Organization for the Protection of the Marine Environment (ROPME Kuwait) approved dispersants shall be utilized.

16.3.3.2.2.4. Dispersants shall be tested on-site to check their effectiveness and to determine the minimum quantity required.

16.3.3.3. The responsibilities, composition, and training requirements of the FRT.

16.3.3.3.1. Oil Spill Response Plan Requirements in Dubai. Responsibilities of appointed officers involved in spill control to be included in spill response plans are:

16.3.3.3.1.1. Management of emergency response at the incident

16.3.3.3.1.2. Coordinating personnel and equipment

16.3.3.3.1.3. Provision of expert advice

16.3.3.3.1.4. Organizing support activities

16.3.3.3.1.5. Legal/ government entity contact

16.3.3.3.2. Incident Response Plan Requirements in Dubai. Any personnel managing a hazardous material storage area shall complete a storage and handling of hazardous materials course which shall include emergency contingency planning. These personnel may provide basic storage and handling of hazardous materials courses to other personnel in-house.

16.3.3.4. The command structure that will be established to manage a worst case discharge. Include an organization chart and the responsibilities and composition of the organization.

16.3.3.5. Procedures for FRT alert and response to include provisions for:

16.3.3.5.1. Access to a reliable communications system for timely notification of a POL spill or hazardous substance spill.

16.3.3.5.1.1. Additional Requirements in Dubai. Spill Response Plan in Dubai shall also include the communication links and information details to be given to various bodies in the event of spill.

16.3.3.5.1.2. Acceptable Communication Types in Abu Dhabi. In Abu Dhabi, alarm systems, activation and annunciation systems appropriate to the nature, size and complexity of a project's operations shall be provided.

16.3.3.5.1.3. Emergency Control Centers in Abu Dhabi. Communication equipment shall be present in an emergency control center situated in a safe zone area to be occupied for the duration of the emergency. The equipment shall consist of a network to receive and transmit information via telephone, radio or other means and a back-up system shall be in place in case of power failure or failure of a means of communication.

16.3.3.5.2. Public affairs involvement.

16.3.3.6. A current roster of the persons, and alternates, who must receive notice of a POL or hazardous substance spill, including a Defense Energy Support Center (DESC) representative if applicable. The roster will include name, organization mailing address, and work and home telephone number. Without compromising security, the plan will include provisions for the notification of the emergency coordinator after normal working hours.

16.3.3.6.1. Additional Requirements in Dubai. Appointed officers shall serve as government/ legal entity contact persons whose responsibilities shall be laid out in the Spill Response Plan.

16.3.3.7. The plan will provide for notification of the FIC, installation commander, and local authorities in the event of hazard to human health or environment.

16.3.3.7.1. Specific Requirements in Abu Dhabi. Irrespective of threshold quantities for designated emergency management responsibilities, an incident involving hazardous materials which results in harm to employees, general public or the environment, shall be reported immediately to the Competent Authority and/ or relevant Sector Regulatory Authorities. External support services shall be notified immediately if required to manage spills upon spill assessment.

16.3.3.7.2. Additional Requirements in Abu Dhabi. Installations shall include procedures in their plans to assure that reports of emergencies are received quickly and appropriate notification and activation of necessary components of the plan are completed in a timely manner.

16.3.3.7.3. Additional Requirements in Dubai. For incidents involving hazardous materials that is beyond the capability of on-site response, installations shall contact Civil Defense and activate its HazMat system (which involves notification and mobilization of local agencies responsible for controlling spills (e.g., emergency response team).

16.3.3.8. Assignment of responsibilities for making the necessary notifications, including notification to the emergency services providers.

16.3.3.8.1 Notification Process in Dubai. The following notification and response strategies shall be followed in the event of incident (e.g., spill, fire or leak) that is beyond the capability of on-site response.

16.3.3.8.1.1. Contact Civil Defense and activate its HazMat System.

16.3.3.8.1.2. Activate the local incident system to stabilize the problem until the HazMat agencies arrive on the scene.

16.3.3.8.1.3. Provide all necessary materials and equipment to implement the local incident plan.

16.3.3.9. Surveillance procedures for early detection of POL and hazardous substance spills. In Jebel Ali, tanks storing hazardous materials shall be equipped with an alarm or warning device which will sound an audible warning or other suitable device in the event the liquid level is exceeded.

16.3.3.10. A prioritized list of various critical water and natural resources that will be protected in the event of a spill. The means to protect these resources shall also be described in plans developed for installations in Dubai.

16.3.3.11. Other resources addressed in prearranged agreements that are available to the installation to cleanup or reclaim a large spill due to DoD activities, if such spill exceeds the response capability of the installation.

16.3.3.12. Cleanup methods, including procedures and techniques used to identify, contain, disperse, reclaim, and remove POL and hazardous substances used in bulk quantity on the installation.

16.3.3.12.1. Additional Requirements in Dubai and Jebel Ali. Specific requirements for spill clean-up in Dubai and Jebel Ali are:

16.3.3.12.1.1. Spilled solids shall be cleaned with an industrial vacuum cleaner.

16.3.3.12.1.2. All necessary equipment to deal with the range of incidents identified in the Spill Response Plan on site.

16.3.3.12.1.3. The use of dispersants is not recommended in harbor waters when physical recovery of oil is feasible.

16.3.3.13. Procedures for the proper reuse and disposal of recovered substances, decontamination wastes, contaminated POL and absorbent materials, and procedures to be accomplished prior to resumption of operations.

16.3.3.13.1. Additional Requirements in Dubai and Jebel Ali. Installations shall comply with the following post-spill operations:

16.3.3.13.1.1. All wastes including packaging materials, broken pallets, etc. shall be disposed of in a safe and environmentally responsible manner.

16.3.3.13.1.2. All contaminated containers not intended for re-use shall be decontaminated where necessary and made unusable by puncturing before disposal.

16.3.3.13.1.3. Personal protective equipment shall be decontaminated and cleaned after use and properly maintained.

16.3.3.13.1.4. Potentially hazardous spilled material shall not be flushed into drainage or sewer systems

16.3.3.14. A description of general health, safety, and fire prevention precautions for spill cleanup actions.

16.3.3.15. A public affairs section that describes the procedures, responsibilities, and methods for releasing information in the event of a spill.

16.3.4. Reporting Section. The reporting section of the spill plan will address the following:

16.3.4.1. Recordkeeping when emergency procedures are invoked.

16.3.4.2. Any significant spill will be reported to the FIC immediately. Immediate actions will be taken to eliminate the source and contain the spill.

16.3.4.2.1. Additional Requirements in Dubai and Jebel Ali. In The appropriate material safety data sheet shall be referred to prior to acting on spills and leaks.

16.3.4.3. The FIC will immediately notify the appropriate In-Theater Component Commander and/or Defense Agency, the EEA, and the LEC and submit a follow-up written report when:

16.3.4.3.1. The spill occurs inside a DoD installation and cannot be contained within any required berm or secondary containment;

16.3.4.3.2. The spill exceeds 400 liters (110 gallons) of POLs;

16.3.4.3.3. A water resource has been polluted; or

16.3.4.3.4. The FIC has determined that the spill is significant.

16.3.4.4. When a significant spill occurs inside a DoD installation and cannot be contained within the installation boundaries or threatens the local HN drinking water resource, the appropriate in-theater component commander and/or Defense Agency, EEA, LEC, and HN authorities will be notified immediately.

16.3.4.4.1. Additional Requirements in Abu Dhabi. In addition to the recordkeeping requirements for incidents included in Table 16.1., installations shall submit an additional report to the LEC. The LEC shall forward this report to the Competent Authority within 30 days of the incident as required. This additional report shall contain the following information:

16.3.4.4.1.1. Cause of the incident

16.3.4.4.1.2. How it might have been prevented

16.3.4.4.1.3. Actions to prevent incident re-occurrence

16.3.4.4.1.4. Decontamination activities

16.3.4.4.1.5. Time frame for implementation of these activities

16.3.4.4.2. Additional Requirements in Dubai. The form attached as Table 16.2 shall be provided to the LEC. The LEC shall forward this form to the Competent Authority within 24 hours of an oil spill incident at locations where a number of vessels are berthed or where oil is stored as required. The following information shall also be provided along with the form:

16.3.4.4.2.1. Clean-up method used

16.3.4.4.2.2. Dispersant's toxicity data sheet

16.3.4.4.2.3. Formulation of dispersants if used (conventional or concentrated)

16.3.4.4.2.4. Dosage

16.3.4.4.2.5. Length of time material has been on the sea surface

16.3.4.4.2.6. Sea state in the spill area

16.3.4.4.2.7. Evidence of biological impacts

16.3.4.4.2.8. Other remarks (e.g., notable features, etc.)

16.3.4.5. If a significant spill occurs outside of a DoD installation, the person in charge at the scene will immediately notify the authorities listed in subparagraph 18.3.4.4, and additionally will notify the local fire departments and obtain necessary assistance.

16.3.5. Installations will provide necessary training and spill response drills to ensure the effectiveness of personnel and equipment. In Abu Dhabi, necessary information concerning training drills shall be included in the Plan.

16.3.6. After completion of the initial response, any remaining free product and/or obviously contaminated soil will be appropriately removed and managed. Further action will be governed by DoDI 4715.8, "Environmental Remediation for DoD Activities Overseas."

Table 16.1. Incident Reporting in the Abu Dhabi Emirate

Incident Type	Record-Keeping & Reporting	Reporting Authority
Near miss and minor pollution incidents medical treatment cases	Recorded immediately upon occurrence and reported in quarterly reports	Sector Regulatory Authority
Serious miss incidents Lost Time Injuries Moderate Pollution Incidents Reportable dangerous occurrences Receipt of a written diagnosis or other knowledge of an occupation disease/ illness arising in the course of work	Reported within 3 working days of occurrence	Sector Regulatory Authority (EAD may be required to be notified for moderate spills)
Fatalities Reportable serious injuries Major pollution incidents	Verbally and in writing (as soon as practicable)	Relevant Sector Regulatory Authority (EAD may be required to be notified for major spills)
Incidents/ injuries to personnel on any travel journey required during the course of employment i.e. Journey incidents (Section 2.0.)	Initial report submitted as soon as practicable and details completed within 3 working days of incident	Relevant Sector Regulatory Authority

Table 16.2. Oil Spill Reporting Form

A18.1.1. The Oil Spill Reporting Form (shown below) shall be provided to the LEC in the event of oil spill to creeks, harbors, or shallow waters:

OIL SPILL REPORT	
DATE:	
DATE OF OBSERVATION:	TIME OF OBSERVATION:
POSITION: (e.g. LATITUDE & LONGITUDE OR NEAREST LAND - MARK)	
SOURCE & CAUSE OF POLLUTION: (e.g. NAME & TYPE OF VESSEL; COLLISION OR GROUNDING).	
ESTIMATE OF AMOUNT OF OIL SPILLED & LIKELIHOOD OF FURTHER SPILLAGE.	
DESCRIPTION OF OIL SLICK INCLUDING DIRECTION, LENGTH, BREADTH & APPEARANCE.	
TYPE OF OIL SPILLED AND ITS CHARACTERISTICS:	
WATER AND SEA CONDITIONS:	
ACTION, BOTH TAKEN AND INTENDED, TO COMBAT POLLUTION & PREVENT FURTHER SPILLAGE.	
NAME & OCCUPATION OF INITIAL OBSERVER & ANY INTERMEDIATE REPORTER & HOW THEY CAN BE CONTACTED. **INITIAL OBSERVER** NAME: OCCUPATION: ADDRESS/PHONE NO.:	 **INTERMEDIATE OBSERVER** NAME: OCCUPATION: ADDRESS/PHONE NO.:
ADDITIONAL INFORMATION/REMARKS:	

CHAPTER 17

UNDERGROUND STORAGE TANKS

17.1. SCOPE

This Chapter contains criteria to control and abate pollution resulting from POL products and hazardous materials stored in USTs. Standards for USTs containing hazardous wastes are covered in Chapter 6, "Hazardous Waste." Criteria for aboveground and below ground POL storage containers are addressed in Chapter 9, "Petroleum, Oil, and Lubricants."

17.2. DEFINITIONS

17.2.1. POL. Refined petroleum, oils, and lubricants.

17.2.2. Hazardous Material. Any material defined as a hazardous material in Chapter 5, "Hazardous Material." The term does not include:

17.2.2.1. Petroleum, including crude POL or any fraction thereof, that is not otherwise specifically listed or designated as a hazardous material above.

17.2.2.2. Natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).

17.2.3. Tank Tightness Testing. A test that must be capable of detecting a 0.38 liter (0.1 gallon) per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table.

17.2.4. Underground Storage Tank (UST). Any tank, including underground piping connected thereto, larger than 416 liters (110 gallons) that is used to contain POL products or hazardous material and the volume of which, including the volume of connected pipes, is 10 % or more beneath the surface of the ground, but does not include:

17.2.4.1. Tanks containing heating oil used for consumption on the premises where it is stored;

17.2.4.2. Septic tanks;

17.2.4.3. Stormwater or wastewater collection systems;

17.2.4.4. Flow through process tanks;

17.2.4.5. Surface impoundments, pits, ponds, or lagoons;

17.2.4.6. Field constructed tanks;

17.2.4.7. Hydrant fueling systems;

17.2.4.8. Storage tanks located in an accessible underground area (such as a basement or vault) if the storage tank is situated upon or above the surface of the floor;

17.2.4.9. UST containing *de minimis* concentrations of regulated substances, except where subparagraph 17.3.2.7. is applicable; and

17.2.4.10. Emergency spill or overflow containment UST systems that are expeditiously emptied after use.

17.2.5. Hazardous Material UST. A UST that contains a hazardous material (but not including hazardous waste as defined in Chapter 6) or any mixture of such hazardous materials and petroleum, and which is not a petroleum UST.

17.2.6. Deferred UST. A deferred UST is an underground tank system that fits into one of the following categories:

17.2.6.1. A hydrant fuel distribution system; or

17.2.6.1. A field-constructed tank.

17.3. CRITERIA

17.3.1. All installations will maintain a UST inventory.

17.3.2. POL USTs. All petroleum UST systems will be properly installed, protected from corrosion, provided with spill/overfill prevention, and will incorporate leak detection as described below.

17.3.2.1. Corrosion Protection. USTs and piping must be provided with corrosion protection unless constructed of fiberglass or other non-corrodible materials. The corrosion protection system must be certified by competent authority.

17.3.2.2. Spill/Overflow Protection. USTs will be provided with spill and overfill prevention equipment, except where transfers are made in the amounts of 95 liters (25 gallons) or less. Where spill and over-fill protection are required, a spill containment box must be installed around the fill pipe. Overfill prevention will be provided by one of the following methods:

17.3.2.2.1. Automatic shut-off device (set at 95% of tank capacity).

17.3.2.2.2. High level alarm (set at 90% of tank capacity).

17.3.2.3. Leak Detection. Leak detection systems must be capable of detecting a 0.38-liter (0.1-gallon) per hour leak rate or a release of 568 liters (150 gallons) (or 1 % of tank volume, whichever is less) within 30 days with a probability of detection of 0.95 and a probability of false alarm of not more than 0.05.

17.3.2.3.1. USTs will use at least one of the following leak detection methods:

17.3.2.3.1.1. Automatic tank gauging;

17.3.2.3.1.2. Vapor monitoring;

17.3.2.3.1.3. Groundwater monitoring; or

17.3.2.3.1.4. Interstitial monitoring.

17.3.2.3.2. All pressurized UST piping must be equipped with automatic line leak detectors and utilize either an annual tightness test or monthly monitoring.

17.3.2.3.3. Suction piping will either have a line tightness test conducted every three years or use monthly monitoring.

17.3.2.4. USTs and piping will be properly closed if not needed, or be upgraded or replaced.

17.3.2.5. Any UST and piping not incorporating a functioning leak detection system will require immediate corrective action. Such systems will be tightness tested annually in accordance with recognized U.S. industry standards and inventoried monthly to determine system tightness.

17.3.2.6. Any verified leaking UST or UST piping will be immediately removed from service. Any UST and piping suspected of leaking (e.g., leak detection equipment), will be verified for leakage to ensure there is not a false positive, or alternately, will immediately be removed from service. If the UST is still required, it will be repaired or replaced. If the UST is no longer required it will be removed from the ground. When a leaking UST is removed, exposed free product and/or obviously contaminated soil in the immediate vicinity of the tank will be appropriately removed and managed. Additional action will be governed by DoDI 4715.8, "Environmental Remediation for DoD Activities Overseas." Under extenuating circumstances (e.g., where the UST is located under a building), the UST will be cleaned and filled with an inert substance, and left in place.

17.3.2.7. When a UST has not been used for one year, or is determined to no longer be required, all of the product and sludges must be removed. Subsequently, the UST must be either cleaned and filled with an inert substance, or removed. UST wastes must be sampled and tested in accordance with Chapter 9, "Petroleum, Oil, and Lubricants," paragraph C9.3.3.

17.3.2.8. When the product stored in a UST is changed, the UST must be emptied and cleaned by removing all liquid and accumulated sludge.

17.3.2.9. When a UST system is temporarily closed, corrosion protection and leak detection systems (if the UST is not empty) must be operated and maintained. If a UST system is temporarily closed for 3 months or greater, the following must be complied with:

17.3.2.9.1. Vent lines must be left open and functioning; and

17.3.2.9.2. All other lines, pumps, manways, and ancillary equipment must be secured and capped.

17.3.2.10. Additional Requirements in Dubai and Jebel Ali. Additional requirements for POL USTs in Dubai and Jebel Ali include:

19.3.2.10.1. All new POL USTs shall be installed under the supervision of an experienced engineer.

17.3.2.10.2. All USTs shall be double-walled when located in sensitive areas (such as areas in close proximity to groundwater flow, agricultural land, etc.).

17.3.3. UST Recordkeeping. Installations will maintain a tank system inventory to include tank system installation, repair, removal, replacement, or upgrade, and operation of corrosion protection equipment for the life of the tank.

17.3.4. Hazardous Material USTs

17.3.4.1. All hazardous material USTs and piping must meet the same design and construction standards as required for petroleum USTs and piping, and in addition must be provided with secondary containment for both tank and piping. Secondary containment can be met by using double-walled tanks and piping, liners, or vaults. Double-walled tanks shall be used in sensitive areas in Dubai and Jebel Ali.

17.3.4.2. Leak Detection. The interstitial space (space between the primary and secondary containment) for tanks and piping must be monitored monthly for liquids or vapors.

17.3.4.3. Hazardous material USTs and piping that do not incorporate the criteria contained in subparagraph 17.3.4.1. shall be immediately removed from service and upgraded or replaced as necessary.

17.3.4.4. Additional Requirements in Dubai and Jebel Ali. All new hazardous material USTs shall be installed under the supervision of an experienced engineer.

17.3.5. Deferred USTs. Deferred USTs constructed after 8 May 1985 must be designed and constructed with corrosion protection, non-corrodible materials, or be otherwise designed and constructed to prevent releases from corrosion or structural failure. UST materials must be compatible with the substance(s) to be stored.

17.3.6. Approvals. Installations handling hazardous material (see Chapter 5) or hazardous waste (see Chapter 6) shall consult the LEC to determine approval requirements.

A1. APPENDIX 1
CHARACTERISTICS OF HAZARDOUS WASTES AND LISTS OF HAZARDOUS WASTES AND HAZARDOUS MATERIALS

A1.1. CHARACTERISTICS OF HAZARDOUS WASTE

A1.1.1. General

A1.1.1.1. A solid waste is a discarded material that may be solid, semi-solid, liquid, or that contained gas.

A1.1.1.2. A solid waste becomes a hazardous waste when it exhibits a characteristic of a hazardous waste or is listed as a hazardous waste in this Appendix. A hazardous waste or any mixture of a solid waste and a hazardous waste that is listed solely because it exhibits one or more characteristics of ignitability, corrosivity, or reactivity, is not a hazardous waste if the waste no longer exhibits any characteristic of hazardous waste.

A1.1.1.3. Each hazardous waste is identified by a USEPA Hazardous Waste Number (HW#). The HW# must be used in complying with the notification, recordkeeping, and reporting requirements.

A1.1.2. Characteristic of Ignitability

A1.1.2.1. A solid waste exhibits the characteristic of ignitability if a representative sample of the waste has any of the following properties:

A1.1.2.1.1. It is a liquid, other than an aqueous solution containing less than 24 percent alcohol by volume and has a flash point less than 60°C (140°F), as determined by a Pensky-Martens Closed Cup Tester, using the test method specified in American Society for Testing and Materials (ASTM) Standard D-93-79 or D-93-80 or a Setaflash Closed Cup Tester, using the test method specified in ASTM Standard D-3278-78, or as determined by an equivalent test method.

A1.1.2.1.2. It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard.

A1.1.2.1.3. It is an ignitable compressed gas as determined by appropriate test methods or USEPA.

A1.1.2.1.4. It is an oxidizer.

A1.1.2.2. A solid waste that exhibits the characteristic of ignitability has the USEPA HW# D001.

A1.1.3. Characteristic of Corrosivity

A1.1.3.1. A solid waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties:

A1.1.3.1.1. It is aqueous and has a pH less than or equal to 2, or greater than or equal to 12.5, as determined by a pH meter.

A1.1.3.1.2. It is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods."

A1.1.3.2. A solid waste that exhibits the characteristic of corrosivity has the USEPA HW# D002.

A1.1.4. <u>Characteristic of Reactivity</u>

A1.1.4.1. A solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties:

A1.1.4.1.1. It is normally unstable and readily undergoes violent change without detonating.

A1.1.4.1.2. It reacts violently with water.

A1.1.4.1.3. It forms potentially explosive mixtures with water.

A1.1.4.1.4. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

A1.1.4.1.5. It is a cyanide or sulfide-bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.

A1.1.4.1.6. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.

A1.1.4.1.7. It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

A1.1.4.1.8. It is a forbidden explosive.

A1.1.4.2. A solid waste that exhibits the characteristic of reactivity has the USEPA HW# D003.

A1.1.5. <u>Toxicity Characteristic</u>

A1.1.5.1. A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, the extract from a representative sample of the waste contains any of the contaminants listed in Table A1.T1., "Maximum Concentration of Contaminants for the Toxicity Characteristic," or section A1.1. at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5 percent filterable solids, the waste itself is considered to be the extract for the purpose of this section.

A1.1.5.2. A solid waste that exhibits the characteristic of toxicity has the USEPA HW# specified in Table A1.T1 or section A1.2., which corresponds to the toxic contaminant causing it to be hazardous.

A1.2. LISTS OF HAZARDOUS WASTES

A1.2.1. General

A1.2.1.1. A solid waste is a hazardous waste if it is listed in this section.

A1.2.1.2. The basis for listing the classes or types of wastes listed employed one or more of the following Hazard Codes:

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

A1.2.1.3. Each hazardous waste listed in section A1.2 of this Appendix is assigned a USEPA HW# which precedes the name of the waste. This number must be used in complying with the notification, recordkeeping and reporting requirements of these alternate standards.

A1.2.2. Hazardous Wastes from Non-Specific Sources. The solid wastes in Table A1.T3., "Listed Hazardous Wastes from Non-Specific Sources," are listed hazardous wastes from non-specific sources. These hazardous wastes are designated with an "F."

A1.2.3. Hazardous Wastes from Specific Sources. The solid wastes listed in Table A1.T4., annotated "K" as the first character of the USEPA Hazardous Waste No. column, are listed hazardous wastes from specific sources.

A1.2.4. Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residue.

AP1.2.4.1. The following materials or items are hazardous wastes if and when they are discarded or intended to be discarded when they are mixed with waste oil or used oil or other material and applied to the land for dust suppression or road treatment, when they are otherwise applied to the land in lieu of their original intended use or when they are contained in products that are applied to the land in lieu of their original intended use, or when, in lieu of their original intended use, are produced for use as (or as a component of) a fuel, distributed for use as a fuel or burned as a fuel.

A1.2.4.1.1. Any commercial chemical product, or manufacturing chemical intermediate having the generic name listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

A1.2.4.1.2. Any off-specification commercial chemical product or manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#.

AP1.2.4.1.3. Any residue remaining in a container or in an inner liner removed from a container that has held any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#, unless the container is empty. [Comment: Unless the residue is being beneficially used or reused, or legitimately recycled or reclaimed; or being accumulated, stored, transported or treated prior to such use, re-use, recycling or reclamation, the residue to be intended for discard, and thus, a hazardous waste. An example of a legitimate re-use of the residue would be where the residue remains in the container and the container is used to hold the same commercial chemical product or manufacturing chemical intermediate it previously held. An example of the discard of the residue would be where the drum is sent to a drum reconditioner who reconditions the drum but discards the residue.]

A1.2.4.1.4. Any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#, or any residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on any land or water, of any off-specification chemical product and manufacturing chemical intermediate which, if it met specifications, would have the generic name listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#. [Comment: The phrase "commercial chemical product or manufacturing chemical intermediate having the generic name listed in..." refers to a chemical substance that is manufactured or formulated for commercial or manufacturing use which consists of the commercially pure grade of the chemical, any technical grades of the chemical that are produced or marketed, and all formulations in which the chemical is the sole active ingredient. It does not refer to a material, such as a manufacturing process waste, that contains any of the substances listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#. Where a manufacturing process waste is deemed to be a hazardous waste because it contains a substance listed in Table A1.T4., annotated "P" or "U" as the first character in the USEPA HW#, such waste will be listed in paragraph A1.2.2. above or will be identified as a hazardous waste by the characteristics set forth in section A1.1. of this Appendix.]

A1.2.4.1.5. The commercial chemical products, manufacturing chemical intermediates or off-specification commercial chemical products or manufacturing chemical intermediates referred to in Table AP1.T4., annotated "P" as the first character in the USEPA HW# are hereby identified as acute hazardous waste (H). [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letters T (Toxicity), and R (Reactivity). Absence of a letter indicates that the compound is only listed for acute toxicity.] These wastes and their corresponding USEPA HW#s are listed in Table A1.T4., annotated "P" as the first character in the USEPA HW#.

A1.2.4.1.6. The commercial chemical products, manufacturing chemical intermediates, or off-specification commercial chemical products referred to in Table A1.T4., subparagraphs A1.2.4.1.1.1. through A1.2.4.1.1.4. of this section, are hereby identified as toxic wastes (T), unless otherwise designated. [Comment: For the convenience of the regulated community, the primary hazardous properties of these materials have been indicated by the letter T (Toxicity), R (Reactivity), I (Ignitability), and C (Corrosivity). Absence of a letter indicates that the compound is only listed for toxicity.

Table A1.T1. Maximum Concentration of Contaminants for the Toxicity Characteristic

USEPA HW No.[1]	Contaminant	CAS No. [2]	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-2	1.0
D007	Chromium	7440-47-3	5.0
D016	2,4-D	94-75-7	10.0
D012	Endrin	72-20-8	0.02
D008	Lead	7439-92-1	5.0
D013	Lindane	58-89-9	0.4
D009	Mercury	7439-97-6	0.2
D014	Methoxychlor	72-43-5	10.0
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D015	Toxaphene	8001-35-2	0.5
D017	2,4,5-TP (Silvex)	93-72-1	1.0

1.

2. Notes

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table A1.T2. Maximum Concentration of Contaminants for Non-Wastewater

USEPA HW No. [1]	Contaminant	CAS No. [2]	Regulatory Level (mg/kg)
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
DO33	Hexachlorobutadiene	87-68-3	0.5
DO34	Hexachloroethane	67-72-1	3.0
DO35	Methyl Ethyl Ketone	78-93-3	200.0
DO36	Nitrobenzene	98-95-3	2.0
D037	Pentachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl Chloride	75-01-4	0.2

3.

4. Notes

1. U.S. EPA Hazardous Waste number.
2. Chemical Abstracts Service number.

Table A1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F002	The following spend halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F003	The following spent non-halogenated solvents: xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I)[2]
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(T)
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	(T)
F007	Spent cyanide plating bath solutions from electroplating operations.	(R,T)

Table A1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	(R,T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	(R,T)
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	(R,T)
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	(R,T)
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	(T)
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusion conversion coating process.	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5- trichlorophenol).	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in Sec26131 or Sec26132).	(T)

Table A1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols (This listing does not include formulations containing Hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component).	(H)
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, and F027.	(T)
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross- contaminated wastes that have had the F032 waste code deleted in accordance with Sec 26135 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	(T)

Table A1.T3. Listed Hazardous Wastes from Non-Specific Sources

USEPA HW No.[1]	Hazardous Waste	Hazard Code
F037	Petroleum refinery primary oil/water/solids separation sludge—Any sludge generated from the gravitational separation of oil/water/ solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/ solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non- contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in Sec 26131(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge—Any sludge and/or float generated from the physical and/or chemical separation of oil/water/ solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in Sec 26131(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028)	(T)

5.

6. Notes

1. U.S. EPA Hazardous Waste number.
2. (I,T) should be used to specify mixtures containing ignitable and toxic constituents.

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Acenaphthene	83329			100
Acenaphthylene	208968			5,000
Acetaldehyde (I)	75070		U001	1,000
Acetaldehyde, chloro-	107200		P023	1,000
Acetaldehyde, trichloro-	75876		U034	5,000
Acetamide	60355			100
Acetamide, N-(aminothioxomethyl)-	591082		P002	1,000
Acetamide, N-(4-ethoxyphenyl)-	62442		U187	100
Acetamide, 2-fluoro-	640197		P057	100
Acetamide, N-9H-fluoren-2-yl-	53963		U005	1
Acetic acid	64197			5,000
Acetic acid (2,4-dichlorophenoxy)- salts and esters	94757		U240	100
Acetic acid, lead(2+) salt	301042		U144	10
Acetic acid, thallium(1+) salt	563688		U214	1000
Acetic acid, (2,4,5-trichlorophenoxy)	93765		U232	1,000
Acetic acid, ethyl ester (I)	141786		U112	5,000
Acetic acid, fluoro-, sodium salt	62748		P058	10
Acetic anhydride	108247			5,000
Acetone (I)	67641		U002	5,000
Acetone cyanohydrin	75865	1,000	P069	10
Acetone thiosemicarbazide	1752303	1,000/10,000		1
Acetonitrile (I,T)	75058		U003	5,000
Acetophenone	98862		U004	5,000
2-Acetylaminofluorene	53963		U005	1
Acetyl bromide	506967			5,000
Acetyl chloride (C,R,T)	75365		U006	5,000
1-Acetyl-2-thiourea	591082		P002	1
Acrolein	107028	500	P003	1
Acrylamide	79061	1,000/10,000	U007	5,000
Acrylic acid (I)	79107		U008	5,000
Acrylonitrile	107131	10,000	U009	100
Acrylyl chloride	814686	100		1
Adipic acid	124049			5,000
Adiponitrile	111693	1,000		1
Aldicarb	116063	100/10,000	P070	1
Aldrin	309002	500/10,000	P004	1
Allyl alcohol	107186	1,000	P005	100

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Allylamine	107119	500		1
Allyl chloride	107051			1,000
Aluminum phosphide (R,T)	20859738	500	P006	100
Aluminum sulfate	10043013			5,000
4-Aminobiphenyl	92671			1
5-(Aminomethyl)-3-isoxazolol	2763964		P007	1,000
Aminopterin	54626	500/10,000		1
4-Aminopyridine	504245		P008	1,000
Amiton	78535	500		1
Amiton oxalate	3734972	100/10,000		1
Amitrole	61825		U011	10
Ammonia	7664417	500		100
Ammonium acetate	631618			5,000
Ammonium benzoate	1863634			5,000
Ammonium bicarbonate	1066337			5,000
Ammonium bichromate	7789095			10
Ammonium bifluoride	1341497			100
Ammonium bisulfite	10192300			5,000
Ammonium carbamate	1111780			5,000
Ammonium carbonate	506876			5,000
Ammonium chloride	12125029			5,000
Ammonium chromate	7788989			10
Ammonium citrate, dibasic	3012655			5,000
Ammonium fluoborate	13826830			5,000
Ammonium fluoride	12125018			100
Ammonium hydroxide	1336216			1,000
Ammonium oxalate	6009707			5,000
	5972736			
	14258492			
Ammonium picrate (R)	131748		P009	10
Ammonium silicofluoride	16919190			1,000
Ammonium sulfamate	7773060			5,000
Ammonium sulfide	12135761			100
Ammonium sulfite	10196040			5,000
Ammonium tartrate	14307438			5,000
	3164292			
Ammonium thiocyanate	1762954			5,000
Ammonium vanadate	7803556		P119	1,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Amphetamlne	300629	1,000		1
Amyl acetate	628637			5,000
Iso-Amyl acetate	123922			
Sec-Amyl acetate	626380			
Tert-Amyl acetate	625161			
Aniline (I,T)	62533	1,000	U012	5,000
Aniline, 2,4,6- trimethyl	88051	500		1
o-Anisidine	90040			100
Anthracene	120127			5,000
Antimony++	7440360			5,000
Antimony pentachloride	7647189			1,000
Antimony pentafluoride	7783702	500		1
Antimony potassium tartrate	28300745			100
Antimony tribromide	7789619			1,000
Antimony trichloride	10025919			1,000
Antimony trifluoride	7783564			1,000
Antimony trioxide	1309644			1,000
Antimycin A	1397940	1,000/10,000		1
ANTU (Thiourea 1-Naphthalenyl)	86884	500/10,000		100
Argentate(1-), bis(cyano-C)-, potassium	506616		P099	1
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
Aroclors	1336363			1
Arsenic++	7440382			1
Arsenic acid H_3AsO_4	1327522		P010	1
	7778394			
Arsenic disulfide	1303328			1
Arsenic oxide As_2O_3	1327533		P012	1
Arsenic oxide As_2O_5	1303282		P011	1
Arsenic pentoxide	1303282	100/10,000	P011	1
Arsenic trichloride	7784341			1
Arsenic trioxide	1327533		P012	1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Arsenic trisulfide	1303339			1
Arsenous oxide	1327533	100/10,000	P012	1
Arsenous trichloride	7784341	500		5,000
Arsine	7784421	100		1
Arsine, diethyl-	692422		P038	1
Arsinic acid, dimethyl-	75605		U136	1
Arsorous dichloride, phenyl-	696286		P036	1
Asbestos+++	1332214			1
Auramine	492808		U014	100
Azaserine	115026		U015	1
Aziridine	151564		P054	1
Azindine, 2-methyl-	75558		P067	1
Azirino[2',3',3,4]pyrrolo[1,2-a]indole-4, 7-dione,6-amino-8-[[aminocarbonylooxy) methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(1a-alpha, 8-beta, 8a-alpha, 8b-alpha)]-	50077		U010	10
Azinphos-ethyl	2642719	100/10,000		100
Azinphos-methyl	86500	10/10,000		1
Barium cyanide	542621		P013	10
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56495		U157	10
Benz[c]acridine	225514		U016	100
Benzal chloride	98873	500	U017	5,000
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23950585		U192	5,000
Benz[a]anthracene	56553		U018	10
1,2-Benzanthracene	56553		U018	10
Benz[a]anthracene, 7,12-dimethyl-	57976		U094	1
Benzenamine (I,T)	62533		U012	5,000
Benzenamine, 3-(Trifluoromethyl)	98168	500		1
Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl-	492808		U014	100
Benzenamine, 4-chloro-	106478		P024	1,000
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165933		U049	100
Benzenamine, N,N-dimethyl-4-(phenylazo-)	60117		U093	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Benzenamine, 2-methyl-	95534		U328	100
Benzenamine, 4-methyl-	106490		U353	100
Benzenamine, 4,4'-methylenebis(2-chloro-	101144		U158	10
Benzenamine, 2-methyl-, hydrochloride	636215		U222	100
Benzenamine, 2-methyl-5-nitro-	99558		U181	100
Benzenamine, 4-nitro-	100016		P077	5,000
Benzene (I,T)	71432		U109	10
Benzene, 1-(Chloromethyl)-4-Nitro-	100141	500/10,000		1
Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510156		U038	10
Benzene, 1-bromo-4-phenoxy-	101553		U030	100
Benzenearsonic Acid	98055	10/10,000		1
Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-	305033		U035	10
Benzene, chloro-	108907		U037	100
Benzene, chloromethyl-	100447		P028	100
Benzenediamin, ar-methyl-	25376458		U221	10
	95807			
	496720			
	823405			
1,2-Benzenedicarboxylic acid, dioctyl ester	117840		U107	5,000
1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)]-ester	117817		U028	100
1,2-Benzenedicarboxylic acid, dibutyl ester	84742		U069	10
1,2-Benzenedicarboxylic acid, diethyl ester	84662		U088	1,000
1,2-Benzenedicarboxylic acid, dimethyl ester	131113		U102	5,000
Benzene, 1,2-dichloro-	95501		U070	100
Benzene, 1,3-dichloro-	541731		U071	100
Benzene, 1,4-dichloro-	106467		U072	100
Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-	72548		U060	1
Benzene, dichloromethyl-	98873		U017	5,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Benzene, 1,3-diisocyanotomethyl- (R,T)	584849		U223	100
	91087			
	264716254			
Benzene, dimethyl (I,T)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
1,3-Benzenediol	108463		U201	5,000
1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]- (R) -	51434		P042	1,000
Benzeneethanamine, alpha, alpha-dimethyl-	122098		P046	5,000
Benzene, hexachloro-	118741		U127	10
Benzene, hexahydro- (I)	110827		U056	1,000
Benzene, hydroxy-	108952		U188	1,000
Benzene, methyl-	108883		U220	1,000
Benzene, 2-methyl-1,3-dinitro-	606202		U106	100
Benzene, 1-methyl-2,4-dinitro-	121142		U105	10
Benzene, 1-methylethyl- (I)	98828		U055	5,000
Benzene, nitro-	98953		U169	1,000
Benzene, pentachloro-	608935		U183	10
Benzene, pentachloronitro-	82688		U185	100
Benzenesulfonic acid chloride (C,R)	98099		U020	100
Benzenesulfonyl chloride	98099		U020	100
Benzene, 1,2,4,5-tetrachloro-	95943		U207	5,000
Benzenethiol	108985		P014	100
Benzene, 1,1'-(2,2,2-tri-chloroethylidene)bis[4-chloro-	50293		U061	1
Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-	72435		U247	1
Benzene, (trichloromethyl)-	98077		U023	10
Benzene, 1,3,5-trinitro-	99354		U234	10
Benzidine	92875		U021	1
Benzimidazole, 4,5-Dichloro-2-(Trifluoromethyl)-	3615212	500/10,000		1
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	81072		U202	100
Benzo[a]anthracene	56553		U018	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Benzo[b]fluoranthene	205992			1
Benzo[k]fluoranthene	207089			5,000
Benzo[j,k]fluorene	206440		U120	100
1,3-Benzodioxole, 5-(1-propenyl)-	120581		U141	100
1,3-Benzodioxole, 5-(2-propenyl)-	94597		U203	100
1,3-Benzodioxole, 5-propyl-	94586		U090	10
Benzoic acid	65850			5,000
Benzonitrile	100470			5,000
Benzo[rst]pentaphene	189559		U064	10
Benzo[ghi]perylene	191242			5,000
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations greater than 0.3%	81812		P001	100
Benzo[a]pyrene	50328		U022	1
3,4-Benzopyrene	50328		U022	1
p-Benzoquinone	106514		U197	10
Benzotrichloride (C,R,T)	98077	500	U023	10
Benzoyl chloride	98884			1,000
1,2-Benzphenanthrene	218019		U050	100
Benzyl chloride	100447	500	P028	100
Benzyl cyanide	140294	500		1
Beryllium++	7440417		P015	10
Beryllium chloride	7787475			1
Beryllium fluoride	7787497			1
Beryllium nitrate	13597994			1
	7787555			
alpha-BHC	319846			10
beta-BHC	319857			1
delta-BHC	319868			1
gamma-BHC	58899		U129	1
Bicyclo [2,2,1]Heptane-2-carbonitrile, 5-chloro-6-(((Methylamino)Carbonyl) Oxy)Imino)-,(1s-(1-alpha, 2-beta, 4-alpha, 5-alpha, 6E))-	15271417	500/10,000		1
2,2'-Bioxirane	1464535		U085	10
Biphenyl	92524			100
(1,1'-Biphenyl)-4,4'diamine	92875		U021	1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
(1,1'-Biphenyl)-4,4'diamine, 3,3'dichloro-	91941		U073	1
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethoxy-	119904		U091	10
(1,1'-Biphenyl)-4,4'diamine, 3,3'dimethyl-	119937		U095	10
Bis(chloromethyl) ketone	534076	10/10,000		1
Bis(2-chloroethyl)ether	111444		U025	10
Bis(2-chloroethoxy)methane	111911		U024	1,000
Bis(2-ethylhexyl)phthalate	117817		U028	100
Bitoscanate	4044659	500/10,000		1
Boron trichloride	10294345	500		1
Boron trifluoride	7637072	500		1
Boron trifluoride compound with methyl ether (1:1)	353424	1,000		1
Bromoacetone	598312		P017	1,000
Bromadiolone	28772567	100/10,000		1
Bromine	7726956	500		1
Bromoform	75252		U225	100
4-Bromophenyl phenyl ether	101553		U030	100
Brucine	357573		P018	100
1,3-Butadiene	106990			10
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683		U128	1
1-Butanamine, N-butyl-N-nitroso-	924163		U172	10
1-Butanol	71363		U031	5,000
2-Butanone	78933		U159	5,000
2-Butanone peroxide (R,T)	1338234		U160	10
2-Butanone, 3,3-dimethyl-1-(methylthio)-, O[(methylamno)carbonyl] oxime	39196184		P045	100
2-Butenal	123739		U053	100
	4170303			
2-Butene, 1,4-dichloro- (I,T)	764410		U074	1
2-Butenoic acid, 2-methyl-, 7[[2,3-dihydroxy-2-(1-meth- oxyethyl)-3-methyl-1-oxobutoxy] methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1-alpha(Z),7(2S*,3R*), 7a-alpha]]-	303344		U143	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Butyl acetate	123864			5,000
iso-Butyl acetate	110190			
sec-Butyl acetate	105464			
tert-Butyl acetate	540885			
n-Butyl alcohol (I)	71363		U031	5,000
Butylamine	109739			1,000
iso-Butylamine	78819			
sec-Butylamine	513495			
tert-Butylamine	13952846			
	75649			
Butyl benzyl phthalate	85687			100
n-Butyl phthalate	84742		U069	10
Butyric acid	107926			5,000
iso-Butyric acid	79312			
Cacodylic acid	75605		U136	1
Cadmium++ (2+)	7440439			10
Cadmium acetate	543908			10
Cadmium bromide	7789426			10
Cadmium chloride	10108642			10
Cadmium oxide	1306190	100/10,000		1
Cadmium stearate	2223930	1,000/10,000		1
Calcium arsenate	7778441	500/10,000		1
Calcium arsenite	52740166			1
Calcium carbide	75207			10
Calcium chromate	13765190		U032	10
Calcium cyanamide	156627			1,000
Calcium cyanide Ca(CN)2	592018		P021	10
Calcium dodecylbenzenesulfonate	26264062			1,000
Calcium hypochlorite	7778543			10
Camphechlor	8001352	500/10,000		1
Camphene, octachloro-	8001352		P123	1
Cantharidin	56257	100/10,000		1
Carbachol chloride	51832	500/10,000		1
Caprolactum	105602			5,000
Captan	133062			10
Carbamic acid, ethyl ester	51796		U238	100
Carbamic acid, methylnitroso-, ethyl ester	615532		U178	1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Carbamic acid, Methyl-, 0-(((2,4-Dimethyl-1, 3-Dithiolan-2-yl)Methyllene)Amino)-	26419738	100/10,000		1
Carbamic chloride, dimethyl-	79447		U097	1
Carbamodithioic acid, 1,2-ethaneiylbis, salts & esters	111546		U114	5,000
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester	2303164		U062	100
Carbaryl	63252			100
Carbofuran	1563662	10/10,000		10
Carbon disulfide	75150	10,000	P022	100
Carbon oxyfluoride (R,T)	353504		U033	1,000
Carbon tetrachloride	56235		U211	10
Carbonic acid, dithallium(1+) salt	6533739		U215	100
Carbonic dichloride	75445		P095	10
Carbonic difluoride	353504		U033	1,000
Carbonochloridic acid, methyl ester	79221		U156	1,000
Carbonyl Sulfide	463581			100
Carbophenothion	786196	500		1
Catechol	120809			100
Chloral	75876		U034	5,000
Chlorambem	133904			100
Chlorambucil	305033		U035	10
Chlordane	57749	1,000	U036	1
Chlordane, alpha & gamma isomers	57749		U036	1
Chlordane, technical	57749		U036	1
Chlorfenvinfos	470906	500		1
Chlorinated champhene (Campheclor)	8001352			1
Chlorine	7782505	100		10
Chlormephos	24934916	500		1
Chlormequat chloride	999815	100/10,000		1
Chlornaphazine	494031		U026	100
Choroacetaldehyde	107200		P023	1,000
Chloroacetophenone	532274			100
Chloroacetic acid	79118	100/10,000		100
p-Chloroaniline	106478		P024	1,000
Chlorobenzene	108907		U037	100

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Chlorobenzilate	510156		U038	10
p-Chloro-m-cresol (4)	59507		U039	5,000
1-Chloro-2,3-epoxypropane	106898		U041	100
Chlorodibromomethane	124481			100
Chloroethane	75003			100
Chloroethanol	107073	500		1
Chloroethyl chlorofomate	627112	1,000		1
2-Chloroethyl vinyl ether	110758		U042	1,000
Chloroform	67663	10,000	U044	10
Chloromethane	74873		U045	100
Chloromethyl ether	542881	100	P016	1
Chloromethyl methyl ether	107302	100	U046	1
beta-Chloronaphthalene	91587		U047	5,000
2-Chloronaphthalene	91587		U047	5,000
Chlorophacinone	3691358	100/10,000		1
o-Chlorophenol (2)	95578		U048	100
4-Chlorophenyl phenyl ether	7005723			5,000
1-(o-Chlorophenyl)thiourea	5344821		P026	100
Chloroprene	126998			100
3-Chloropropionitrile	542767		P027	1,000
Chlorosulfonic acid	7790945			1,000
4-Chloro-o-toluidine, hydrochloride	3165933		U049	100
Chlorpyrifos	2921882			1
Chloroxuron	1982474	500/10,000		1
Chlorthiophos	21923239	500		1
Chromic acetate	1066304			1,000
Chromic acid	11115745			10
	7738945			
Chromic acid H_2CrO_4, calcium salt	13765190		U032	10
Chromic chloride (Chromium chloride)	10025737	1/10,000		1
Chromic sulfate	10101538			1,000
Chromium++	7440473			5,000
Chromous chloride	10049055			1,000
Chrysene	218019		U050	100
Cobalt, ((2,2'-(1,2-ethanediylbis (Nitrilo-methylidyne))Bis(6-fluoro-phenolato))(2-)-N,N',O,O')-,	62207765	100/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
Cobaltous bromide	7789437			1,000
Cobalt carbonyl	10210681	10/10,000		1
Cobaltous formate	544183			1,000
Cobaltous sulfamate	14017415			1,000
Coke Oven Emissions	NA			1
Colchicine	64868	10/10,000		1
Copper++	7440508			5,000
Copper cyanide	544923		P029	10
Coumaphos	56724	100/10,000		10
Coumatetralyl	5836293	500/10,000		1
Creosote	8001589		U051	1
Cresol(s) (Phenol, Methyl)	1319773		U052	100
m-Cresol	108394	1,000/10,000		100
o-Cresol	95487			100
p-Cresol	106445			100
Cresylic acid	1319773		U052	100
m-Cresylic acid	108394			100
o-Cresylic acid	95487			100
p-Cresylic acid	106445			100
Crimidine	535897	100/10,000		1
Crotonaldehyde	123739	1,000	U053	100
	4170303	1,000		100
Cumene (I)	98828		U055	5,000
Cupric acetate	142712			100
Cupric acetoarsenite	12002038			1
Cupric chloride	7447394			10
Cupric nitrate	3251238			100
Cupric oxalate	5893663			100
Cupric sulfate	7758987			10
Cupric sulfate, ammoniated	10380297			100
Cupric tartrate	815827			100
Cyanides (soluble salts and complexes) not otherwise specified	57125		P030	10
Cyanogen	460195		P031	100
Cyanogen bromide	506683	500/10,000	U246	1,000
Cyanogen chloride	506774		P033	10
Cyanogen iodide (Iodine cyanide)	506785	1,000/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Cyanophos	2636262	1,000		1
Cyanuric fluoride	675149	100		1
2,5-Cyclohexadiene-1,4-dione	106514		U197	10
Cyclohexane (I)	110827		U056	1,000
Cyclohexane, 1,2,3,4,5,6-hexachloro, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-alpha, 6-beta)-	58899		U129	1
Cyclohexanone (I)	108941		U057	5,000
2-Cyclohexanone	131895		P034	100
Cycloheximide	66819	100/10,000		1
Cyclohexylamine	108918	10,000		1
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474		U130	10
Cyclophosphamide	50180		U058	10
2,4-D Acid	94757		U240	100
2,4-D Ester	94111			100
	94791			
	94804			
	1320189			
	1928387			
	1928616			
	1929733			
	2971382			
	25168267			
	53467111			
2,4-D, salts & esters (2,4-Dichlorophenoxyacetic Acid)	94757		U240	100
Daunomycin	20830813		U059	10
Decarborane(14)	17702419	500/10,000		1
Demeton	8065483	500		1
Demeton-S-Methyl	919868	500		1
DDD, 4,4'DDD	72548		U060	1
DDE, 4,4'DDE	72559			1
DDT, 4,4'DDT	50293		U061	1
DEHP (Diethylhexyl phthalate)	117817		U028	100
Diallate	2303164		U062	100
Dialifor	10311849	100/10,000		1
Diazinon	333415			1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Diazomethane	334883			100
Dibenz[a,h]anthracene	53703		U063	1
1,2:5,6-Dibenzanthracene	53703		U063	1
Dibenzo[a,h]anthracene	53703		U063	1
Dibenzofuran	132649			100
Dibenz[a,i]pyrene	189559		U064	10
1,2-Dibromo-3-chloropropane	96128		U066	1
Dibromoethane	106934		U067	1
Diborane	19287457	100		1
Dibutyl phthalate	84742		U069	10
Di-n-butyl phthalate	84742		U069	10
Dicamba	1918009			1,000
Dichlobenil	1194656			100
Dichlone	117806			1
Dichlorobenzene	25321226			100
m-Dichlorobenzene (1,3)	541731		U071	100
o-Dichlorobenzene (1,2)	95501		U070	100
p-Dichlorobenzene (1,4)	106467		U072	100
3,3'-Dichlorobenzidine	91941		U073	1
Dichlorobromomethane	75274			5,000
1,4-Dichloro-2-butene (I,T)	764410		U074	1
Dichlorodifluoromethane	75718		U075	5,000
1,1-Dichloroethane	75343		U076	1,000
1,2-Dichloroethane	107062		U077	100
1,1-Dichloroethylene	75354		U078	100
1,2-Dichloroethylene	156605		U079	1,000
Dichloroethyl ether	111444	10,000	U025	10
Dichloroisopropyl ether	108601		U027	1,000
Dichloromethoxy ethane	111911		U024	1,000
Dichloromethyl ether	542881		P016	1
Dichloromethylphenylsilane	149746	1,000		1
2,4-Dichlorophenol	120832		U081	100
2,6-Dichlorophenol	87650		U082	100
Dichlorophenylarsine	696286		P036	1
Dichloropropane	26638197			1,000
1,1-Dichloropropane	78999			
1,3-Dichloropropane	142289			
1,2-Dichloropropane	78875		U083	1,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Dichloropropane--Dichloropropene (mixture)	8003198			100
Dichloropropene	26952238			100
2,3-Dichloropropene	78886			
1,3-Dichloropropene	542756		U084	100
2,2-Dichloropropionic acid	75990			5,000
Dichlorvos	62737	1,000		10
Dicofol	115322			10
Dicrotophos	141662	100		1
Dieldrin	60571		P037	1
1,2:3,4-Diepoxybutane (I,T)	1464535	500	U085	10
Diethanolamine	111422			100
Diethyl chlorophosphate	814493	500		1
Diethylamine	109897			1,000
Diethylarsine	692422		P038	1
Diethylcarbmazine citrate	1642542	100/10,000		1
1,4-Diethylenedioxide	123911		U108	100
Diethylhexyl phthalate	117817		U028	100
N,N-Diethylaniline	91667			1,000
N,N'-Diethylhydrazine	1615801		U086	10
O,O-Diethyl S-methyl dithiophosphate	3288582		U087	5,000
Diethyl-p-nitrophenyl phosphate	311455		P041	100
Diethyl phthalate	84662		U088	1,000
O,O-Diethyl O-pyrazinyl phosphorothioate	297972		P040	100
Diethylstilbestrol	56531		U089	1
Diethyl sulfate	64675			10
Digitoxin	71636	100/10,000		1
Diglycidyl ether	2238075	1,000		1
Digoxin	20830755	10/10,000		1
Dihydrosafrole	94586		U090	10
Diisopropyfluorophosphate	55914		P043	100
Diisopropylfluorophosphate, 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1-alpha, 4-alpha, 4a-beta, 5-alpha, 8-alpha, 8a-beta)-	309002		P004	1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro, (1-alpha, 4-alpha, 4a-beta, 5a-beta, 8-beta, 8a-beta)-	465736		P060	1
2,7:3,6-Dimethanonaphth[2,3 b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1a-alpha, 2-beta, 2a-alpha, 3-beta, 6-beta, 6a-alpha, 7beta, 7aalpha)-	60571		P037	1
2,7:3,6 Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octa-hydro-, (1a-alpha, 2-beta, 2a-beta, 3-alpha, 6-alpha, 6a-beta, 7-beta, 7a-alpha)-	72208		P051	1
Dimethoate	60515		P044	10
3,3'-Dimethoxybenzidine	119904		U091	10
Dimefox	115264	500		1
Dimethoate	60515	500/10,000		10
Dimethyl Phosphorochloridothioate	2524030	500		1
Dimethyl sulfate	77781	500		100
Dimethylamine (I)	124403		U092	1,000
p-Dimethylaminoazobenzene	60117		U093	10
7,12-Dimethylbenz[a]anthracene	57976		U094	1
3,3'-Dimethylbenzidine	119937		U095	10
alpha,alpha-Dimethylbenzylhydroperoxide(R)	80159		U096	10
Dimethylcarbamoyl chloride	79447		U097	1
Dimethylformamide	68122			100
Dimethyldichlorosilane	75785	500		1
1,1-Dimethylhydrazine	57147	1,000	U098	10
1,2-Dimethylhydrazine	540738		U099	1
alpha, alpha-Dimethylphenethylamine	122098		P046	5,000
Dimethyl-p-phenylenediamine	99989	10/10,000		1
2,4-Dimethylphenol	105679		U101	100
Dimethyl phthalate	131113		U102	5,000
Dimethyl sulfate	77781		U103	100
Dimetilan	644644	500/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Dinitrobenzene (mixed)	25154545			100
m-Dinitrobenzene	99650			
o-Dinitrobenzene	528290			
p-Dinitrobenzene	100254			
4,6-Dinitro-o-cresol and salts	534521	10/10,000	P047	10
Dinitrophenol	25550587			10
2,5-Dinitrophenol	329715			
2,6-Dinitrophenol	573568			
2,4-Dinitrophenol	51285		P048	10
Dinitrotoluene	25321146			10
3,4-Dinitrotoluene	610399			
2,4-Dinitrotoluene	121142		U105	10
2,6-Dinitrotoluene	606202		U106	100
Dinoseb	88857	100/10,000	P020	1,000
Dinoterb	1420071	500/10,000		1
Di-n-octyl phthalate	117840		U107	5,000
1,4-Dioxane	123911		U108	100
Dioxathion	78342	500		1
Diphacinone	82666	10/10,000		1
1,2-Diphenylhydrazine	122667		U109	10
Diphosphoramide, octamethyl-	152169	100	P085	100
Diphosphoric acid, tetraethyl ester	107493		P111	10
Dipropylamine	142847		U110	5,000
Di-n-propylnitrosamine	621647		U111	10
Diquat	85007			1,000
	2764729			
Disulfoton	298044	500	P039	1
Dithiazanine iodide	514738	500/10,000		1
Dithiobiuret	541537	100/10,000	P049	100
Diuron	330541			100
Dodecylbenzenesulfonic acid	27176870			1,000
Emetine, Dihydrochloride	316427	1/10,000		1
Endosulfan	115297	10/10,000	P050	1
alpha-Endosulfan	959988			1
beta-Endosulfan	33213659			1
Endosulfant sulfate	1031078			1
Endothall	145733		P088	1,000
Endothion	2778043	500/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Endrin	72208	500/10,000	P051	1
Endrin aldehyde	7421934			1
Endrin & metabolites	72208		P051	1
Epichlorohydrin	106898	1,000	U041	100
Epinephrine	51434		P042	1,000
EPN	2104645	100/10,000		1
1,2-Epoxybutane	106887			100
Ergocalciferol	50146	1,000/10,000		1
Ergotamine tartrate	379793	500/10,000		1
Ethanal	75070		U001	1,000
Ethanamine, N-ethyl-N-nitroso-	55185		U174	1
1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-	91805		U155	5,000
Ethane, 1,2-dibromo-	106934		U067	1
Ethane, 1,1-dichloro-	75343		U076	1,000
Ethane, 1,2-dichloro-	107062		U077	100
Ethanedinitrile	460195		P031	100
Ethane, hexachloro-	67721		U131	100
Ethane, 1,1'-[methylenebis(oxy)]bis(2-chloro-	111911		U024	1,000
Ethane, 1,1'-oxybis-	60297		U117	100
Ethane, 1,1'-oxybis(2-chloro-	111444		U025	10
Ethane, pentachloro-	76017		U184	10
Ethanesulfonyl chloride, 2-chloro	1622328	500		1
Ethane, 1,1,1,2-tetrachloro-	630206		U208	100
Ethane, 1,1,2,2-tetrachloro-	79345		U209	100
Ethanethioamide	62555		U218	10
Ethane, 1,1,1-trichloro-	71556		U226	1,000
Ethane, 1,1,2-trichloro-	79005		U227	100
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester	16752775		P066	100
Ethanol, 1,2-Dichloro-, acetate	10140871	1,000		1
Ethanol, 2-ethoxy-	110805		U359	1,000
Ethanol, 2,2'-(nitrosoimino)bis-	1116547		U173	1
Ethanone, 1-phenyl-	98862		U004	5,000
Ethene, chloro-	75014		U043	1
Ethene, 2-chloroethoxy-	110758		U042	1,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Ethene, 1,1-dichloro-	75354		U078	100
Ethene, 1,2-dichloro- (E)	156605		U079	1,000
Ethene, tetrachloro-	127184		U210	100
Ethene, trichloro-	79016		U228	100
Ethion	563122	1,000		10
Ethoprophos	13194484	1,000		1
Ethyl acetate (I)	141786		U112	5,000
Ethyl acrylate (I)	140885		U113	1,000
Ethylbenzene	100414			1,000
Ethylbis(2-Chloroethyl)amine	538078	500		1
Ethyl carbamate (urethane)	51796		U238	100
Ethyl chloride	75003			100
Ethyl cyanide	107120		P101	10
Ethylenebisdithiocarbamic acid, salts & esters	111546		U114	5,000
Ethylenediamine	107153			5,000
Ethylenediamine-tetraacetic acid (EDTA)	60004			5,000
Ethylene dibromide	106934		U067	1
Ethylene dichloride	107062		U077	100
Ethylene fluorohydrin	371620	10		1
Ethylene glycol	107211			5,000
Ethylene glycol monoethyl ether	110805		U359	1,000
Ethylene oxide (I,T)	75218	1,000	U115	10
Ethylenediamine	107153	10,000		5,000
Ethylenethiourea	96457		U116	10
Ethyleneimine	151564	500	P054	1
Ethyl ether (I)	60297		U117	100
Ethylthiocyanate	542905	10,000		1
Ethylidene dichloride	75343		U076	1,000
Ethyl methacrylate	97632		U118	1,000
Ethyl methanesulfonate	62500		U119	1
Famphur	52857		P097	1,000
Fenamlphos	22224926	10/10,000		1
Fenltrothion	122145	500		1
Fensulfothion	115902	500		1
Ferric ammonium citrate	1185575			1,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Ferric ammonium oxalate	2944674			1,000
	55488874			
Ferric chloride	7705080			1,000
Ferric fluoride	7783508			100
Ferric nitrate	10421484			1,000
Ferric sulfate	10028225			1,000
Ferrous ammonium sulfate	10045893			1,000
Ferrous chloride	7758943			100
Ferrous sulfate	7720787			1,000
	7782630			
Fluenetil	4301502	100/10,000		1
Fluoranthene	206440		U120	100
Fluorene	86737			5,000
Fluorine	7782414	500	P056	10
Fluoroacetamide	640197	100/10,000	P057	100
Fluoracetic acid	144490	10/10,000		1
Fluoroacetic acid, sodium salt	62786		P058	10
Fluoroacetyl chloride	359068	10		1
Fluorouracil	51218	500/10,000		1
Fonofos	944229	500		1
Formaldehyde	50000	500	U122	100
Formaldehyde cyanohydrin	107164	1,000		1
Formetanate hydrochloride	23422539	500/10,000		1
Formothion	2540821	100		1
Formparanate	17702577	100/10,000		1
Formic acid (C,T)	64186		U123	5,000
Fosthletan	21548323	500		1
Fubendazole	3878191	100/10,000		1
Fulminic acid, mercury(2^-) salt (R,T)	628864		P065	10
Fumaric acid	110178			5,000
Furan (I)	110009	500	U124	100
Furan, tetrahydro- (I)	109999		U213	1,000
2-Furancarboxaldehyde (I)	98011		U125	5,000
2,5-Furandione	108316		U147	5,000
Furfural (I)	98011		U125	5,000
Furfuran (I)	110009		U124	100
Gallium trichloride	13450903	500/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664		U206	1
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-	18883664		U206	1
Glycidylaldehyde	765344		U126	10
Guanidine, N-methyl-N'-nitro-N-nitroso-	70257		U163	10
Guthion	86500			1
Heptachlor	76448		P059	1
Heptachlor epoxide	1024573			1
Hexachlorobenzene	118741		U127	10
Hexachlorobutadiene	87683		U128	1
Hexachlorocyclohexane (gamma isomer)	58899		U129	1
Hexachlorocyclopentadiene	77474	100	U130	10
Hexachloroethane	67721		U131	100
Hexachlorophene	70304		U132	100
Hexachloropropene	1888717		U243	1,000
Hexaethyl tetraphosphate	757584		P062	100
Hexamethylene-1, 6-diisocyanate	822060			100
Hexamethylphosphoramide	680319			1
Hexamethylenediamine, N,N'-Dibutyl	4835114	500		1
Hexane	110543			5,000
Hexone (Methyl isobutyl ketone)	108101		U161	5,000
Hydrazine (R,T)	302012	1,000	U133	1
Hydrazine, 1,2-diethyl-	1615801		U086	10
Hydrazine, 1,1-dimethyl-	57147		U098	10
Hydrazine, 1,2-dimethyl-	540738		U099	1
Hydrazine, 1,2-diphenyl-	122667		U109	10
Hydrazine, methyl-	60344		P068	10
Hydrazinecarbothioamide	79196		P116	100
Hydrochloric acid	7647010			5,000
Hydrocyanic acid	74908	100	P063	10
Hydrofluoric acid	7664393		U134	100
Hydrogen chloride (gas only)	7647010	500		5,000
Hydrogen cyanide	74908		P063	10
Hydrogen fluoride	7664393	100	U134	100

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Hydrogen peroxide (Conc. >52%)	7722841	1,000		1
Hydrogen phosphide	7803512		P096	100
Hydrogen selenide	7783075	10		1
Hydrogen sulfide	7783064	500	U135	100
Hydroperoxide, 1-methyl-1-phenylethyl-	80159		U096	10
Hydroquinone	123319	500/10,000		100
2-Imidazolidinethione	96457		U116	10
Indeno(1,2,3-cd)pyrene	193395		U137	100
Iodomethane	74884		U138	100
Iron, Pentacarbonyl-	13463406	100		1
Isobenzan	297789	100/10,000		1
1,3-Isobenzofurandione	85449		U190	5,000
Isobutyronitrile	78820	1,000		1
Isobutyl alcohol (I,T)	78831		U140	5,000
Isocyanic acid, 3,4-Dichlorophenyl ester	102363	500/10,000		1
Isodrin	465736	100/10,000	P060	1
Isofluorphate	55914	100		100
Isophorone	78591			5,000
Isophorone Diisocyanate	4098719	100		1
Isoprene	78795			100
Isopropanolamine dodecylbenzene sulfonate	42504461			1,000
Isopropyl chloroformate	108236	1,000		1
Isopropylmethylpryrazolyl dimethylcarbamate	119380	500		1
Isosafrole	120581		U141	100
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964		P007	1,000
Kepone	143500		U142	1
Lactonitrile	78977	1,000		1
Lasiocarpine	303344		U143	10
Lead acetate	301042		U144	#
Lead arsenate	7784409			1
	7645252			
	10102484			
Lead, bis(acetato-O)tetrahydroxytri	1335326		U146	10
Lead chloride	7758954			10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Lead fluoborate	13814965			10
Lead fluoride	7783462			10
Lead iodide	10101630			10
Lead nitrate	10099748			10
Lead phosphate	7446277		U145	10
Lead stearate	7428480			10
	1072351			
	52652592			
	56189094			
Lead subacetate	1335326		U146	10
Lead sulfate	15739807			10
	7446142			
Lead sulfide	1314870			10
Lead thiocyanate	592870			10
Leptophos	21609905	500/10,000		1
Lewisite	541253	10		1
Lindane	58899	1,000/10,000	U129	1
Lithium chromate	14307358			10
Lithium hydride	7580678	100		1
Malathion	121755			100
Maleic acid	110167			5,000
Maleic anhydride	108316		U147	5,000
Maleic hydrazide	123331		U148	5,000
Malononitrile	109773	500/10,000	U149	1,000
Manganese, tricarbonyl methylcyclopentadienyl	12108133	100		1
MDI (Methylene diphenyl diisocyanate)	101688			5,000
Mechlorethamine	51752	10		1
MEK (Methyl ethyl ketone)	78933		U159	5,000
Melphalan	148823		U150	1
Mephosfolan	950107	500		1
Mercaptodimethur	2032657			10
Mercuric acetate	1600277	500/10,000		1
Mercuric chloride	7487947	500/10,000		1
Mercuric cyanide	592041			1
Mercuric nitrate	10045940			10
Mercuric oxide	21908532	500/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Mercuric sulfate	7783359			10
Mercuric thiocyanate	592858			10
Mercurous nitrate	10415755			10
	7782867			
Mercury	7439976		U151	1
Mercury (acetate-O)phenyl-	62384		P092	100
Mercury fulminate	628864		P065	10
Methacrolein diacetate	10476956	1,000		1
Methacrylic anhydride	760930	500		1
Methacrylonitrile (I,T)	126987	500	U152	1,000
Methacryloyl chloride	920467	100		1
Methacryloyloxyethyl isocyanate	30674807	100		1
Methamidophos	10265926	100/10,000		1
Methanamine, N-methyl-	124403		U092	1,000
Methanamine, N-methyl-N-nitroso-	62759		P082	10
Methane, bromo-	74839		U029	1,000
Methane, chloro- (I,T)	74873		U045	100
Methane, chloromethoxy-	107302		U046	1
Methane, dibromo-	74953		U068	1,000
Methane, dichloro-	75092		U080	1,000
Methane, dichlorodifluoro-	75718		U075	5,000
Methane, iodo-	74884		U138	100
Methane, isocyanato-	624839		P064	10
Methane, oxybis(chloro-	542881		P016	1
Methanesulfenyl chloride, trichloro-	594423		P118	100
Methanesulfonyl fluoride	558258	1,000		1
Methanesulfonic acid, ethyl ester	62500		U119	1
Methane, tetrachloro-	56235		U211	10
Methane, tetranitro- (R)	509148		P112	10
Methane, tribromo-	75252		U225	100
Methane, trichloro-	67663		U044	10
Methane, trichlorofluoro-	75694		U121	5,000
Methanethiol (I,T)	74931		U153	100
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10, 10-hexa-chloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide	115297		P050	1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
1,3,4-Metheno-2H-cyclobutal[cd]pentalen-2-one,1,1a,3,3a,4,5,5a,5b,6-decachloroctahydro-	143500		U142	1
4,7-Methano-1H-indene, 1,4,5,6,7,8,8 heptachloro-3a,4,7,7a-tetrahydro-	76448		P059	1
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8 octachloro-2,3,3a,4,7,7a-hexahydro-	57749		U036	1
Methanol (I)	67561		U154	5,000
Methapyrilene	91805		U155	5,000
Methidathion	950378	500/10,000		1
Methiocarb	2032657	500/10,000	P199	10
Methomyl	16752775	500/10,000	P066	100
Methoxychlor	72435		U247	1
Methoxyethylmercuric acetate	151382	500/10,000		1
Methyl alcohol (I)	67561		U154	5,000
Methyl aziridine	75558		P067	1
Methyl bromide	74839	1,000	U029	1,000
1-Methylbutadiene (I)	504609		U186	100
Methyl chloride (I,T)	74873		U045	100
Methyl 2-chloroacrylate	80637	500		1
Methyl chlorocarbonate (I,T)	79221		U156	1,000
Methyl chloroform	71556		U226	1,000
Methyl chloroformate	79221	500	U156	1,000
3-Methylcholanthrene	56495		U157	10
4,4'-Methylenebis(2-chloroaniline)	101144		U158	10
Methylene bromide	74953		U068	1,000
Methylene chloride	75092		U080	1,000
4,4'-Methylenedianiline	101779			10
Methylene diphenyl diisocyanate (MDI)	101688			5,000
Methyl ethyl ketone (MEK) (I,T)	78933		U159	5,000
Methyl ethyl ketone peroxide (R,T)	1338234		U160	10
Methyl hydrazine	60344	500	P068	10
Methyl iodide	74884		U138	100
Methyl isobutyl ketone	108101		U161	5,000
Methyl isocyanate	624839	500	P064	10
Methyl isothiocyanate	556616	500		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
2-Methyllactonitrile	75865		P069	10
Methyl mercaptan	74931	500	U153	100
Methyl methacrylate (I,T)	80626		U162	1,000
Methyl parathion	298000		P071	100
Methyl phenkapton	3735237	500		1
Methyl phosphonic dichloride	676971	100		1
4-Methyl-2-pentanone (I)	108101		U161	5,000
Methyl tert-butyl ether	1634044			1,000
Methyl thiocyanate	556649	10,000		1
Methylthiouracil	56042		U164	10
Methyl vinyl ketone	78944	10		1
Methylmercuric dicyanamide	502396	500/10,000		1
Methyltrichlorosilane	75796	500		1
Metolcarb	1129415	100/10,000		1
Mevinphos	7786347	500		10
Mexacarbate	315184	500/10,000		1,000
Mitomycin C	50077	500/10,000	U010	10
MNNG	70257		U163	10
Monocrotophos	6923224	10/10,000		1
Monoethylamine	75047			100
Monomethylamine	74895			100
Muscimol	2763964	500/10,000	P007	1,000
Mustard gas	505602	500		1
Naled	300765			10
5,12-Naphthaacenedione, 8-acetyl-10-[3 amino-2,3,6-tri-deoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-	20830813		U059	10
1-Naphthalenamine	134327		U167	100
2-Naphthalenamine (beta-Naphthylamine)	91598		U168	1
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494031		U026	100
Naphthalene	91203		U165	100
Naphthalene, 2-chloro-	91587		U047	5,000
1,4-Naphthalenedione	130154		U166	5,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
2,7-Naphthalenedisulfonic acid, 3,3' [(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-dryl)-bis(azo)] bis(5-amino-4-hydroxy)-tetrasodium salt	72571		U236	10
Naphthenic acid	1338245			100
1,4-Naphthoquinone	130154		U166	5,000
alpha-Naphthylamine	134327		U167	100
beta-Naphthylamine (2-Naphthalenamine)	91598		U168	1
alpha-Naphthylthiourea	86884		P072	100
Nickel++	7440020			100
Nickel ammonium sulfate	15699180			100
Nickel carbonyl	13463393	1	P073	10
Nickel carbonyl Ni(CO)4, (T-4)-	13463393		P073	10
Nickel chloride	7718549			100
	37211055			
Nickel cyanide	557197		P074	10
Nickel hydroxide	12054487			10
Nickel nitrate	14216752			100
Nickel sulfate	7786814			100
Nicotine & salts	54115	100	P075	100
Nicotine sulfate	65305	100/10,000		1
Nitric acid	7697372	1,000		1,000
Nitric acid, thallium(1+) salt	10102451		U217	100
Nitric oxide	10102439	100	P076	10
p-Nitroaniline	100016		P077	5,000
Nitrobenzene (I,T)	98953	10,000	U169	1,000
4-Nitrobiphenyl	92933			10
Nitrocyclohexane	1122607	500		1
Nitrogen dioxide	10102440	100	P078	10
	10544726			
Nitrogen oxide	10102439		P076	10
Nitroglycerine	55630		P081	10
Nitrophenol (mixed)	25154556			100
m-Nitrophenol	554847			100
o-Nitrophenol (2)	88755			100
p-Nitrophenol (4)	100027		U170	100
2-Nitropropane (I,T)	79469		U171	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.** [3]	**RQ (Pounds)**[4]
N-Nitrosodi-n-butylamine	924163		U172	10
N-Nitrosodiethanolamine	1116547		U173	1
N-Nitrosodiethylamine	55185		U174	1
N-Nitrosodimethylamine	62759	1,000	P082	10
N-Nitrosodiphenylamine	86306			100
N-Nitroso-N-ethylurea	759739		U176	1
N-Nitroso-N-methylurea	684935		U177	1
N-Nitroso-N-methylurethane	615532		U178	1
N-Nitrosomethylvinylamine	4549400		P084	10
N-Nitrosomorpholine	59892			1
N-Nitrosopiperidine	100754		U179	10
N-Nitrosopyrrolidine	930552		U180	1
Nitrotoluene	1321126			1,000
m-Nitrotoluene	99081			
o-Nitrotoluene	88722			
p-Nitrotoluene	99990			
5-Nitro-o-toluidine	99558		U181	100
Norbromide	991424	100/10,000		1
Octamethylpyrophosphoramide	152169		P085	100
Organorhodium complex (PMN-82-147)	0	10/10,000		1
Osmium tetroxide	20816120		P087	1,000
Ouabain	630604	100/10,000		1
7-Oxabicyclo[2,2,1]heptane-2,3-dicarboxylic acid	145733		P088	1,000
Oxamyl	23135220	100/10,000	P194	1
1,2-Oxathiolane, 2,2-dioxide	1120714		U193	10
2H-1,3,2-Oxazaphosphorin-2-amine, N,N bis (2-chloroethyl)tetrahydro-, 2-oxide	50180		U058	10
Oxetane, 3,3-bis(chloromethyl)-	78717	500		1
Oxirane (I,T)	75218		U115	10
Oxiranecarboxyaldehyde	765344		U126	10
Oxirane, (chloromethyl)-	106898		U041	100
Oxydisulfoton	2497076	500		1
Ozone	10028156	100		1
Paraformaldehyde	30525894			1,000
Paraldehyde	123637		U182	1,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Paraquat	1910425	10/10,000		1
Paraquat methosulfate	2074502	10/10,000		1
Parathion	56382	100	P089	10
Parathion-methyl	298000	100/10,000		100
Paris green	12002038	500/10,000		100
PCBs	1336363			
Aroclor 1016	12674112			1
Aroclor 1221	11104282			1
Aroclor 1232	11141165			1
Aroclor 1242	53469219			1
Aroclor 1248	12672296			1
Aroclor 1254	11097691			1
Aroclor 1260	11096825			1
PCNB (Pentachloronitrobenzene)	82688		U185	100
Pentaborane	19624227	500		1
Pentachlorobenzene	608935		U183	10
Pentachloroethane	76017		U184	10
Pentachlorophenol	87865		U242	10
Pentachloronitrobenzene (PCNB)	82688		U185	100
Pentadecylamine	2570265	100/10,000		1
Paracetic acid	79210	500		1
1,3-Pentadiene (I)	504609		U186	100
Perachloroethylene	127184		U210	100
Perchloromethylmercaptan	594423	500		100
Phenacetin	62442		U187	100
Phenanthrene	85018			5,000
Phenol	108952	500/10,000	U188	1,000
Phenol, 2-chloro-	95578		U048	100
Phenol, 4-chloro-3-methyl-	59507		U039	5,000
Phenol, 2-cyclohexyl-4,6-dinitro-	131895		P034	100
Phenol, 2,4-dichloro-	120832		U081	100
Phenol, 2,6-dichloro-	87650		U082	100
Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56531		U089	1
Phenol, 2,4-dimethyl-	105679		U101	100
Phenol, 2,4-dinitro-	51285		P048	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Phenol, methyl-	1319773		U052	1,000
m-Cresol	108394			
o-Cresol	95487			
p-Cresol	106445			
Phenol, 2-methyl-4,6-dinitro-and salts	534521		P047	10
Phenol, 2,2'-methylenebis[3,4,6-trichloro-	70304		U132	100
Phenol, 2,2'-thiobis(4-chloro-6-methyl)-	4418660	100/10,000		1
Phenol, 2-(1-methylpropyl)-4,6-dinitro	88857		P020	1,000
Phenol, 3-(1-methylethyl)-, methylcarbamate	64006	500/10,000		1
Phenol, 4-nitro-	100027		U170	100
Phenol, pentachloro-	87865		U242	10
Phenol, 2,3,4,6-tetrachloro-	58902		U212	10
Phenol, 2,4,5-trichloro-	95954		U230	10
Phenol, 2,4,6-trichloro-	88062		U231	10
Phenol, 2,4,6-trinitro-, ammonium salt	131748		P009	10
Phenoxarsine, 10,10'-oxydi-	58366	500/10,000		1
L-Phenylalanine, 4-[bis(2-chloroethyl)aminol]	148823		U150	1
Phenyl dichloroarsine	696286	500		1
1,10-(1,2-Phenylene)pyrene	193395		U137	100
p-Phenylenediamine	106503			5,000
Phenylhydrazine hydrochloride	59881	1,000/10,000		1
Phenylmercury acetate	62384	500/10,000	P092	100
Phenylsilatrane	2097190	100/10,000		1
Phenylthiourea	103855	100/10,000	P093	100
Phorate	298022	10	P094	10
Phosacetim	4104147	100/10,000		1
Phosfolan	947024	100/10,000		1
Phosgene	75445	10	P095	10
Phosmet	732116	10/10,000		1
Phosphamidon	13171216	100		1
Phosphine	7803512	500		100
Phosphorothioic acid, o,o-Dimethyl-s (2-Methylthio) ethyl ester	2587908	500		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Phosphorothioic acid, methyl-, o-ethyl o-(4-(methylthio)phenyl) ester	2703131	500		1
Phosphorothioic acid, methyl-, s-(2-(bis(1-methylethyl)amino)ethyl o-ethyl ester	50782699	100		1
Phosphorothioic acid, methyl-, 0-(4-nitrophenyl) o-phenyl ester	2665307	500		1
Phosphoric acid	7664382			5,000
Phosphoric acid, diethyl 4-nitrophenyl ester	311455		P041	100
Phosphoric acid, dimethyl 4-(methylthio) phenyl ester	3254635	500		1
Phosphoric acid, lead(2+) salt (2:3)	7446277	500	U145	10
Phosphorodithioic acid, O,O-diethyl S-[2 (ethylthio)ethyl]ester	298044		P039	1
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester	298022		P094	10
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288582		U087	5,000
Phosphorodithoic acid, O,O-dimethyl S-[2(methyl-amino)-2-oxoethyl] ester	60515		P044	10
Phosphorofluondic acid, bis(1-methylethyl) ester	55914		P043	100
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56382		P089	10
Phosphorothioic acid, O,[4-[(dime-thylamino)sulfonyl]phenyl]O,O-dimethyl ester	52857		P097	1,000
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298000		P071	100
Phosphorothioic acid, 0,0-diethyl 0 pyrazinyl ester	297972		P040	100
Phosphorus	7723140	100		1
Phosphorus oxychloride	10025873	500		1,000
Phosphorous pentachloride	10026138	500		1
Phosphorus pentasulfide (R)	1314803		U189	100
Phosphorus pentoxide	1314563	10		1
Phosphorus trichloride	7719122	1,000		1,000
Phthalic anhydride	85449		U190	5,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Physostigmine	57476	100/10,000	P204	1
Phosostigmine, salicylate (1:1)	57647	100/10,000		1
2-Picoline	109068		U191	5,000
Picotoxin	124878	500/10,000		1
Piperidine	110894	1,000		1
Piperidine, 1-nitroso-	100754		U179	10
Pirimifos-ethyl	23505411	1,000		1
Plumbane, tetraethyl-	78002		P110	10
Polychlorinated biphenyls (See PCBs or Aroclor)	1336363			1
Potassium arsenate	7784410			1
Potassium arsenite	10124502	500/10,000		1
Potassium bichromate	7778509			10
Potassium chromate	7789006			10
Potassium cyanide	151508	100	P098	10
Potassium hydroxide	1310583			1,000
Potassium permanganate	7722647			100
Potassium silver cyanide	506616	500	P099	1
Promecarb	2631370	500/10,000		1
Pronamide	23950585		U192	5,000
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116063		P070	1
1-Propanamine (I,T)	107108		U194	5,000
1-Propanamine, N-propyl-	142847		U110	5,000
1-Propanamine, N-nitroso-N-propyl-	621647		U111	10
Propane, 1,2-dibromo-3-chloro	96128		U066	1
Propane, 2-nitro- (I,T)	79469		U171	10
1,3-Propane sultone	1120714		U193	10
Propane 1,2-dichloro-	78875		U083	1,000
Propanedinitrile	109773		U149	1,000
Propanenitrile	107120		P101	10
Propanenitrile, 3-chloro-	542767		P027	1,000
Propanenitrile, 2-hydroxy-2-methyl-	75865		P069	10
Propane, 2,2'-oxybis[2-chloro-	108601		U027	1,000
1,2,3-Propanetnol, trinitrate- (R)	55630		P081	10
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727		U235	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
1-Propanol, 2-methyl- (I,T)	78831		U140	5,000
2-Propanone (I)	67641		U002	5,000
2-Propanone, 1-bromo-	598312		P017	1,000
Propargite	2312358			10
Propargyl alcohol	107197		P102	1,000
Propargyl bromide	106967	10		1
2-Propenal	107028		P003	1
2-Propenamide	79061		U007	5,000
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717		U243	1,000
1-Propene, 1,3-dichloro-	542756		U084	100
2-Propenenitrile	107131		U009	100
2-Propenenitrile, 2-methyl- (I,T)	126987		U152	1,000
2-Propenoic acid (I)	79107		U008	5,000
2-Prepenoic acid, ethyl ester (I)	140885		U113	1,000
2-Prepenoic acid, 2-methyl-, ethyl ester	97632		U118	1,000
2-Prepenoic acid, 2-methyl-, methyl ester (I,T)	80626		U162	1,000
2-Propen-1-o1	107186		P005	100
Propiolactone, beta-	57578	500		1
Propionaldehyde	123386			1,000
Propionic acid	79094			5,000
Propionic acid, 2-(2,4,5-trichlorophenoxyl)-	93721		U233	100
Propionic anhydride	123626			5,000
Propoxor (Baygon)	114261		U411	100
Propionitrile	107120	500		10
Propionitrile, 3-chloro-	542767	1,000		1,000
Propiophenone, 1, 4-amino phenyl	70699	100/10,000		1
n-Propylamine	107108		U194	5,000
Propyl chloroformate	109615	500		1
Propylene dichloride	78875		U083	1,000
Propylene oxide	75569	10,000		100
1,2-Propylenimine	75558	10,000	P067	1
2-Propyn-1-o1	107197		P102	1,000
Prothoate	2275185	100/10,000		1
Pyrene	129000	1,000/10,000		5,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
Pyrethrins	121299			1
	121211			
	8003347			
3,6-Pyridazinedione, 1,2-dihydro-	123331		U148	5,000
4-Pyridinamine	504245		P008	1,000
Pyridine	110861		U196	1,000
Pyridine, 2-methyl-	109068		U191	5,000
Pyridine, 2-methyl-5-vinyl-	140761	500		1
Pyridine, 4-amino-	504245	500/10,000		1,000
Pyridine, 4-nitro-, 1-oxide	1124330	500/10,000		1
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)	54115		P075	100
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	66751		U237	10
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042		U164	10
Pyriminil	53558251	100/10,000		1
Pyrrolidine, 1-nitroso-	930552		U180	1
Quinoline	91225			5,000
Quinone (p-Benzoquinone)	106514		U197	10
Quintobenzene	82688		U185	100
Reserpine	50555		U200	5,000
Resorcinol	108463		U201	5,000
Saccharin and salts	81072		U202	100
Salcomine	14167181	500/10,000		1
Sarin	107448	10		1
Safrole	94597		U203	100
Selenious acid	7783008	1,000/10,000	U204	10
Selenious acid, dithallium (1+) salt	12039520		P114	1,000
Selenium ++	7782492			100
Selenium dioxide	7446084		U204	10
Selenium oxychloride	7791233	500		1
Selenium sulfide (R,T)	7488564		U205	10
Selenourea	630104		P103	1,000
Semicarbazide hydrochloride	563417	1,000/10,000		1
L-Serine, diazoacetate (ester)	115026		U015	1
Silane, (4-aminobutyl)diethoxymethyl-	3037727	1,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Silver ++	7440224			1,000
Silver cyanide	506649		P104	1
Silver nitrate	7761888			1
Silvex (2,4,5-TP)	93721		U233	100
Sodium	7440235			10
Sodium arsenate	7631892	1,000/10,000		1
Sodium arsenite	7784465	500/10,000		1
Sodium azide	26628228	500	P105	1,000
Sodium bichromate	10588019			10
Sodium bifluoride	1333831			100
Sodium bisulfite	7631905			5,000
Sodium cacodylate	124652	100/10,000		1
Sodium chromate	7775113			10
Sodium cyanide	143339	100	P106	10
Sodium dodecylbenzenesulfonate	25155300			1,000
Sodium fluoride	7681494			1,000
Sodium fluoroacetate	62748	10/10,000		10
Sodium hydrosulfide	16721805			5,000
Sodium hydroxide	1310732			1,000
Sodium hypochlorite	7681529			100
	10022705			
Sodium methylate	124414			1,000
Sodium nitrite	7632000			100
Sodium prentachlorophenate	131522	100/10,000		1
Sodium phosphate, dibasic	7558794			5,000
	10039324			
	10140655			
Sodium phosphate, tribasic	7601549			5,000
	7758294			
	7785844			
	10101890			
	10124568			
	10361894			
Sodium selenate	13410010	100/10,000		1
Sodium selenite	10102188	100/10,000		100
	7782823			
Sodium tellurite	10102202	500/10,000		1
Stannane, acetoxytriphenyl	900958	500/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
Streptozotocin	18883664		U206	1
Strontium chromate	7789062			10
Strychnidin-10-one	57249		P108	10
Strychnidin-10-one, 2,3-dimethoxy-	357573		P018	100
Strychnine, & salts	572494	100/10,000	P108	10
Strychnine sulfate	60413	100/10,000		1
Styrene	100425			1,000
Styrene oxide	96093			100
Sulfotep	3689245	500		100
Sulfoxide, 3-chloropropyl octyl	3569571	500		1
Sulfur monochloride	12771083			1,000
Sulfur dioxide	7446095	500		1
Sulfur phosphide (R)	1314803		U189	100
Sulfur tetrafluoride	7783600	100		1
Sulfur trioxide	7446119	100		1
Sulfuric acid	7664939	1,000		1,000
	8014957			
Sulfuric acid, dithallium (1+) salt	7446186		P115	100
	10031591			
Sulfuric acid, dimethyl ester	77781		U103	100
Tabun	77816	10		1
2,4,5-T acid	93765		U232	1,000
2,4,5-T amines	2008460			5,000
	1319728			
	3813147			
	6369966			
	6369977			
Tellurium	13494809	500/10,000		1
Tellurium hexafluoride	7783804	100		1
2,4,5-T esters	93798			1,000
	1928478			
	2545597			
	25168154			
	61792072			
2,4,5-T salts	13560991			1,000
2,4,5-T	93765		U232	1,000
TDE (Dichloro diphenyl dichloroethane)	72548		U060	1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
TEPP (Tetraethyl ester diphosphoric acid)	107493	100		10
Terbufos	13071799	100		1
1,2,4,5-Tetrachlorobenzene	95943		U207	5,000
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746016			1
1,1,1,2-Tetrachloroethane	630206		U208	100
1,1,2,2-Tetrachloroethane	79345		U209	100
Tetrachloroethene	127184		U210	100
Tetrachloroethylene	127184		U210	100
2,3,4,6-Tetrachlorophenol	58902		U212	10
Tetraethyl lead	78002	100	P110	10
Tetraethyl pyrophosphate	107493		P111	10
Tetraethyldithiopyrophosphate	3689245		P109	100
Tetraethyltin	597648	100		1
Tetramethyllead	75741	100		1
Tetrahydrofuran (I)	109999		U213	1,000
Tetranitromethane (R)	509148	500	P112	10
Tetraphosphoric acid, hexaethyl ester	757584		P062	100
Thallic oxide	1314325		P113	100
Thallium ++	7440280			1,000
Thallium acetate	563688		U214	100
Thallium carbonate	6533739		U215	100
Thallium chloride	7791120		U216	100
Thallium nitrate	10102451		U217	100
Thallium oxide	1314325		P113	100
Thallium selenite	12039520		P114	1,000
Thallium sulfate	7446186	100/10,000	P115	100
	10031591			
Thallous carbonate (Thallium (I) carbonate)	6533739	100/10,000	U215	100
Thallous chloride (Thallium (I) chloride)	7791120	100/10,000	U216	100
Thallous malonate (Thallium (I) malonate)	2757188	100/10,000		1
Thallous sulfate (Thallium (I) sulfate)	7446186	100/10,000	P115	100
Thioacetamide	62555		U218	10
Thiocarbazide	2231574	1,000/10,000		1

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Thiodiphosphoric acid, tetraethyl ester	3689245		P109	100
Thiofanox	39196184	100/10,000	P045	100
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541537		P049	100
Thiomethanol (I,T)	74931		U153	100
Thionazin	297972	500		100
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetra-methyl-	137268		U244	10
Thiophenol	108985	500	P104	100
Thiosemicarbazide	79196	100/10,000	P116	100
Thiourea	62566		U219	10
Thiourea, (2-chlorophenyl)-	5344821	100/10,000	P026	100
Thiourea, (2-methylphenyl)-	614788	500/10,000		1
Thiourea, 1-naphthalenyl-	86884		P072	100
Thiourea, phenyl-	103855		P093	100
Thiram	137268		U244	10
Titanium tetrachloride	7550450	100		1,000
Toluene	108883		U220	1,000
Toluenediamine	95807		U221	10
	496720			
	823405			
	25376458			
Toluene diisocyanate (R,T)	584849	500	U223	100
	91087	100		100
	26471625			
o-Toluidine	95534		U328	100
p-Toluidine	106490		U353	100
o-Toluidine hydrochloride	636215		U222	100
Toxaphene	8001352		P123	1
2,4,5-TP acid	93721		U233	100
2,4,5-TP acid esters	32534955			100
1H-1,2,4-Triazol-3-amine	61825		U011	10
Trans-1,4-dichlorobutene	110576	500		1
Triamiphos	1031476	500/10,000		1
Triazofos	24017478	500		1
Trichloroacetyl chloride	76028	500		1
Trichlorfon	52686			100
1,2,4-Trichlorobenzene	120821			100

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.**[1]	**Threshold Planning Quantity (Pounds)**[2]	**USEPA HW No.**[3]	**RQ (Pounds)**[4]
1,1,1-Trichloroethane	71556		U226	1,000
1,1,2-Trichloroethane	79005		U227	100
Trichloroethene	79016		U228	100
Trichloroethylene	79016		U228	100
Trichloroethylsilane	115219	500		1
Trichloronate	327980	500		1
Trichloromethanesulfenyl chloride	594423		P118	100
Trichloromonofluoromethane	75694		U121	5,000
Trichlorophenol	21567822			10
2,3,4-Trichlorophenol	15950660			
2,3,5-Trichlorophenol	933788			
2,3,6-Trichlorophenol	933755			
2,4,5-Trichlorophenol	95954		U230	10
2,4,6-Trichlorophenol	88062		U231	10
3,4,5-Trichlorophenol	609198			
Trichlorophenylsilane	98135	500		1
Trichloro(chloromethyl)silane	1558254	100		1
Trichloro(dichlorophenyl)silane	27137855	500		1
Triethanolamine dodecylbenzene-sulfonate	27323417			1,000
Triethoxysilane	998301	500		1
Trifluralin	1582098			10
Triethylamine	121448			5,000
Trimethylamine	75503			100
Trimethylchlorsilane	75774	1,000		1
2,2,4-Trimethylpentane	540841			1,000
Trimethylolpropane phosphite	824113	100/10,000		1
Trimethyiltin chloride	1066451	500/10,000		1
1,3,5-Trinitrobenzene (R,T)	99354		U234	10
1,3,5-Trioxane, 2,4,6-trimethyl-	123637		U182	1,000
Triphenyltin chloride	639587	500/10,000		1
Tris(2-chloroethyl)amine	555771	100		1
Tris(2,3-dibromopropyl) phosphate	126727		U235	10
Trypan blue	72571		U236	10
Unlisted Hazardous Wastes Characteristic of **Ignitability**	NA		D001	100
Unlisted Hazardous Wastes Characteristic of **Corrosivity**	NA		D002	100

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Unlisted Hazardous Wastes Characteristic of **Reactivity**	NA		D003	100
Unlisted Hazardous Wastes Characteristic of **Toxicity**				

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No.[3]	RQ (Pounds)[4]
Arsenic			D004	1
Barium			D005	1,000
Benzene			D018	10
Cadmium			D006	10
Carbon Tetrachloride			D019	10
Chlordane			D020	1
Chlorobenzene			D021	100
Chloroform			D022	10
Chromium			D007	10
o-Cresol			D023	100
m-Cresol			D024	100
p-Cresol			D025	100
Cresol			D026	100
2,4-D (Dichlorophenoxyacetic acid)			D016	100
1,4-Dichlorobenzene			D027	100
1,2-Dichloroethane			D028	100
1,1-Dichloroethylene			D029	100
2,4-Dinitrotoluene			D030	10
Endrin			D012	1
Heptachlor (and epoxide)			D031	1
Hexachlorobenzene			D032	10
Hexachlorobutadiene			D033	1
Hexachloroethane			D034	100
Lead			D008	10
Lindane			D013	1
Mercury			D009	1
Methoxychlor			D014	1
Methyl ethyl ketone			D035	5,000
Nitrobenzene			D036	1,000
Pentachlorophenol			D037	10
Pyridine			D038	1,000
Selenium			D010	10
Silver			D011	1
Tetrachloroethylene			D039	100
Toxaphene			D015	1
Trichloroethylene			D040	100
2,4,5 Trichlorophenol			D041	10

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	CAS No.[1]	Threshold Planning Quantity (Pounds)[2]	USEPA HW No. [3]	RQ (Pounds)[4]
2,4,5-TP			D017	100
Vinyl chloride			D043	1
Uracil mustard	66751		U237	10
Uranyl acetate	541093			100
Uranyl nitrate	10102064			100
	36478769			
Urea, N-ethyl-N-nitroso	759739		U176	1
Urea, N-methyl-N-nitroso	684935		U177	1
Urethane (Carbamic acid ethyl ester)	51796		U238	100
Valinomycin	2001958	1,000/10,000		1
Vanadic acid, ammonium salt	7803556		P119	1,000
Vanadic oxide V_20_5	1314621		P120	1,000
Vanadic pentoxide	1314621		P120	1,000
Vanadium pentoxide	1314621	100/10,000		1,000
Vanadyl sulfate	27774136			1,000
Vinyl chloride	75014		U043	1
Vinyl acetate	108054			5,000
Vinyl acetate monomer	108054	1,000		5,000
Vinylamine, N-methyl-N-nitroso-	4549400		P084	10
Vinyl bromide	593602			100
Vinylidene chloride	75354		U078	100
Warfarin, & salts, when present at concentrations greater than 0.3%	81812	500/10,000	P001	100
Warfarin sodium	129066	100/10,000		100
Xylene (mixed)	1330207		U239	100
m-Benzene, dimethyl	108383			1,000
o-Benzene, dimethyl	95476			1,000
p-Benzene, dimethyl	106423			100
Xylenol	1300716			1,000
Xylylene dichloride	28347139	100/10,000		1
Yohimban-16-carboxylic acid, 11,17 dimethoxy-18-[(3,4,5-trimethoxy-benzoyl)oxy]-, methyl ester (3-beta, 16-beta,17-alpha,18-beta,20-alpha)-	50555		U200	5,000
Zinc ++	7440666			1,000
Zinc acetate	557346			1,000

Table A1.T4. List of Hazardous Waste/Substances/Materials
(All notes appear at the end of the table.)

Hazardous Waste/Substance/Material	**CAS No.[1]**	**Threshold Planning Quantity (Pounds)[2]**	**USEPA HW No. [3]**	**RQ (Pounds)[4]**
Zinc ammonium chloride	52628258			1,000
	14639975			
	14639986			
Zinc borate	1332076			1,000
Zinc bromide	7699458			1,000
Zinc carbonate	3486359			1,000
Zinc chloride	7646857			1,000
Zinc cyanide	557211		P121	10
Zinc, dichloro(4,4-dimethyl-5((((methyl-amino)carbonyl)oxy)imino)pentaenitrile)-,(t-4)-	58270089	100/10,000		1
Zinc fluoride	7783495			1,000
Zinc formate	557415			1,000
Zinc hydrosulfite	7779864			1,000
Zinc nitrate	7779886			1,000
Zinc phenosulfonate	127822			5,000
Zinc phosphide	1314847	500	P122	100
Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	1314847		P122	100
Zinc silicofluoride	16871719			5,000
Zinc sulfate	7733020			1,000
Zirconium nitrate	13746899			5,000
Zirconium potassium fluoride	16923958			1,000
Zirconium sulfate	14644612			5,000
Zirconium tetrachloride	10026116			5,000

F001			**F001**	**10**
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of 10 percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Trichloroethylene	79016		U228	100
(c) Methylene chloride	75092		U080	1,000
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Carbon tetrachloride	56235		U211	10
(f) Chlorinated fluorocarbons	NA			5,000
F002			**F002**	**10**
The following spent halogenated solvents: all spent solvent mixtures/blends containing, before use, a total of 10 percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127184		U210	100
(b) Methylene chloride	75092		U080	1,000
(c) Trichloroethylene	79016		U228	100
(d) 1,1,1-Trichloroethane	71556		U226	1,000
(e) Chlorobenzene	108907		U037	100
(f) 1,1,2-Trichloro-1,2,2 trifluoroethane	76131			5,000
(g) o-Dischlorobenzene	95501		U070	100
(h) Trichlorofluoromethane	75694		U121	5,000
(i) 1,1,2-Trichloroethane	79005		U227	100
F003			**F003**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Xylene	1330207			1,000
(b) Acetone	67641			5,000
(c) Ethyl acetate	141786			5,000
(d) Ethylbenzene	100414			1,000
(e) Ethyl ether	60297			100
(f) Methyl isobutyl ketone	108101			5,000
(g) n-Butyl alcohol	71363			5,000
(h) Cyclohexanone	108941			5,000
(i) Methanol	67561			5,000
F004			**F004**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319773		U052	100
(b) Nitrobenzene	98953		U169	1,000

F005		**F005**	**100**
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:			
(a) Toluene	108883	U220	1,000
(b) Methyl ethyl ketone	78933	U159	5,000
(c) Carbon disulfide	75150	P022	100
(d) Isobutanol	78831	U140	5,000
(e) Pyndine	110861	U196	1,000
F006		**F006**	**10**
Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.			
F007		**F007**	**10**
Spent cyanide plating bath solutions from electroplating operations.			
F008		**F008**	**10**
Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.			
F009		**F009**	**10**
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.			
F010		**F010**	**10**
Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.			
F011		**F011**	**10**
Spent cyanide solution from salt bath pot cleaning from metal heat treating operations.			
F012		**F012**	**10**
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.			
F019		**F019**	**10**
Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive coating process.			
F020		**F020**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri-or-tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)			
F021		**F021**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives.			

F022	**F022**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.		
F023	**F023**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexa-chlorophene from highly purified, 2,4,5-tri-chlorophenol.)		
F024	**F024**	**1**
Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in Section 261.32.)		
F025	**F025**	**1**
Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.		
F026	**F026**	**1**
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-penta-, or hexachlorobenzene under alkaline conditions.		
F027	**F027**	**1**
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-tri-chlorophenol as the sole component.)		
F028	**K028**	**1**
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Numbers F020, F021, F022, F023, F026, and F027.		
F032	**F032**	**1**
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used clorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.		

F034 Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	**F034**	**1**
F035 Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	**F035**	**1**
F037 Petroleum refinery primary oil/water/solids separation sludge--any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundment; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment unites) and K051 wastes are not included in this listing.	**F037**	**1**
F038 Petroleum refinery secondary (emulsified) oil/water/solids separation sludge--any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from once-through non-contact cooling waters segregated from treatment from other process or oil cooling wastes, sludges and floats generated in aggressive biological treatment units as defined in 261.31(b) (2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.	**F038**	**1**
K001 Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.	**K001**	**1**
K002 Wastewater treatment sludge from the production of chrome yellow and orange pigments.	**K002**	**10**
K003 Wastewater treatment sludge from the production of molyodate orange pigments.	**K003**	**10**
K004 Wastewater treatment sludge from the production of zinc yellow pigments.	**K004**	**10**
K005 Wastewater treatment sludge from the production of chrome green pigments.	**K005**	**10**
K006 Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).	**K006**	**10**

K007 Wastewater treatment sludge from the production of iron blue pigments.	**K007**	**10**
K008 Oven residue from the production of chrome oxide green pigments.	**K008**	**10**
K009 Distillation bottoms from the production of acetaldehyde from ethylene.	**K009**	**10**
K010 Distillation side cuts from the production of acetaldehyde from ethylene.	**K010**	**10**
K011 Bottom stream from the wastewater stripper in the production of acrylonitrile.	**K011**	**10**
K013 Bottom stream from the acetonitrile column in the production of acrylonitrile.	**K013**	**10**
K014 Bottoms from the acetonitrile purification column in the production of acrylonitrile.	**K014**	**5,000**
K015 Still bottoms from the distillation of benzyl chloride.	**K015**	**10**
K016 Heavy ends or distillation residues from the production of carbon tetrachloride.	**K016**	**1**
K017 Heavy ends (still bottoms) from the purification column in the production of epi-chlorohydrin.	**K017**	**10**
K018 Heavy ends from the fractionation column in ethyl chloride production.	**K018**	**1**
K019 Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.	**K019**	**1**
K020 Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.	**K020**	**1**
K021 Aqueous spent antimony catalyst waste from fluoromethanes production.	**K021**	**10**
K022 Distillation bottom tars from the production of phenol/acetone from cumene.	**K022**	**1**
K023 Distillation light ends from the production of ophthalic anhydride from naphthalene.	**K023**	**5,000**
K024 Distillation bottoms from the production of phthalic anhydride from naphthalene.	**K024**	**5,000**
K025 Distillation bottoms from the production of nitrobenzene by the nitration of benzene.	**K025**	**10**
K026 Stripping still tails from the production of methyl ethyl pyridines.	**K026**	**1,000**
K027 Centrifuge and distillation residues from toluene diisocyanate production.	**K027**	**10**
K028 Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.	**K028**	**1**
K029 Waste from the product steam stripper in the production of 1,1,1-trichloroethane.	**K029**	**1**

K030 Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.	**K030**	**1**
K031 By-product salts generated in the production of MSMA and cacodylic acid.	**K031**	**1**
K032 Wastewater treatment sludge from the production of chlordane.	**K032**	**10**
K033 Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.	**K033**	**10**
K034 Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.	**K034**	**10**
K035 Wastewater treatment sludges generated in the production of creosote.	**K035**	**1**
K036 Still bottoms from toluene reclamation distillation in the production of disulfoton.	**K036**	**1**
K037 Wastewater treatment sludges from the production of disulfoton.	**K037**	**1**
K038 Wastewater from the washing and stripping of phorate production.	**K038**	**10**
K039 Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.	**K039**	**10**
K040 Wastewater treatment sludge from the production of phorate.	**K040**	**10**
K041 Wastewater treatment sludge from the production of toxaphene.	**K041**	**1**
K042 Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	**K042**	**10**
K043 2,6-Dichlorophenol waste from the production of 2,4-D.	**K043**	**10**
K044 Wastewater treatment sludges from the manufacturing and processing of explosives.	**K044**	**10**
K045 Spent carbon from the treatment of wastewater containing explosives.	**K045**	**10**
K046 Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.	**K046**	**10**
K047 Pink/red water from TNT operations.	**K047**	**10**
K048 Dissolved air flotation (DAF) float from the petroleum refining industry.	**K048**	**10**
K049 Slop oil emulsion solids from the petroleum refining industry.	**K049**	**10**
K050 Heat exchanger bundle cleaning sludge from the petroleum refining industry.	**K050**	**10**

K051 API separator sludge from the petroleum refining industry.	**K051**	**10**
K052 Tank bottoms (leaded) from the petroleum refining industry.	**K052**	**10**
K060 Ammonia still lime sludge from coking operations.	**K060**	**1**
K061 Emission control dust/sludge from the primary production of steel in electric furnaces.	**K061**	**10**
K062 Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).	**K062**	**10**
K064 Acid plant blowdown slurry/sludge resulting from thickening of blowdown slurry from primary copper production.	**K064**	**10**
K065 Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.	**K065**	**10**
K066 Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.	**K066**	**10**
K069 Emission control dust/sludge from secondary lead smelting.	**K069**	**10**
K071 Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.	**K071**	**1**
K073 Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	**K073**	**10**
K083 Distillation bottoms from aniline extraction.	**K083**	**100**
K084 Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K084**	**1**
K085 Distillation or fractionation column bottoms from the production of chlorobenzenes.	**K085**	**10**
K086 Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.	**K086**	**10**
K087 Decanter tank tar sludge from coking operations.	**K087**	**100**
K088 Spent potliners from primary aluminum reduction.	**K088**	**10**
K090 Emission control dust or sludge from ferrochromiumsilicon production.	**K090**	**10**
K091 Emission control dust or sludge from ferrochromium production.	**K091**	**10**

K093 Distillation light ends from the production of phthalic anhydride from ortho-xylene.	**K093**	**5,000**
K094 Distillation bottoms from the production of phthalic anhydride from ortho-xylene.	**K094**	**5,000**
K095 Distillation bottoms from the production of 1,1,1-trichloroethane.	**K095**	**100**
K096 Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	**K096**	**100**
K097 Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	**K097**	**1**
K098 Untreated process wastewater from the production of toxaphene.	**K098**	**1**
K099 Untreated wastewater from the production of 2,4-D.	**K099**	**10**
K100 Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	**K100**	**10**
K101 Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K101**	**1**
K102 Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	**K102**	**1**
K103 Process residues from aniline extraction from the production of aniline.	**K103**	**100**
K104 Combined wastewater streams generated from nitrobenzene/aniline production.	**K104**	**10**
K105 Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	**K105**	**10**
K106 Wastewater treatment sludge from the mercury cell process in chlorine production.	**K106**	**1**
K107 Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazines.	**K107**	**10**
K108 Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K108**	**10**
K109 Spent filter cartridges from product purification from the production of 1.1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K109**	**10**
K110 Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	**K110**	**10**
K111 Product washwaters from the production of dinitrotoluene via nitration of toluene.	**K111**	**10**

K112 Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K112**	**10**
K113 Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K113**	**10**
K114 Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K114**	**10**
K115 Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	**K115**	**10**
K116 Organic condensate from the solvent recovery column in the production of toluene disocyanate via phosgenation of toluenediamine.	**K116**	**10**
K117 Wastewater from the reaction vent gas scrubber in the production of ethylene bromide via bromination of ethene.	**K117**	**1**
K118 Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide.	**K118**	**1**
K123 Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.	**K123**	**10**
K124 Reactor vent scrubber water from the production of ethylene- bisdithiocarbamic acid and its salts.	**K124**	**10**
K125 Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.	**K125**	**10**
K126 Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylene-bisdithiocarbamic acid and its salts.	**K126**	**10**
K131 Wastewater from the reactor and spent sulfuric acid from the acid dryer in the production of methyl bromide.	**K131**	**100**
K132 Spent absorbent and wastewater solids from the production of methyl bromide.	**K132**	**1,000**
K136 Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	**K136**	**1**
K141 Process residues from the recovery of coal tar, including but not limited to, tar collecting sump residues from the production of coke or coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).	**K141**	**1**
K142 Tar storage tank residues from the production of coke or from the recovery of coke by-products produced from coal.	**K142**	**1**

K143 Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.	**K143**	**1**
K144 Wastewater treatment sludges from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.	**K144**	**1**
K145 Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.	**K145**	**1**
K147 Tar storage tank residues from coal tar refining.	**K147**	**1**
K148 Residues from coal tar distillation, including, but not limited to, still bottoms.	**K148**	**1**
K149 Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.]	**K149**	10
K150 Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	**K150**	10
K151 Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	**K151**	10
K157 Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not include sludges derived from the treatment of these wastewaters.)	**K157**	++
K158 Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes.	**K158**	++
K159 Organics from the treatment of thiocarbamate wastes.	**K159**	++
K160 Solids (including filter wastes, separation solids, and spent catalysts) from the production of thiocarbamates and solids from the treatment of thiocarbamate wastes.	**K160**	++
K161 Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust, and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)	**K161**	++

Notes:

1 Chemical Abstract Service (CAS) Registry Number.

2 USEPA Hazardous Waste Number.

3 Reportable quantity release that requires notification. (See Chapter 18, "Spill Prevention and Response Planning").

4 Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR'. Where: n = 1, 2, or 3; R = alkyl C7 or less; or R = phenyl or alkyl substituted phenyl; R' = H or alkyl C7 or less; or OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.
++ No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches).
+++ The reportable quantity (RQ) for asbestos is limited to friable forms only.
# Indicates that the RQ is subject to change when the assessment of potential carcinogenicity is completed.
The statutory RQ for this hazardous substance may be adjusted in a future rulemaking; until then the statutory RQ applies.
1* Indicates that the 1-pound RQ is a statutory RQ.
** Indicates that no RQ is being assigned to the generic or broad class.
(1+) Indicates that the statutory source for designation of this hazardous substance under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is Clean Water Act (CWA) Section 311(b)(4).
(2+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CWA section 30711(a)(4).
(3+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is CAA section 112.
(4+) Indicates that the statutory source for designation of this hazardous substance under CERCLA is Resource Conservation and Recovery Act, Section 3001.

A2. APPENDIX 2

DETERMINATION OF WORST CASE DISCHARGE PLANNING VOLUME

A2.1. This Appendix provides criteria to determine, on an installation-specific basis, the extent of a worst-case discharge (WCD).

A2.2. This Appendix provides criteria to determine the volume of oil or hazardous substance to be used in planning for a WCD. Installations should calculate both WCD volumes that apply to the installation's design and operation and use the larger volume as the WCD planning volume.

A2.3. For installations transferring oil to and from vessels with tank capacities of 10,500 gallons (250 barrels) or more, the WCD planning volume is calculated as follows:

A2.3.1. Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment; plus

A2.3.2. The discharge from all piping carrying oil between the marine transfer manifold and the valve or manifold adjacent to the POL storage container. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the installation) multiplied by the maximum flow rate expressed in gallons per hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in gallons for the pipe between the marine transfer manifold and the valve or manifold adjacent to the POL storage container.

A2.4. For installations with POL Storage Containers:

A2.4.1. Single POL Storage Container Facilities. For facilities containing only one aboveground oil or hazardous substance storage container, the WCD planning volume equals the capacity of the oil or hazardous substance storage container. If adequate secondary containment (sufficiently large to contain the capacity of the above ground oil or hazardous substance storage container plus sufficient freeboard to allow for precipitation) exists for the oil storage container, multiply the capacity of the container by 0.8.

A2.4.2. Multiple POL Storage Container Facilities

A2.4.2.1. Facilities having no secondary containment. If none of the above ground storage containers at the facility have adequate secondary containment, the worst case planning volume equals the total above ground oil and hazardous substance storage capacity at the facility.

A2.4.2.2. Facilities having complete secondary containment. If every above ground storage container at the facility has adequate secondary containment, the WCD planning volume equals the capacity of the largest single above ground oil or hazardous substance storage container.

A2.4.2.3. Facilities having partial secondary containment. If some, but not all above ground storage containers at the facility have adequate secondary containment, the WCD planning volume equals the sum of:

A2.4.2.3.1. The total capacity of the above ground oil and hazardous substance storage container that lacks adequate secondary containment; plus

A2.4.2.3.2. The capacity of the largest single above ground oil or hazardous substance storage container that has adequate secondary containment.

A2.4.3. For purposes of this Appendix, the term "adequate secondary containment" means an impervious containment system such as a dike, berm, containment curb, drainage system or other device that will prevent the escape of spilled material into the surrounding soil.