Description of document:	Department of Veterans Affairs (VA) Veterans Benefits Administration (VBA) Contract with Alvin Young to Catalogue and Index 5000 Boxes of Records on Agent Orange / Agent Blue Herbicide Usage and reports and indexes provided under the contract 2012-2014
Requested date:	28-August-2020
First release date:	03-September-2020 09-November-2020
Posted date: Update posted date:	14-September-2020 28-June-2021
Source of documents:	Department of Veterans Affairs FOIA Request 810 Vermont Avenue, NW (20M33) VACO Washington, DC 20420 Fax: (202) 273-9386 Email: vhafoia2@va.gov

VA | U.S. Department of Veterans Affairs

September 3, 2020

Via Email:

Re: Final Response Letter 20-09301-F

This letter serves as the final response to your 08/28/2020, Freedom of Information Act (FOIA) request. Within your request, you sought records regarding a copy of the contract file for Contract VA10112C0006, a firm fixed price federal contract award on September 28, 2012 for $599,884 funded by the Veteran's Benefits Administration. I also request a copy of the contract file checklist and any memos included in the contract file.

Upon receiving your request, we conducted a search and located 75 pages responsive to your request. After careful review and consideration, we have determined 62 pages are releasable in full, seven (7) pages are releasable in part pursuant to FOIA Exemptions U.S.C. § 552 (b)(4),(b)(5),(b)(6) and six (6) pages are being withheld in full pursuant to FOIA Exemption U.S.C. § 552 (b)(5), (b)(6).

Exemption 4
Protects trade secrets and commercial or financial information obtained from a person that is privileged or confidential. The courts have held that this subsection protects (a) confidential commercial information, the disclosure of which is likely to cause substantial harm to the competitive position of the person who submitted the information and (b) information that was voluntarily submitted to the government if it is the kind of information that the provider would not customarily make available to the public.

Exemption 5
Protects from disclosure those inter- or intra-agency documents that are normally privileged in the civil discovery context. The three most frequently invoked privileges are the deliberative process privilege, the attorney work-product privilege, and the attorney-client privilege. After carefully reviewing the responsive documents, we determined that portions of the responsive documents qualify for protection under the following privilege(s):

Exemption 6
Exempts from disclosure of personnel or medical files and similar files the release of which would cause a clearly unwarranted invasion of personal privacy. This requires a balancing of the public's right to disclosure against the individual's right to privacy. The privacy interests of the individuals in the records you have requested outweigh any minimal public interest in disclosure

of the information. Any private interest you may have in that information does not factor into the aforementioned balancing test.

If you believe that the information withheld should not be exempt from disclosure, or this response constitutes an adverse determination, you may appeal. By filing an appeal, you preserve your rights under FOIA and give the agency a chance to review and reconsider your request and the agency's decision.

FOIA Mediation

As part of the 2007 FOIA amendments, the Office of Government Information Services (OGIS) was created to offer mediation services to resolve disputes between FOIA requesters and Federal agencies as a non-exclusive alternative to litigation. Using OGIS services does not affect your right to pursue litigation. Under the provisions of the FOIA Improvement Act of 2016 the following contact information is provided to assist FOIA requesters in resolving disputes:

VBA Office FOIA Public Liaison
Name: Angela Davis
Email Address: FOIA.VBACO@va.gov

Office of Government Information Services (OGIS)
Email address: ogis@nara.gov
Fax: 202-741-5769
Mailing address:
National Archives and Records Administration
8601 Adelphi Road
College Park, MD 20740-6001

FOIA Appeal

Please be advised that should you desire to do so; you may appeal the determination made in this response to:

Office of General Counsel (024)
Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420

If you choose to file an appeal, please include a copy of this letter with your written appeal and clearly indicate the basis of your disagreement with the determination set forth in this response. Please be advised that in accordance with VA's implementing FOIA regulations at 38 C.F.R. § 1.559, your appeal must be postmarked no later than ninety (90) days of the date of this letter

Sincerely,

Paula G. Presley 3422255
Digitally signed by Paula G. Presley 3422255
Date: 2020.09.03 12:52:48 -04'00'

Paula Presley
VBA Program Specialist

CONTRACT AWARD

PAGE 1 OF PAGES 75

1. CONTRACT NUMBER	2. EFFECTIVE DATE	3. SOLICITATION NUMBER	4. REQUISITION/PROJECT NUMBER
VA-101-12-C-0056		Unsolicited Proposal	

5. ISSUED BY CODE

The Department of Veterans Affairs
VBA/Office of Acquisition
1800 G Street NW

Washington DC 20006

6. ADMINISTERED BY (If other than Item 5) CODE

The Department of Veterans Affairs
VBA/Office of Acquisition
1800 G Street NW

Washington DC 20006

7. NAME AND ADDRESS OF CONTRACTOR CODE

AL YOUNG CONSULTING, INC

1910 TRANQUILITY RD

CHEYENNE WY 82009-1907

8. PAYMENT WILL BE MADE BY

The Department of Veterans Affairs 00310
Financial Service Center
P.O. Box 149971
P O Box 8079
Austin TX 78714
PHONE 1-877-353-9791 FAX 1-512-460-5542

9A. DUNS NUMBER	9B. TAXPAYER'S IDENTIFICATION NO	10. SUBMIT INVOICES (4 copies unless otherwise specified) TO
(b)(4)	(b)(4)	☐ ITEM 5 ☐ ITEM 6 ☒ ITEM 8 ☐ OTHER (specify)

11. TABLE OF CONTENTS See Attached Table of Contents

(X)	SEC	DESCRIPTION	PAGE(S)	(X)	SEC	DESCRIPTION	PAGE(S)
		PART I - THE SCHEDULE				PART II - CONTRACT CLAUSES	
	A	SOLICITATION/CONTRACT FORM			I	CONTRACT CLAUSES	
	B	SUPPLIES OR SERVICES AND PRICES/COSTS				PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH	
	C	DESCRIPTION/SPECS./WORK STATEMENT			J	LIST OF ATTACHMENTS	
	D	PACKAGING AND MARKING				PART IV - REPRESENTATIONS AND INSTRUCTIONS	
	E	INSPECTION AND ACCEPTANCE			K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
	F	DELIVERIES OR PERFORMANCE			L	INSTRS., CONDS., AND NOTICES TO OFFER	
	G	CONTRACT ADMINISTRATION DATA			M	EVALUATION FACTORS FOR AWARD	
	H	SPECIAL CONTRACT REQUIREMENTS					

12. BRief DESCRIPTION

A L YOUNG CONSULTING,INC. TO PROVIDE R&D AND ENVIRONMENTAL CONSULTING SERVICES TO PRODUCE AN ARCHIVAL DIRECTORY, INDEX OF AGENT ORANGE DOCUMENTS FOR THE VETERANS ADMINISTRATION

SEE SECTION C SOW, YOUR VBA CONTRACTING OFFICER REPRESENTATIVE (COR) IS MR. MICHAEL PHARR AT 202-461-9119

PLEASE CONTACT MR PHARR FOR ALL TECHNICAL QUESTIONS PERTAINING TO THIS CONTRACT.

INVOICE INSTRUCTIONS:
PLEASE SEND ALL INVOICES TO ADDRESS IN BOX 8, ALL INVOICES NEED TO INCLUDE THE (b)(4)

12. TOTAL AMOUNT OF CONTRACT $600,000.00

14. CONTRACTOR'S AGREEMENT. Contractor agrees to furnish and deliver the items or perform services to the extent stated in this document for the consideration stated. The rights and obligations of the parties to this contract shall be subject to and governed by this document and any documents attached or incorporated by reference

15. AWARD. The Government hereby accepts your offer on the solicitation identified in Item 3 above as reflected in this award document. The rights and obligations of the parties to the contract shall be subject to and governed by this document and any documents attached or incorporated by reference

☒ A. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN FOUR COPIES TO THE ISSUING OFFICE (Check if applicable)

B. SIGNATURE OF PERSON AUTHORIZED TO SIGN	A. UNITED STATES OF AMERICA (Signature of Contracting Officer)
Alvin L. Young	Felton Jones
C. NAME OF SIGNER: Alvin L. YOUNG	B. NAME OF CONTRACTING OFFICER: Felton Jones
D. TITLE OF SIGNER: DIRECTOR	C. DATE: 9-28-2012
E. DATE: 28 September 2012	

AUTHORIZED FOR LOCAL REPRODUCTION

OPTIONAL FORM 307 (9-97)
Prescribed by GSA - FAR (48 CFR) 53.215-1(a)

Table of Contents

PART I - THE SCHEDULE

SECTION B - SUPPLIES OR SERVICES AND PRICE/COSTS

B.1 PRICE/COST SCHEDULE

CLIN

(b)(4)

A.L Young Consulting, INC. to provide R&D
and Environmental Consulting Services
to Produce an Archival Directory, Index\
of Agent Orange Documents for the
Veterans Administration.

GRAND TOTAL --- $600,000.00

(b)(4)

SECTION C - DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK

STATEMENT OF WORK

A. GENERAL INFORMATION

1. Title of Project: Archival Directory of Agent Orange Documents

   Scope of Work: The contractor shall provide all resources necessary to accomplish the deliverables described in the statement of work (SOW), except as may otherwise be specified. The scope of work proposes to search for, identify, and catalog all available government documents related to Agent Orange held by the National Archives and Records Administration and other Government Repository Systems. These systems contain all such documents that are available as the result of a 1979 Agent Orange related class action lawsuit court order. In addition to this cataloging effort, the contractor shall gather together relevant documents on specific Agent Orange related topics, geographic locations, or incidents and prepare summary reports, similar to those recently produced for the US 8th Army in Korea.

2. Background: Under current VA environmental exposure policy, when a disability claim based on Agent Orange exposure outside Vietnam or the Korean DMZ is received by a regional office, a description of the exposure is forwarded to the Compensation Service Agent Orange Mailbox. The location and circumstances of exposure are then evaluated based on information provided by DOD and a response is sent back to the regional office regarding whether or not the DOD evidence can support the claimed exposure. If not, then the regional office is instructed to send a request to DOD's Army and Joint Services Records Research Center (JSRRC) for any supporting evidence it can supply. The initial Agent Orange Mailbox review is based primarily on the 2006 *History of the US Department of Defense Programs for the Testing, Evaluation, and Storage of Tactical Herbicides*, The subsequent JSRRC review is conducted based on military unit records, which are non specific Agent Orange related documents.

   Agent Orange has always been a contentious topic, with two main threads of controversy. One relates to potential exposure locations and the other to potential long-term health effects. The issue of potential exposure locations is of primary concern for Compensation Service. A presumption of exposure has already been established for Vietnam Veterans through the *Agent Orange Act of 1991* and recent VA regulations have extended that presumption to certain Veterans with service on the Korean DMZ during the Vietnam era. However, Compensation Service receives a continuous flow of approximately 20 Agent Orange exposure claims per week from Veterans, forwarded by regional offices, based on service in other locations worldwide. The usual Compensation Service response is that there is insufficient evidence to support the claim and this is

generally confirmed by the SRRC response. By conducting this research and when the directory and indexes are available, it will enhance VA's duty to assist by providing a more complete response to these claims, with citations to specific documents for the claimed location. Such authoritative responses may prove more satisfactory to Veteran claimants and their representatives and could reduce the appeal rate. Additionally, if the documents in this directory could be copied, digitalized, and made available electronically to regional offices, Agent Orange related claims might be resolved locally without the need for Compensation Service or JSRRC input and processing timeliness could be improved.

3. Performance Period: The contractor shall complete all tasks and deliverables within the proposed 2-Year, 24 month, period from the date of award. Work at the government site shall not take place on Federal holidays or weekends unless directed by the Contracting Officer (CO).

4. Type of Contract: Firm-Fixed Price.

5. Place of Performance.
At contractor's Office, in addition to the National Archives and Records Administration in Washington, DC and College Park, MD; The Washington National Records Center, Suitland, MD; Archives in Atlanta, GA and Montgomery, AL, and Technical Libraries at Military Installations and other Archive and Record Centers, as needed.

B. CONTRACT AWARD MEETING

The contractor shall not commence performance on the tasks in this SOW until the CO has conducted a kick off meeting or has advised the contractor that a kick off meeting is waived.

C. SPECIFIC MANDATORY TASKS AND ASSOCIATED DELIVERABLES

Description of Tasks and Associated Deliverables: The contractor shall provide the specific tasks and deliverables described below, on **Attachment A: Deliverable Schedule**, and within the performance period stated in Section A.3 of this SOW.

Task One: The contractor shall provide an overarching two –year research project to find, review, catalog, and construct a directory of all available and accessible records related to Agent Orange and other tactical herbicides used by the US military during the Vietnam era. These records will include numerous paper documents held in boxes at various locations such as the National Archives and Records Administration in Washington, DC and College Park, MD; THE Washington National Records Center, Suitland, MD;

Archives in Atlanta, GA and Montgomery, AL, Technical Libraries at Military installations

Deliverable One: An indexed list of documents and their locations by particular Agent Orange related topics.

Task Two: Monthly status reports on the progress of the research that will include: (a) general information on the documents found and (b) specific information on topics of special interest to VBA)

Deliverable Two: Monthly status report due by the first of the month that describes the previous months work.

Task Three: Final reports on geographic locations and issues related to Agent Orange, to be specified by VBA, that will include all documents and empirical data found on the geographic location or issue, copied and provided in electronic format for VBA accessibility and use. These reports will be produced at monthly intervals, but may be updated as new and relevant documents are discovered during the research project. Final reports desired by VBA include, but are not limited to, the geographic locations of: Okinawa; Guam; Panama; Thailand; Johnston Island; Fort Detrick, MD; Gulfport, MS; Eglin Air Force Base, FL, and Fort McClelland, AL. Examples of issues include, but are not limited to, an analysis of: the difference between tactical and commercial herbicides; the persistence or residuals of Agent Orange (dioxin) in the natural environment; the potential for "secondary" or "remote" exposure to Agent Orange (dioxin) based on contact with aircraft or equipment used in Vietnam; and a summary of past studies done by VA, the Department of Defense, or other federal agencies, related to Agent Orange (dioxin) exposure.

Deliverable Three: Electronic drafts of the monthly reports to be delivered by the first of each month, with the understanding that they will be updated as new material is discovered and will be finalized by the end of the contract period.

Task Four: Quarterly Conference Calls with VBA COR, James Sampsel, or an authorized VBA contact regarding research progress. (All VBA POCs will only be authorized by the Contracting Officer). Calls will consist of current research progress that will include: (a) general information on the documents found and (b) specific information on topics of special interest to VBA.

Deliverable Four: Quarterly Conference Calls with VBA COR.

D. CHANGES TO STATEMENT OF WORK

Any changes to this SOW shall be authorized and approved only through written correspondence from the CO. A copy of each change will be kept in a project folder along with all other products of the project. Changes may only be affected by the Contracting Officer in writing.

E. TRAVEL

Travel shall be in accordance with VA/Federal Travel Regulations. Travel must be pre-approved by the COR. Each contractor invoice must include copies of all receipts that support the travel costs claimed in the invoice. Local travel within a 50-mile radius from the contractor's facility is considered the cost of doing business and will not be reimbursed. This includes travel, subsistence, and associated labor charges for travel time. Travel performed for personal convenience and daily travel to and from work at the contractor's facility will not be reimbursed. Travel, subsistence, and associated labor charges for travel time for travel beyond a 50-mile radius of the contractor's facility are authorized on a case-by-case basis and must be pre-approved by the COR.

F. CONTRACTOR EXPERIENCE REQUIREMENTS - KEY PERSONNEL

These skilled experienced professional and/or technical personnel are essential for successful contractor accomplishment of the work to be performed under this contract and subsequent task orders and options. These are defined as key personnel and are those persons whose names were submitted at the start of the contract. The contractor agrees that the key personnel shall not be removed, diverted, or replaced from work without approval of the CO and COR.

Any personnel the contractor offers as substitutes shall have the ability and qualifications equal to or better than the key personnel that are being replaced. Requests to substitute personnel shall be approved by the COR and the CO. All requests for approval of substitutions in personnel shall be submitted to the COR and the CO within 10 calendar days prior to making any change in key personnel. The request shall be written and provide a detailed explanation of the circumstances necessitating the proposed substitution. The contractor shall submit a complete resume for the proposed substitute, any changes to the rate specified in the order (as applicable) and any other information requested by the CO needed to approve or disapprove the proposed substitution. The CO will evaluate such requests and promptly notify the contractor of approval or disapproval thereof in writing.

SECURITY

VA Information and Information System Security/Privacy Requirements

General

All Contractors and Contractor personnel shall be subject to the same Federal security and privacy laws, regulations, standards and VA policies as VA, including the Privacy Act, 5 U.S.C. §552a, and VA personnel, regarding information and information system security. Contractors must follow policies and procedures outlined in VA Directive 6500, Information Security Program; and VA Handbook 6500.6, Contract Security which are available at: http://www1.va.gov/vapubs and its handbooks to ensure appropriate security controls are in place.

Access to VA Information and VA Information Systems

VA will supply the Contractor with the minimum logical (technical) and/or physical access to VA information and VA information systems for employees, sub-contractors: (1) to perform the services specified in the contract, (2) to perform necessary maintenance functions for electronic storage or transmission media necessary for performance of the contract, and (3) for individuals who first satisfy the same conditions, requirements, and restrictions that comparable VA employees must meet to have access to the same type of VA information.

All Contractors and subcontractors working with VA Sensitive Information are subject to the same investigative requirements as those of regular VA appointees or employees who have access to the same types of information. The level of background security investigation will be in accordance with VA Directive 0710, Handbook 0710, which are available at: http://www1.va.gov/vapubs, and VHA Directive 0710 and Implementation Handbook 0710.01, which are available at: http://www1.va.gov/vhapublications/index.cfm . Contractors are responsible for screening their employees. The following are VA's approved policy exceptions for meeting VA background screenings/investigative requirements for certain types of Contractor personnel:

- Contractor personnel not accessing VA information resources, such as personnel hired to maintain the medical facility grounds, construction contracts, utility system contractors, etc.
- Contractor personnel with limited and intermittent access to equipment connected to networks on which no VA sensitive information resides
- Contractor personnel with limited and intermittent access to equipment connected to networks on which limited VA sensitive information resides and with limited and intermittent access to facilities at which they are escorted

VAAR-852.273-75 Security Requirements for Unclassified Information Technology Resources (Interim-October 2008)

The contractor and their personnel shall be subject to the same Federal laws, regulations, standards and VA policies as VA personnel, regarding information and information system security. These include, but are not limited to Federal Information Security Management Act (FISMA), Appendix III of OMB Circular A-130, and guidance and standards, available from the Department of Commerce's National Institute of Standards and Technology (NIST). This also includes the use of common security configurations available from NIST's Web site at: **http://checklists.nist.gov.**

To ensure that appropriate security controls are in place, Contractors must follow the procedures set forth in "*VA Information and Information System Security/Privacy Requirements for IT Contracts*" located at the following Web site: **http://www.iprm.oit.va.gov.**

VA Information Custodial Requirements

VA information provided to the Contractor for either the performance or administration of this contract shall only be used for those purposes. No other use is permitted without the CO's express written authorization. This clause expressly limits the Contractor's rights to use data as described in Rights in Data - General, FAR 52.227-14(d) (1). The Government shall retain the rights to all data and records produced in the execution or administration of this contract.

Prior to termination or completion of this contract, Contractor will not destroy information received from VA or gathered or created by the Contractor in the course of performing this contract without prior written approval by the CO. A Contractor destroying data on VA's behalf must do so accordance with National Archives and Records Administration (NARA) requirements as outlined in VA Directive 6300, Records and Information Management and its Handbook 6300.1 Records Management Procedures, and applicable VA Records Control Schedules. All data and reports shall be transferred to VBA upon contract completion.

The Contractor shall not make copies of VA information, electronic or otherwise, except as necessary to perform the terms of the agreement or to preserve electronic information stored on Contractor electronic storage media for restoration in case any electronic equipment or data used by the Contractor needs to be restored to an operating state.

The Contractor shall not use technologies banned in VA in meeting the requirements of the contract (e.g., Bluetooth-enabled devices).

Physical Security

If the contract requires taking VA data to a contractor site and the data contains Personally Identifiable Information, the contractor will provide an independent physical security assessment of their facility to the COR prior to commencing work. General guidelines for physical security can be found in VA Directive 0730, Section 6 (Physical Security) and VA

Memorandum (subj: IT Oversight & Compliance Information Physical Security Assessments) dated October 24, 2007.

Training

All Contractor and subcontractor personnel requiring access to VA information and VA information systems shall complete the following before being granted access to VA information and networks:

1. Sign and acknowledge understanding of and responsibilities for compliance with the ***National Rules of Behavior*** related to access to VA information and information systems
2. Successfully complete VA Information Security Awareness training and annual refresher training as required
3. Successfully complete VA Privacy Awareness training and annual refresher training as required
4. Successfully complete any additional Information Security or Privacy training as required for VA personnel with equivalent information system access

The Contractor shall provide to the COR a copy of the training certificates for each applicable employee within 1 week of the initiation of the contract and annually thereafter, as required. These online courses are located at **www.tms.va.gov**. To self-enroll, click the "Create New User" button on the red bar and complete the assigned training. The COR will provide the contractor with the appropriate information to complete self-enrollment. Technical issues with TMS should be directed to the TMS help desk at vatmshelp@va.gov or 1.866.496.0463.

Failure to complete this mandatory training within the timeframe required will be grounds for suspension or termination of all physical and/or electronic access privileges and removal from work on the contract until such time as the training is completed.

Contractor Personnel Security

All contract employees who require access to the VA site(s) and/or access to VA local area network (LAN) systems shall be the subject of a background investigation and must receive a favorable adjudication from the VA Security and Investigations Center (SIC). These requirements are applicable to all subcontractor personnel requiring the same level of Background Investigation.

The level of background security investigation will be in accordance with VA Directive 0710 dated September 10, 2004 and is available at http://www1.va.gov/vapubs/viewPublication.asp?Pub_ID=487&FType=2

Background Investigation

The contract employee level of background investigation required for this effort is: ***NACI.***

Contractor Responsibilities

1. The Contractor shall bear the expense of obtaining background investigations or reciprocals of previous investigations held that meet or exceed the required investigation level. **The cost of background investigations is based on the current Office of Personnel Management (OPM) rate at the time the application is processed at OPM.** Fiscal Year 2012 rates are as follows: Low Risk (NACI) **$267**, Moderate Risk (MBI) **$952**, High Risk (BI) **$3,998** or Reciprocals **$27**. VA will pay for investigations or reciprocals processed through the VA SIC and conducted by OPM in advance; however, the Contractor shall reimburse the full cost of background investigations/reciprocals to VA within 30 days of Bill of Collections received from VA. VA shall send up to three plus one final delinquent notice to the Contractor. If the Contractor does not adhere to the Bill of Collections, future invoices may be subject to be offset by VA to recoup background investigation/reciprocal costs.

2. Immediately after contract or task order award, the Contractor must submit the completed **Attachment B** form (VBA Contractor Background Investigation Request Worksheet) to the COR to begin the background investigation process for all contract employees working on the contract, who will have access to VA facilities, VA systems, or privacy data.

3. After the VA inputs the Contractor's information from the Attachment B, the Contractor and Contractor point of contact (POC) will receive an email notification from the SIC identifying the website link that includes detailed instructions regarding completion of the background clearance application process in the Electronic Questionnaires for Investigations Processing (e-QIP) system. E-QIP is an online, Internet accessible system where the contractor employee completes the security questionnaire required to process the background investigation.

4. The Contractor shall prescreen all personnel who require access to VA site(s) and/or access to VA LAN systems to ensure they maintain a U.S. citizenship or Alien Registration that authorizes them to work in the U.S. and are able to read, write, speak and understand the English language.

5. Contractors who have a current favorable background investigation previously conducted by OPM or Defense Security Service (DSS) may be accepted through reciprocation. When a previous clearance is currently held, it does not preclude the vendor from submitting a completed Attachment B form to the COR immediately after contract or task order award for all contract employees who will be working on the contract.

6. Contract performance **shall not** commence before SIC confirmation that it has received the Contractor's investigative documents, that they are complete, and that the investigation information has been released to OPM for scheduling of the background investigation. Once the Contractor's background investigation has been released to OPM for scheduling of the

background investigation or the SIC has confirmed that the verified investigation will be reciprocated, contract performance may commence. The COR will notify and forward the Contractor a copy of the Certificate of Investigation when the background investigation has been favorably completed or a Certificate of Eligibility (Form 4236) if the investigation has been reciprocated. The Contractor, if notified of an unfavorable adjudication by the Government, shall withdraw the employee from consideration from working under the contract. Failure to comply with the Contractor personnel security requirements may result in termination of the contract for default.

7. If the security clearance investigation is not completed prior to the start date of the contract, the contract employee may work on the contract with an "initiated background investigation" status (when received from the SIC) while the security clearance is being processed. However, the Contractor will be responsible for the actions of those contract and subcontract employees they provide to perform work for VA. In the event damage arises from work performed by Contractor personnel, under the auspices of the contract, the Contractor will be responsible for resources necessary to remedy the incident.

8. Should the Contractor use a vendor other than OPM or DSS to conduct investigations, the investigative company must be certified by OPM/DSS to conduct Contractor investigations. The Vendor Cage Code number must be provided to the VA SIC, which will verify the information and conclude whether access to the Government's site(s) and/or VA LAN systems can be granted.

9. The investigative history for Contractor personnel working under this contract must be maintained in the databases of either OPM or the Defense Industrial Security Clearance Organization (DISCO).

Government Responsibilities

1. After the COR has received Attachment B form(s) from the Contractor, the SIC will send an e-mail notification to the Contractor and their POC identifying the website link that includes detailed instructions regarding completion of the background clearance application process and what level of background was requested.

2. Upon receipt of required investigative documents, SIC will review the investigative documents for completion and initiate the background investigation by forwarding the investigative documents to OPM to conduct the background investigation. If the investigative documents are not complete, the SIC will notify the vendor of deficiencies and include corrective instructions.

3. VA will pay for investigations and reciprocals processed through the VA SIC and conducted by OPM in advance, however, the Contractor shall reimburse the full cost of background investigations/reciprocals to VA within 30 days of Bill of Collections from VA. VA shall send up to three plus one final delinquent notice to the Contractor. If the Contractor does not adhere to the Bill of Collections, future invoices may be subject to be offset by VA to recoup background investigation costs and may be considered grounds for default.

4. The COR will notify and forward the Contractor a copy of the Certificate of Investigation when the background investigation has been favorably adjudicated or a Certificate of Eligibility (Form 4236) if the investigation has been reciprocated. The COR will also notify the Contractor of an unfavorable adjudication by the Government.

Information System Design and Development

a. Information systems that are designed or developed for or on behalf of VA at non-VA facilities shall comply with all VA directives developed in accordance with FISMA, HIPAA, NIST, and related VA security and privacy control requirements for Federal information systems. This includes standards for the protection of electronic PHI, outlined in 45 C.F.R. Part 164, Subpart C, information and system security categorization level designations in accordance with FIPS 199 and FIPS 200 with implementation of all baseline security controls commensurate with the FIPS 199 system security categorization (reference Appendix D of VA Handbook 6500, VA Information Security Program). During the development cycle a Privacy Impact Assessment (PIA) must be completed, provided to the COR, and approved by the VA Privacy Service in accordance with Directive 6507, VA Privacy Impact Assessment.

b. The contractor/subcontractor shall certify to the COR that applications are fully functional and operate correctly as intended on systems using the VA Federal Desktop Core Configuration (FDCC), and the common security configuration guidelines provided by NIST or the VA. This includes Internet Explorer 7 configured to operate on Windows XP and Vista (in Protected Mode on Vista) and future versions, as required.

c. The standard installation, operation, maintenance, updating, and patching of software shall not alter the configuration settings from the VA approved and FDCC configuration. Information technology staff must also use the Windows Installer Service for installation to the default "program files" directory and silently install and uninstall.

d. Applications designed for normal end users shall run in the standard user context without elevated system administration privileges.

e. The security controls must be designed, developed, approved by VA, and implemented in accordance with the provisions of VA security system development life cycle as outlined in NIST Special Publication 800-37, Guide for Applying the Risk Management Framework to Federal Information Systems, VA Handbook 6500, Information Security Program and VA Handbook 6500.5, Incorporating Security and Privacy in System Development Lifecycle.

f. The contractor/subcontractor is required to design, develop, or operate a System of Records Notice (SOR) on individuals to accomplish an agency function subject to the Privacy Act of 1974, (as amended), Public Law 93-579, December 31, 1974 (5 U.S.C. 552a) and applicable agency regulations. Violation of the Privacy Act may involve the imposition of criminal and civil penalties.

g. The contractor/subcontractor agrees to:

(1) Comply with the Privacy Act of 1974 (the Act) and the agency rules and regulations issued under the Act in the design, development, or operation of any system of records on individuals to accomplish an agency function when the contract specifically identifies:

(a) The Systems of Records (SOR); and

(b) The design, development, or operation work that the contractor/subcontractor is to perform;

(1) Include the Privacy Act notification contained in this contract in every solicitation and resulting subcontract and in every subcontract awarded without a solicitation, when the work statement in the proposed subcontract requires the redesign, development, or operation of a SOR on individuals that is subject to the Privacy Act; and

(2) Include this Privacy Act clause, including this subparagraph (3), in all subcontracts awarded under this contract which requires the design, development, or operation of such a SOR.

h. In the event of violations of the Act, a civil action may be brought against the agency involved when the violation concerns the design, development, or operation of a SOR on individuals to accomplish an agency function, and criminal penalties may be imposed upon the officers or employees of the agency when the violation concerns the operation of a SOR on individuals to accomplish an agency function. For purposes of the Act, when the contract is for the operation of a SOR on individuals to accomplish an agency function, the contractor/subcontractor is considered to be an employee of the agency.

(1) "Operation of a System of Records" means performance of any of the activities associated with maintaining the SOR, including the collection, use, maintenance, and dissemination of records.

(2) "Record" means any item, collection, or grouping of information about an individual that is maintained by an agency, including, but not limited to, education, financial transactions, medical
history, and criminal or employment history and contains the person's name, or identifying number, symbol, or any other identifying particular assigned to the individual, such as a fingerprint or voiceprint, or a photograph.

(3) "System of Records" means a group of any records under the control of any agency from which information is retrieved by the name of the individual or by some identifying number, symbol, or other identifying particular assigned to the individual.

i. The vendor shall ensure the security of all procured or developed systems and technologies, including their subcomponents (hereinafter referred to as "Systems"), throughout the life of this contract and any extension, warranty, or maintenance periods. This includes, but is not limited to workarounds, patches, hot fixes, upgrades, and any physical components (hereafter referred to as Security Fixes) which may be necessary to fix all security vulnerabilities published or known to the vendor anywhere in the Systems, including Operating Systems and firmware. The vendor shall ensure that Security Fixes shall not negatively impact the Systems.

j. The vendor shall notify VA within 24 hours of the discovery or disclosure of successful exploits of the vulnerability which can compromise the security of the Systems (including the confidentiality or integrity of its data and operations, or the availability of the system). Such issues shall be remediated as quickly as is practical, but in no event longer than 60 days.

k. When the Security Fixes involve installing third party patches (such as Microsoft OS patches or Adobe Acrobat), the vendor will provide written notice to the VA that the patch has been validated as not affecting the Systems within 10 working days. When the vendor is responsible for operations or maintenance of the Systems, they shall apply the Security Fixes within 60 days.

l. All other vulnerabilities shall be remediated as specified in this paragraph in a timely manner based on risk, but within 60 days of discovery or disclosure. Exceptions to this paragraph (e.g. for the convenience of VA) shall only be granted with approval of the contracting officer and the VA Assistant Secretary for Office of Information and Technology.

Information System Hosting, Operation, Maintenance, or Use

a. For information systems that are hosted, operated, maintained, or used on behalf of VA at non-VA facilities, contractors/subcontractors are fully responsible and accountable for ensuring compliance with all HIPAA, Privacy Act, FISMA, NIST, FIPS, and VA security and privacy directives and handbooks. This includes conducting compliant risk assessments, routine vulnerability scanning, system patching and change management procedures, and the completion of an acceptable contingency plan for each system. The contractor's security control procedures must be equivalent, to those procedures used to secure VA systems. A Privacy Impact Assessment (PIA) must also be provided to the COR and approved by VA Privacy Service prior to operational approval. All external Internet connections to VA's network involving VA information must be reviewed and approved by VA prior to implementation.

b. Adequate security controls for collecting, processing, transmitting, and storing of Personally Identifiable Information (PII), as determined by the VA Privacy Service, must be in place, tested, and approved by VA prior to hosting, operation, maintenance, or use of the information system, or systems by or on behalf of VA. These security controls are to be assessed and stated within the PIA and if these controls are determined not to be in place, or inadequate, a Plan of Action and Milestones (POA&M) must be submitted and approved prior to the collection of PII.

c. Outsourcing (contractor facility, contractor equipment or contractor staff) of systems or network operations, telecommunications services, or other managed services requires certification and accreditation (authorization) (C&A) of the contractor's systems in accordance with VA Handbook 6500.3, Certification and Accreditation and/or the VA OCS Certification Program Office. Government-owned (government facility or government equipment) contractor-operated systems, third party or business partner networks require memorandums of understanding and interconnection agreements (MOU-ISA) which detail what data types are

shared, who has access, and the appropriate level of security controls for all systems connected to VA networks.

d. The contractor/subcontractor's system must adhere to all FISMA, FIPS, and NIST standards related to the annual FISMA security controls assessment and review and update the PIA. Any deficiencies noted during this assessment must be provided to the VA contracting officer and the ISO for entry into VA's POA&M management process. The contractor/subcontractor must use VA's POA&M process to document planned remedial actions to address any deficiencies in information security policies, procedures, and practices, and the completion of those activities. Security deficiencies must be corrected within the timeframes approved by the government. Contractor/subcontractor procedures are subject to periodic, unannounced assessments by VA officials, including the VA Office of Inspector General. The physical security aspects associated with contractor/subcontractor activities must also be subject to such assessments. If major changes to the system occur that may affect the privacy or security of the data or the system, the C&A of the system may need to be reviewed, retested and re-authorized per VA Handbook 6500.3. This may require reviewing and updating all of the documentation (PIA, System Security Plan, and Contingency Plan). The Certification Program Office can provide guidance on whether a new C&A would be necessary.

e. The contractor/subcontractor must conduct an annual self assessment on all systems and outsourced services as required. Both hard copy and electronic copies of the assessment must be provided to the COR. The government reserves the right to conduct such an assessment using government personnel or another contractor/subcontractor. The contractor/subcontractor must take appropriate and timely action (this can be specified in the contract) to correct or mitigate any weaknesses discovered during such testing, generally at no additional cost.

f. VA prohibits the installation and use of personally-owned or contractor/subcontractor-owned equipment or software on VA's network. If non-VA owned equipment must be used to fulfill the requirements of a contract, it must be stated in the service agreement, SOW or contract. All of the security controls required for government furnished equipment (GFE) must be utilized in approved other equipment (OE) and must be funded by the owner of the equipment. All remote systems must be equipped with, and use, a VA-approved antivirus (AV) software and a personal (host-based or enclave based) firewall that is configured with a VA-approved configuration. Software must be kept current, including all critical updates and patches. Owners of approved OE are responsible for providing and maintaining the anti-viral software and the firewall on the non-VA owned OE.

g. All electronic storage media used on non-VA leased or non-VA owned IT equipment that is used to store, process, or access VA information must be handled in adherence with VA Handbook 6500.1, Electronic Media Sanitization upon: (i) completion or termination of the contract or (ii) disposal or return of the IT equipment by the contractor/subcontractor or any person acting on behalf of the contractor/subcontractor, whichever is earlier. Media (hard drives, optical disks, CDs, back-up tapes, etc.) used by the contractors/subcontractors that contain VA information must be returned to the VA for sanitization or destruction or the contractor/subcontractor must self-certify that the media has been disposed of per 6500.1 requirements. This must be completed within 30 days of termination of the contract.

h. Bio-Medical devices and other equipment or systems containing media (hard drives, optical disks, etc.) with VA sensitive information must not be returned to the vendor at the end of lease, for trade-in, or other purposes. The options are:

(1) Vendor must accept the system without the drive;

(2) VA's initial medical device purchase includes a spare drive which must be installed in place of the original drive at time of turn-in; or

(3) VA must reimburse the company for media at a reasonable open market replacement cost at time of purchase.

(4) Due to the highly specialized and sometimes proprietary hardware and software associated with medical equipment/systems, if it is not possible for the VA to retain the hard drive, then;

(a) The equipment vendor must have an existing BAA if the device being traded in has sensitive information stored on it and hard drive(s) from the system are being returned physically intact; and

(b) Any fixed hard drive on the device must be non-destructively sanitized to the greatest extent possible without negatively impacting system operation. Selective clearing down to patient data folder level is recommended using VA approved and validated overwriting technologies/methods/tools. Applicable media sanitization specifications need to be pre-approved and described in the purchase order or contract.

(c) A statement needs to be signed by the Director (System Owner) that states that the drive could not be removed and that (a) and (b) controls above are in place and completed. The ISO needs to maintain the documentation.

Security Incident Investigation

a. The term "security incident" means an event that has, or could have, resulted in unauthorized access to, loss or damage to VA assets, or sensitive information, or an action the breaches VA security procedures. The contractor/subcontractor shall immediately notify the COR and simultaneously, the designated ISO and Privacy Officer for the contract of any known or suspected security/privacy incidents, or any unauthorized disclosure of sensitive information, including that contained in system(s) to which the contractor/subcontractor has access.

b. To the extent known by the contractor/subcontractor, the contractor/subcontractor's notice to VA shall identify the information involved, the circumstances surrounding the incident (including to whom, how, when, and where the VA information or assets were placed at risk or compromised), and any other information that the contractor/subcontractor considers relevant.

c. With respect to unsecured protected health information, the business associate is deemed to have discovered a data breach when the business associate knew or should have known of a breach of such information. Upon discovery, the business associate must notify the covered

entity of the breach. Notifications need to be made in accordance with the executed business associate agreement.

d. In instances of theft or break-in or other criminal activity, the contractor/subcontractor must concurrently report the incident to the appropriate law enforcement entity (or entities) of jurisdiction, including the VA OIG and Security and Law Enforcement. The contractor, its employees, and its subcontractors and their employees shall cooperate with VA and any law enforcement authority responsible for the investigation and prosecution of any possible criminal law violation(s) associated with any incident. The contractor/subcontractor shall cooperate with VA in any civil litigation to recover VA information, obtain monetary or other compensation from a third party for damages arising from any incident, or obtain injunctive relief against any third party arising from, or related to, the incident.

Security Controls Compliance Testing

On a periodic basis, VA, including the Office of Inspector General, reserves the right to evaluate any or all of the security controls and privacy practices implemented by the contractor under the clauses contained within the contract. With 10 working-day's notice, at the request of the government, the contractor must fully cooperate and assist in a government-sponsored security controls assessment at each location wherein VA information is processed or stored, or information systems are developed, operated, maintained, or used on behalf of VA, including those initiated by the Office of Inspector General. The government may conduct a security control assessment on shorter notice (to include unannounced assessments) as determined by VA in the event of a security incident or at any other time.

Attachment A

Schedule of Deliverables

Note: Flexibility will be given to adjust this schedule of Deliverables, as necessary, but will be at the Government's discretion and IAW Section D of this SOW:

Deliverable No.	Item	Quantity	Delivery Date
One	A Final Directory with multiple indexed lists of documents and their locations by particular Agent Orange related topics.	1	Due by September 27, 2014.
Two	Monthly status reports.	23	First status report due by November 1, 2012, then submitting on the first of the each month after, until September 1, 2014.

Schedule of Deliverables

Note: Flexibility will be given to adjust this schedule of Deliverables, as necessary, but will be at the Government's discretion and IAW Section D of this SOW:

Three	Electronic drafts of the monthly reports with the understanding that they will be continually updated as new material is discovered to ensure completion and delivery of deliverable One.	23	First electronic draft due by November 1, 2012, then submitting on the first of the each month after, until September 1, 2014.
Four	Quarterly Conference Calls with VBA COR regarding Progress.	7	At least 90 calendar days after award and at least every 90 days thereafter.

Attachment B

VBA Contractor Background Investigation Request Worksheet

The following applicant is a Contract employee.
Please complete the following fields on all applicants who have access to VA facilities, systems or privacy data:

Station where applicant will work:
Station Name – City: _____ State: _____ Station #: _____

Station to be billed for clearance:
Station Name – City: **Washington** State: **DC** Station #: **101**

Please complete the following fields on each Contract Employee:

Applicant Name:
Last: _____ First: _____ Middle: _____
If none (NMN)
SSN: _____ DOB: _____ Email: _____
Place of Birth: City: _____ State: _____ Country: _____
Contractor Occupation: _____

Are you asking for a low risk clearance on a foreign national? Yes: No:

Type of Investigation requested:
BI (High Risk): MBI (Moderate Risk): NACI (Low Risk):
Is this a security upgrade to the contract you are currently working? Yes: No:

VA COR: **Michael Pharr** VA COR Phone: **202-461-9119**
VA COR Email: (b)(6)@va.gov
Complete Address: **810 Vermont Avenue, NW**
City/State: **Washington, DC** Zip Code: **20420**

Prime Contracting Company Name: _____
Prime Contracting Company POC: _____
POC Phone: _____ POC Email: _____
Complete Address: _____
City/State: _____ Zip Code: _____

Contract Title: _____
Task Order/Contract #: _____
Obligation #: _____

If you are a Sub, what is your Company Name? _____

SECTION D - PACKAGING AND MARKING

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SECTION E - INSPECTION AND ACCEPTANCE

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SECTION F - DELIVERIES OR PERFORMANCE

F.1 52.211-11 LIQUIDATED DAMAGES - SUPPLIES, SERVICES, OR RESEARCH AND DEVELOPMENT (SEPT 2000)

(a) If the Contractor fails to deliver the supplies or perform the services within the time specified in this contract, the Contractor shall, in place of actual damages, pay to the Government liquidated damages of $37.50 per calendar day of delay.

(b) If the Government terminates this contract in whole or in part under the Default--Fixed-Price Supply and Service clause, the Contractor is liable for liquidated damages accruing until the Government reasonably obtains delivery or performance of similar supplies or services. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(c) The Contractor will not be charged with liquidated damages when the delay in delivery or performance is beyond the control and without the fault or negligence of the Contractor as defined in the Default--Fixed-Price Supply and Service clause in this contract.

(End of Clause)

F.2 DELIVERY SCHEDULE

SEE SOW: SECTION C.

SECTION G - CONTRACT ADMINISTRATION DATA

a. CONTRACTOR: **A.L. Young Consulting Services, INC**

b. GOVERNMENT: Felton Jones, Contracting Officer
Department of Veterans Affairs
VBA Office of Acquisition
1800 G Street, N.W.
Washington, DC 20006

2. CONTRACTOR REMITTANCE ADDRESS: All payments by the Government to the contractor will be made in accordance with:

[x] 52.232-34, Payment by Electronic Funds Transfer-Other than Central Contractor Registration.

3. CONTRACTOR INVOICING INSTRUCTIONS: Invoices shall be submitted in arrears upon submission of deliverables 2 and 3, on a monthly basis.

a. All invoices must be sent to our Contracting Officer's Representative (COR) for certification:

Contracting Officer's Representative (COR):
Michael Pharr
VBA, Compensation Services
Office: (202) 461-9009
(b)(6) @va.gov

b. Upon receiving the COR's certified copy of your invoice, please mail, via U.S. Postal Service, to the address in block 18a, of the standard form 1449:

Attn: FISCAL Department.
Department of Veterans Affairs
Financial Service Center
P.O. BOX 149971
Austin, TX 78714

A PROPER invoice **MUST** include the following:

1) Name and address of the contractor,
2) Invoice date and number,
3) The **Contract Number**: **VA-101-12-C-0006,**
4) The **IFCAP Purchase Order Number: PO#:** (b)(4)

INVOICES THAT DO NOT COMPLY WITH THESE REQUIREMENTS WILL NOT BE PAID

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 IT CONTRACT SECURITY

SEE SOW: SECTION C.

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1 52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.acquisition.gov/far/index.html
http://www.va.gov/oamm/oa/ars/policyreg/vaar/index.cfm

(End of Clause)

52.202-1	DEFINITIONS	JAN 2012
52.203-3	GRATUITIES	APR 1984
52.203-5	COVENANT AGAINST CONTINGENT FEES	APR 1984
52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT	SEP 2006
52.203-7	ANTI-KICKBACK PROCEDURES	OCT 2010
52.203-8	CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY	JAN 1997
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	JAN 1997
52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	OCT 2010
52.204-4	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER	MAY 2011
52.204-9	PERSONAL IDENTITY VERIFICATION OF CONTRACTOR PERSONNEL	JAN 2011
52.204-10	REPORTING EXECUTIVE COMPENSATION AND FIRST-TIER SUBCONTRACT AWARDS	AUG 2012
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT	DEC 2010
52.209-10	PROHIBITION ON CONTRACTING WITH INVERTED DOMESTIC CORPORATIONS	MAY 2012
52.215-2	AUDIT AND RECORDS--NEGOTIATION	OCT 2010
52.215-8	ORDER OF PRECEDENCE--UNIFORM CONTRACT FORMAT	OCT 1997
52.219-8	UTILIZATION OF SMALL BUSINESS CONCERNS	JAN 2011
52.222-21	PROHIBITION OF SEGREGATED FACILITIES	FEB 1999
52.222-26	EQUAL OPPORTUNITY	MAR 2007

52.222-29	NOTIFICATION OF VISA DENIAL	JUN 2003
52.222-35	EQUAL OPPORTUNITY FOR VETERANS	SEP 2010
52.222-36	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES	OCT 2010
52.222-37	EMPLOYMENT REPORTS ON VETERANS	SEP 2010
52.222-50	COMBATING TRAFFICKING IN PERSONS	FEB 2009
52.222-54	EMPLOYMENT ELIGIBILITY VERIFICATION	JUL 2012
52.223-5	POLLUTION PREVENTION AND RIGHT-TO-KNOW INFORMATION	MAY 2011
52.223-18	ENCOURAGING CONTRACTOR POLICIES TO BAN TEXT MESSAGING WHILE DRIVING	AUG 2011
52.225-13	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES	JUN 2008
52.227-1	AUTHORIZATION AND CONSENT ALTERNATE I (APR 1984)	DEC 2007
52.227-2	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT	DEC 2007
52.227-11	PATENT RIGHTS--OWNERSHIP BY THE CONTRACTOR	DEC 2007
52.228-5	INSURANCE--WORK ON A GOVERNMENT INSTALLATION	JAN 1997
52.232-2	PAYMENTS UNDER FIXED-PRICE RESEARCH AND DEVELOPMENT CONTRACTS	APR 1984
52.232-17	INTEREST	OCT 2010
52.232-23	ASSIGNMENT OF CLAIMS	JAN 1986
52.232-25	PROMPT PAYMENT	OCT 2008
52.233-1	DISPUTES ALTERNATE I (DEC 1991)	JUL 2002
52.233-3	PROTEST AFTER AWARD	AUG 1996
52.233-4	APPLICABLE LAW FOR BREACH OF CONTRACT CLAIM	OCT 2004
52.236-9	PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS	APR 1984
52.236-10	OPERATIONS AND STORAGE AREAS	APR 1984
52.237-2	PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT, AND VEGETATION	APR 1984
52.242-13	BANKRUPTCY	JUL 1995
52.243-1	CHANGES--FIXED PRICE ALTERNATE V (APR 1984)	AUG 1987
52.244-2	SUBCONTRACTS	OCT 2010
52.244-6	SUBCONTRACTS FOR COMMERCIAL ITEMS	DEC 2010
52.246-23	LIMITATION OF LIABILITY	FEB 1997
52.246-25	LIMITATION OF LIABILITY--SERVICES	FEB 1997
52.249-2	TERMINATION FOR CONVENIENCE OF THE GOVERNMENT (FIXED-PRICE)	APR 2012
52.249-9	DEFAULT (FIXED-PRICE RESEARCH AND DEVELOPMENT)	APR 1984
52.253-1	COMPUTER GENERATED FORMS	JAN 1991
852.203-70	COMMERCIAL ADVERTISING	JAN 2008
852.211-74	LIQUIDATED DAMAGES	JAN 2008

I.2 52.219-28 POST-AWARD SMALL BUSINESS PROGRAM REREPRESENTATION (APR 2012)

(a) Definitions. As used in this clause-

Long-term contract means a contract of more than five years in duration, including options. However, the term does not include contracts that exceed five years in duration because the period of performance has been extended for a cumulative period not to exceed six months under the clause at 52.217-8, Option to Extend Services, or other appropriate authority.

Small business concern means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (c) of this clause. Such a concern is "not dominant in its field of operation" when it does not exercise a controlling or major influence on a national basis in a kind of business activity in which a number of business concerns are primarily engaged. In determining whether dominance exists, consideration shall be given to all appropriate factors, including volume of business, number of employees, financial resources, competitive status or position, ownership or control of materials, processes, patents, license agreements, facilities, sales territory, and nature of business activity.

(b) If the Contractor represented that it was a small business concern prior to award of this contract, the Contractor shall rerepresent its size status according to paragraph (e) of this clause or, if applicable, paragraph (g) of this clause, upon the occurrence of any of the following:

(1) Within 30 days after execution of a novation agreement or within 30 days after modification of the contract to include this clause, if the novation agreement was executed prior to inclusion of this clause in the contract.

(2) Within 30 days after a merger or acquisition that does not require a novation or within 30 days after modification of the contract to include this clause, if the merger or acquisition occurred prior to inclusion of this clause in the contract.

(3) For long-term contracts-

(i) Within 60 to 120 days prior to the end of the fifth year of the contract; and

(ii) Within 60 to 120 days prior to the date specified in the contract for exercising any option thereafter.

(c) The Contractor shall rerepresent its size status in accordance with the size standard in effect at the time of this rerepresentation that corresponds to the North American Industry Classification System (NAICS) code assigned to this contract. The small business size standard corresponding to this NAICS code can be found at http://www.sba.gov/content/table-small-business-size-standards.

(d) The small business size standard for a Contractor providing a product which it does not manufacture itself, for a contract other than a construction or service contract, is 500 employees.

(e) Except as provided in paragraph (g) of this clause, the Contractor shall make the rerepresentation required by paragraph (b) of this clause by validating or updating all its representations in the Online Representations and Certifications Application and its data in the Central Contractor Registration, as

necessary, to ensure that they reflect the Contractor's current status. The Contractor shall notify the contracting office in writing within the timeframes specified in paragraph (b) of this clause that the data have been validated or updated, and provide the date of the validation or update.

(f) If the Contractor represented that it was other than a small business concern prior to award of this contract, the Contractor may, but is not required to, take the actions required by paragraphs (e) or (g) of this clause.

(g) If the Contractor does not have representations and certifications in ORCA, or does not have a representation in ORCA for the NAICS code applicable to this contract, the Contractor is required to complete the following rerepresentation and submit it to the contracting office, along with the contract number and the date on which the rerepresentation was completed:

The Contractor represents that it [ ] is, [ ] is not a small business concern under NAICS Code 541620 assigned to contract number VA-101-12-C-0006.

[Contractor to sign and date and insert authorized signer's name and title].

(End of Clause)

I.3 52.222-40 NOTIFICATION OF EMPLOYEE RIGHTS UNDER THE NATIONAL LABOR RELATIONS ACT (DEC 2010)

(a) During the term of this contract, the Contractor shall post an employee notice, of such size and in such form, and containing such content as prescribed by the Secretary of Labor, in conspicuous places in and about its plants and offices where employees covered by the National Labor Relations Act engage in activities relating to the performance of the contract, including all places where notices to employees are customarily posted both physically and electronically, in the languages employees speak, in accordance with 29 CFR 471.2(d) and (f).

(1) Physical posting of the employee notice shall be in conspicuous places in and about the Contractor's plants and offices so that the notice is prominent and readily seen by employees who are covered by the National Labor Relations Act and engage in activities related to the performance of the contract.

(2) If the Contractor customarily posts notices to employees electronically, then the Contractor shall also post the required notice electronically by displaying prominently, on any Web site that is maintained by the Contractor and is customarily used for notices to employees about terms and conditions of employment, a link to the Department of Labor's Web site that contains the full text of the poster. The link to the Department's Web site, as referenced in (b)(3) of this section, must read, "Important Notice about Employee Rights to Organize and Bargain Collectively with Their Employers."

(b) This required employee notice, printed by the Department of Labor, may be-

(1) Obtained from the Division of Interpretations and Standards, Office of Labor-Management Standards, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-5609, Washington, DC 20210, (202) 693-0123, or from any field office of the Office of Labor-Management Standards or Office of Federal Contract Compliance Programs;

(2) Provided by the Federal contracting agency if requested;

(3) Downloaded from the Office of Labor-Management Standards Web site at http://www.dol.gov/olms/regs/compliance/EO13496.htm; or

(4) Reproduced and used as exact duplicate copies of the Department of Labor's official poster.

(c) The required text of the employee notice referred to in this clause is located at Appendix A, Subpart A, 29 CFR Part 471.

(d) The Contractor shall comply with all provisions of the employee notice and related rules, regulations, and orders of the Secretary of Labor.

(e) In the event that the Contractor does not comply with the requirements set forth in paragraphs (a) through (d) of this clause, this contract may be terminated or suspended in whole or in part, and the Contractor may be suspended or debarred in accordance with 29 CFR 471.14 and subpart 9.4. Such other sanctions or remedies may be imposed as are provided by 29 CFR part 471, which implements Executive Order 13496 or as otherwise provided by law.

(f) Subcontracts.

(1) The Contractor shall include the substance of this clause, including this paragraph (f), in every subcontract that exceeds $10,000 and will be performed wholly or partially in the United States, unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to section 3 of Executive Order 13496 of January 30, 2009, so that such provisions will be binding upon each subcontractor.

(2) The Contractor shall not procure supplies or services in a way designed to avoid the applicability of Executive Order 13496 or this clause.

(3) The Contractor shall take such action with respect to any such subcontract as may be directed by the Secretary of Labor as a means of enforcing such provisions, including the imposition of sanctions for noncompliance.

(4) However, if the Contractor becomes involved in litigation with a subcontractor, or is threatened with such involvement, as a result of such direction, the Contractor may request the United States, through the Secretary of Labor, to enter into such litigation to protect the interests of the United States.

(End of Clause)

I.4 VAAR 852.273-76 ELECTRONIC INVOICE SUBMISSION (Interim - October 2008)

(a) To improve the timeliness of payments and lower overall administrative costs, VA strongly encourages contractors to submit invoices using its electronic invoicing system. At present, electronic submission is voluntary and any nominal registration fees will be the responsibility of the contractor. VA intends to mandate electronic invoice submission, subject to completion of the federal rulemaking process. At present, VA is using a 3rd party agent to contact contractors regarding this service. During the voluntary period, contractors interested in registering for the electronic system should contact the VA's Financial Services Center at http://www.fsc.va.gov/einvoice.asp.

I.5 VAAR 852.237-70 CONTRACTOR RESPONSIBILITIES (APR 1984)

The contractor shall obtain all necessary licenses and/or permits required to perform this work. He/she shall take all reasonable precautions necessary to protect persons and property from injury or damage during the performance of this contract. He/she shall be responsible for any injury to himself/herself, his/her employees, as well as for any damage to personal or public property that occurs during the performance of this contract that is caused by his/her employees fault or negligence, and shall maintain personal liability and property damage insurance having coverage for a limit as required by the laws of the State of . Further, it is agreed that any negligence of the Government, its officers, agents, servants and employees, shall not be the responsibility of the contractor hereunder with the regard to any claims, loss, damage, injury, and liability resulting there from.

(End of Clause)

I.6 VAAR 852.270-1 REPRESENTATIVES OF CONTRACTING OFFICERS (JAN 2008)

The contracting officer reserves the right to designate representatives to act for him/her in furnishing technical guidance and advice or generally monitor the work to be performed under this contract. Such designation will be in writing and will define the scope and limitation of the designee's authority. A copy of the designation shall be furnished to the contractor.

(End of Provision)

PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHMENTS

SECTION J - LIST OF ATTACHMENTS

ATTACHMENT NO. NUMBER PAGES	TITLE	DATE

UNSOLICITED PROPOSAL
TO THE
UNDER SECRETARY FOR BENEFITS
UNITED STATES DEPARTMENT OF VETERANS AFFAIRS
WASHINGTON DC 20420
Submitted 27 MARCH 2012
COMPILATION AND DIRECTORY OF AGENT ORANGE MATERIALS IN VARIOUS UNITED STATES NATIONAL ARCHIVES
(Short title: Archival Directory of Agent Orange Documents)

A. L. Young Consulting, Inc.
1810 Tranquility Road, Cheyenne, WY 82009

SITUATION

During 2011, Professor Alvin L. Young and Mr. Kristian L. Young, under a program managed by the Department of Energy's Oak Ridge Institute for Science and Education (ORISE), assisted the United States Eighth Army (EUSA) in Korea in addressing historical and potential environmental issues related to the use of the tactical herbicides "Agent Orange" and "Agent Blue" in Korea in 1968. Although the Department of Veterans Affairs had published a Final Rule (38 CFR Parts 3, 7, and 21) "*Herbicide Exposure and Veterans With Covered Service in Korea*", many questions were being asked by media and the Korean Ministry of the Environment concerning allegations that claimed Agent Orange was also extensively used beyond the Korean Demilitarized Zone (DMZ) and even buried in South Korea. What were missing were answers to the key questions of where did the tactical herbicides come from, how did they arrive in Korea, were they used only on the Korean DMZ, were our military units responsible for spraying the tactical herbicides, and what happened to any excess herbicides or the empty drums? To answer these questions, A.L. Young Consulting, Inc. initiated an exhaustive search of the records in the National Archives, especially the National Archives (NARA) in College Park and the Washington National Records Center (WNRC) in Suitland, Maryland. Our efforts were successful in finding many historical documents

related to the shipping, use, and applications of Agents Orange and Blue for the Korean DMZ. We subsequently prepared the report: "**Historical Review of the 1968 Project to Spray Tactical Herbicides on the Korean DMZ**" (attached). After successfully locating and reproducing the appropriate records for the Eighth Army, it became apparent that there was a critical need:

- To identify the various archives that store Agent Orange related records/documents;
- To identify the series within the archives where relevant documents may be found;
- To compile a list of the boxes holding the documents that house the series;
- To examine the file folders within those boxes, and identify and compile a list of the contents within the folders;
- To develop a directory where specific topics can be rapidly located and documents retrieved; and
- That when the Department of Veterans Affairs is required to make policy decisions as to herbicide exposure and veterans outside Vietnam, it can be assured that the records retained in the National Archives have been thoroughly searched, documented and indexed.

This project is intended to meet the critical need of identifying the various archives that store Agent Orange related records and documents, and to prepare a Directory and Index of those records. We believe that the pertinent records exist because the 1979 litigation against the US Government and the Chemical Companies required that all Agent Orange related records from all military and other governmental agencies be retained. Although the historical records in the archives may belong to the Department of Defense, the Department of Justice, and other Federal agencies, the actual need for these records is with the Under Secretary for Benefits, the Department of Veterans Affairs.

BACKGROUND

Dr. Young was assigned to the Veterans Administration's Agent Orange Office as a military officer from 1981 to 1983, a time when the Department was making key decisions on how this government was going to deal with the issue of Agent Orange and our Vietnam veterans. He was instrumental in assisting the Agency in establishing the **Agent Orange Registry**, the **Agent Orange Review**, and in implementing a research program on the Vietnam veteran. He testified before

Congressional Committees in support of the need for a comprehensive resolution of the Agent Orange Controversy based on the scientific efforts of the Agent Orange Working Group. The Agent Orange Act of 1991was implemented and has required the Department to respond to the millions of veterans who served in Vietnam and their allegations that their health has been impacted by exposure to Agent Orange and other tactical herbicides. However, the list of veterans seeking health care and presumptive compensation has rapidly expanded in the past years. In the last ten years, various countries and the US Department of Veterans Affairs (DVA) have requested information from the US Department of Defense (DoD) on the storage, use, and disposal of Agent Orange as it relates to the potential exposure to it by former military and civilian personnel. The DoD responded by doing a cursory review of records, and publishing in December 2006 "**The History of the US Department of Defense Programs for the Testing, Evaluation, and Storage of Tactical Herbicides**." The publication of that Report resulted in a demand for more information on the identified sites, and it has also initiated new allegations that the Department of Defense failed to document all of the sites where veterans could have been exposed to Agent Orange and other tactical herbicides. That report did document the tests and evaluations of Agent Orange in the United States in the mid 1960s. This has resulted in veterans who never served outside the United States to apply to DVA for benefits.

The allegations now involve veterans who claimed they were exposed to Agent Orange in Canada, Guam, Okinawa, Panama, Thailand, Cambodia, Puerto Rico, the Philippines, and elsewhere in Korea besides the Korean DMZ. In addition, this list now must include the sites in the United States where the US Army Chemical Corps conducted its experimental research on tactical herbicides at nine different military installations including the testing of the spray-equipment used in Vietnam at Eglin Air Force Base, Florida.

Individually, veterans have had to turn to the US Army Joint Services Records Research Center (CURR), but the mission of this Center is to provide documented information to support veterans' involvement in stressful incidents while serving in the US military, e.g., combat "stressor" that might have caused PTSD. The Center does not provide general historical documentation or copies of records for large periods of time without specific incidents. It is also not the mission of CURR to document whether an individual was present at a time or place where Agent Orange was used or stored.

Repeatedly, the DVA has responded to veteran inquiries by stating that the VA does not have access to documents to confirm exposure to Agent Orange or other tactical herbicides. Veterans are told that they must obtain the records on their own from the National Archives and Records Administration in College Park, Maryland, and from other sources. This is an extraordinarily difficult process

because only a small portion of the Agent Orange records can be accessed by veterans; the remaining records are not available to the public because they are located in strictly controlled-access archives.

Need for a Directory

Presently there exist vast amounts of information regarding the tactical herbicide "Agent Orange". Although there are thousands of websites and veteran blogs on the Internet and hundreds of quasi-scientific publications on Agent Orange, much of this information consists of allegations, and historical inaccuracies. When a US government agency or a foreign government is faced with an allegation related to the use, application, removal or storage of Agents Orange, Blue or White they are typically left with contacting the US Department of Defense to determine if the allegation is true or not, and the outcome depends on whether the Department can readily access and provide a timely search of the massive number of documents available (>5,000 boxes) of archival records that the United States Government has archived in the 60 years since the first significant evaluation of tactical herbicides in 1952. Generally, DoD's response has been that it is not aware of any available records to support or deny the allegation because it has not conducted a search of the archival records. Currently, this vast amount of archival material exists at least at seven locations in the United States, and there is no index or directory to assist in finding relevant documents. The failure to provide documentation to confirm or reject the allegation has resulted in the media and public accepting the allegation without confirmation.

Although the Department presumes exposure for Vietnam veterans and US Korean veterans, this is not the case for veterans potentially exposed outside of Vietnam or Korea. For these cases, the Department of Veterans Affairs has been placed in a very difficult position, because without appropriate record identification, the Department has had to rely upon minimal documentation, and often only on the unsubstantiated documentation, to determine the validity of the veteran's claim. Clearly, it would have been beneficial to all parties to have had all the available records related to the allegation or incident.

Thus, there is a critical need for a comprehensive directory comprising of an index of the massive amount of archival material related to Agent Orange and the other tactical herbicides. A searchable and publishable document would provide a cataloging and indexing of the full range of various documents in the seven archival locations all relating to the history of development, use, experimental application, military use, termination, storage, final destruction, and the extensive scientific studies related to Agent Orange and the other tactical herbicides.

The current information about Agent Orange and its history is dispersed over multiple facilities spread across the United States. A searchable and publishable 'Archival Directory of Agent Orange Documents' would assist in reducing time

and human and financial resources spent on answering public, other Departmental (e.g., the Department of State) and Congressional questions related to the history and use of Agent Orange. Currently, a potential researcher is lost when considering where to start looking for an answer involving a reporter's, a citizen's or a veteran's question or allegation. This Directory would also serve as a resource to current and future seekers of information regarding the tactical herbicides and their history.

National Archives Known to Contain Agent Orange Related Records

To achieve the project's goal of developing a Directory, it will require an investigator to travel to and spend significant time in the various facilities that serve as repository to portions of the Agent Orange records. The location of the archives and potential record holdings include:

- The National Archives (NARA) in College Park (Repository for Records of Headquarters USAF/Air Staff) (an estimated 500 boxes);
- The Washington National Records Center (WNRC), Suitland, Maryland (Repository for many primary collections from all agencies, an estimated 2,500 boxes),
- The Air Force Historical Research Agency, Maxwell Air Force Base, Montgomery, Alabama (Repository for Air Force historical records on Operation RANCH HAND, an estimated 1,000 boxes);
- The Wright-Patterson Air Force Base, Office of History, Columbus, Ohio (Repository for historical records on the procurement, maintenance, and disposal of Herbicide Orange, an estimated 100 boxes);
- The National Archives at Atlanta, Georgia (Repository for the research records of the CDC Studies on Agent Orange, and records on the tests and evaluations of the tactical herbicides at Eglin Air Force Base, Florida (an estimated 1,000 boxes).
- The US Army Center of Military History, Fort McNair, Washington, DC (Repository for records related to the Army Chemical Corps use of tactical herbicides; and the use of herbicides by the Army Corps of Engineers, no estimate of number of boxes); and,

- The Vietnam Center, Texas Tech University, Lubbock, Texas (Repository of wide range of records related to Tactical Air Controllers and other military units use of the tactical herbicides, no estimate of number of boxes).

In addition, there are records at the National Agricultural Library, the Technical Libraries at Eglin AFB, Dugway Proving Grounds, Utah, and Fort Detrick, Maryland, the Offices of History at Bolling AFB, DC, and Hickam AFB, Hawaii.

Evaluation of the Records

In providing assistance to the US Eighth Army, Kristian Young spent more than 140 hours conducting a cursory examination of 350 boxes of Agent Orange records at the National Archives in College Park, Maryland, and the Washington National Records Center at Suitland, Maryland. The following "Mock Directory" would be the product that would comprise a Final Directory.

**********MOCKDIRECTORY**********

US National Archives and Records Administration
College Park, MD

Records Group 999
Records of HQ US Air Force (Air Staff)
Office of the Judge Advocate General
General Records Pertaining to Agent Orange Product Liability Litigation

RG No. 999 Stack 111 Row 20 Compartment 35 → Shelf 5 →

Box 1

- II-C Drum Disposal
  - Sampling No.'s of samples at Gulfport Aug 71—Oct.75; Shipment for Research purposes 17 Oct 73; Sampling NCBC 12 Aug 74 (Copied by Vecera); OH Reports by Merrill, 28 June 74, OH Analyses, Tiernan, 21 Jan 74,
- II-D Incineration at Sea (Operation PACER HO/Ocean Contamination
  - Dioxin with Ref." Rowe & Gehring/Midland, MI 48640; "Toxicology of Dioxins" VK Rowe, etc. HHRDC Studies; Studies on Dioxin, Various Analyses of Dioxin Contamination, Various Presentations, Reports, early 70's; Incineration studies by Dow Chemical; Levels Dioxin reported by ARL 1977 (copied by Meffert)
- Non-Vietnam Use of Herbicide
  - Korea, Message from SAAMA authorizing shipment from Port of Saigon to Inchon; Buckner Report on Use of Herbicides Orange and Blue on Korean DMZ.
  - Okinawa, AFPCB Approved Shipment of 2,4,5-T;
  - Thailand, Use of Purple, Pink and Orange on Phan Buri Calibration Grid, 1964.
- II-B-4 EHL Monitoring Johnston Island
  - Abstracts: Degradation TCDD, etc.; Photodecomposition articles in Agricultural Food Chemistry, 1972; and, Insoluble in Water article by Crosby/Wong, 1973

- Analytical Laboratory Studies of NCBC, Gulfport, MS
    - Various Analyses of Dioxin Contamination at NCBC, Various Presentations by OEHL; Trip Reports to NCBC, during 1970s.
    - 2.3 million gallon stock; Correspondence NCBC: problem-solving task force sent because of number of problems; outcome—team replaced. Memo—discrepancy on HO Drum count May—June 1977

The final product would be a full accounting of the items within all files and boxes related to Agent Orange that are obtainable by the primary project researcher and will be amendable as further information is discovered, obtained or made available. The next step in adding to the Directory will be the compilation of key subject areas related to Agent Orange. For example where are the records found for: the test and evaluations of the spray equipment used in Vietnam and the subsequent ecological studies that were conducted at Eglin AFB, Florida by military personnel; Operation RANCH HAND (the spraying of Agent Orange and other tactical herbicides in Southeast Asia); Operation PACER HO (the disposal of Agent Orange); Operation PACER IVY (the re-drumming of Agent Orange prior to shipment from Vietnam to Johnston Island; the destruction of Agent Orange by the *M/T Vulcanus* in 1977, the storage and cleanup of the Naval Construction Battalion Center, Gulfport, Mississippi by military personnel; the storage and cleanup of Johnston Island, Central Pacific Ocean by military personnel; the Test and Evaluations Programs conducted by Fort Detrick; the Use of Tactical Herbicides on the Demilitarized Zone in Korea in 1968; the cleanup of the UC-123s before returning to the United States and the Air Force Reserves; the collection of samples and analytical studies by Wright State University and military personnel; the field studies of Agent Orange conducted in Kansas and in Oregon; the field tests conducted in Puerto Rico, Hawaii, Canada, and Thailand, Records of the Workshops conducted in Vietnam in 2005 and 2007, etc. The efforts to identify the topics and assist in compiling a list of where the appropriate records are located will be the responsibility of Dr. Alvin L. Young, who will provide oversight of the project. Dr. Young will also be providing an overview of the history to ensure that the most complete telling of the Agent Orange story (that is substantiated by the archival records) is detailed in the documents indexed in the archive directory.

REQUIRED EXPERTISE

The Principal Archival Researcher (a former ORISE Post Graduate Researcher), Kristian L. Young, has eleven years of research experience directly related to projects concerning Agent Orange and its history. He has assisted in the primary research and evaluation of information related to the publication of the 2009 book: **The History, Use, Disposition and Environmental Fate of Agent Orange**, by

Dr. Alvin L. Young. He also assisted in the preparation of the Workshops in Vietnam and in Korea. The Principal Researcher holds a BA in Political Science and an MA in International Relations. He has considerable experience in working with the National Archives. From August through October 2011, Kristian Young spent more than 140 hours conducting a cursory examination of 350 boxes of Agent Orange records at the National Archives in College Park, Maryland, and the Washington National Records Center at Suitland, Maryland in the successful search for records related to the use of Agent Orange in Korea.

The efforts to help identify the topics and assist in compiling a list of where the appropriate records are located will be the responsibility of Dr. Alvin L. Young. Dr. Young will provide oversight of the project and will be responsible for preparing the final reports that answer the questions of concern by the various components of the Department of Veterans Affairs.

For more than 40 years, Dr. Young has collected documents, reports, and photographs of the use of Agent Orange and other herbicides used in the Vietnam Conflict. He has published four books and more than 70 peer reviewed publications, editorials and commentaries on the herbicides (and the associated dioxin contaminant) used in Vietnam. In 2006, at the request of the Department of Defense, Dr. Young prepared the report: "**The History of the US Department of Defense Programs for the Testing, Evaluation, and Storage of Tactical Herbicides**." He completed his Ph.D. in Herbicide Physiology and Environmental Toxicology at Kansas State University in 1968. He began his Air Force career as a Project Scientist with the United States Air Force in 1968, evaluating both the dissemination characteristics of the Air Force aircraft and the fate of the herbicides used in South Vietnam. In his 21 years with the Air Force (obtaining the rank of Colonel), he was involved with all phases of the Agent Orange Controversy, from test and evaluation of equipment to environmental fate and health impacts. During his years as associate professor at the United States Air Force Academy (1971-1977), at Colorado Springs, Colorado, he conducted studies on the environmental fate of TCDD including studies on the biodegradation of massive quantities of Agent Orange. From 1977-1983, Dr. Young was affiliated with the Epidemiology Division of the School of Aerospace Medicine, Brooks AFB, Texas, and the Environmental Epidemiology Unit of the Department of Veterans Affairs, Washington, D.C. From 1983 through 1988, Dr. Young was assigned to the Office of Science and Technology Policy (OSTP), Executive Office of the President. He represented OSTP on the President's Domestic Council's Agent Orange Working Group. Following assignments as a Science Advisor to the Secretary of Agriculture and Secretary of Energy, he was Visiting Professor at the University of Oklahoma.

Timetable

The proposed time for completion of the project is 24 months; beginning as soon as funding is available. The Principal Researcher is willing to devote his efforts over the next two years on this project which will require extensive travel in order to examine and record the contents of the Agent Orange related documents primarily in the seven identified archives as well as secondary locations and any others that become known and available during the timetable of the project. In addition, the Principal Researcher will construct a progressive draft directory by adding the information obtained from each archival visit.

(b)(4)

(b)(4)

SOLE SOURCE:

The Project Director, Professor Doctor Alvin L. Young provides a unique service having more than 40 years of experience in various agencies of the United States government (including DVA), and in researching, and publishing on all aspects of the issues associated with Agent Orange. He is recognized as the world's expert on issues associated with Agent Orange, including its use in Vietnam, its environmental and human impact, and its final disposition. His collection of more 5,000 documents on Agent Orange is now a Special Collection at the National Agricultural Library at Bethesda, Maryland. He has served as the Senior Consultant on Agent Orange for the United States Department of Defense.

A.L.YOUNG, CONSULTING, INC. is a veteran-owned company incorporated under Wyoming statutes in 2003. The primary focus of the company is consulting on the topics of Agent Orange, its associated dioxin contaminant, and the development of pesticides for military use. The research and scientific consulting activities are the responsibility of Professor Doctor Alvin L. Young (youngrisk@aol.com). Kristian L. Young, MA, BA is the Principal Researcher and Gaela M. Young (gmarieyng@gmail.com) is the Business Manager and Administrative Specialist for the Company. The Company has provided consultative support to the United Department of Defense, the United States Department of Justice, the United States Army Environmental Center, the United States Army Corps of Engineers, the United States Eighth Army in Korea, The Dow Chemical Company, Monsanto Company, and the United States Soybean Board.

Attached:

Historical Review of the 1968 Project to Spray Tactical Herbicides on the Korean DMZ, 30 November 2011, a report prepared by A. L. Young Consulting, Inc. the for Eighth United States Army, Republic of Korea

Review of Unsolicited Agent Orange Related Proposal from Alvin L. Young

Author's Experience and Proposal

Alvin L. Young is the leading expert on the historical development, testing, and use of Vietnam era tactical herbicide agents, collectively known as "Agent Orange" and currently described at 38 U.S.C. § 1116(f) and 38 CFR § 3.307(a)(6). He worked on tactical herbicide projects as a scientist for the US Air Force during the Vietnam era; holds a PhD in Herbicide Physiology and Environmental Toxicology; has written numerous scientific books and articles on herbicides; has conducted herbicide related research for governmental agencies, including the Department of Veterans Affairs (VA) Environmental Epidemiology Unit in the 1980s; and currently owns a consulting firm specializing in Agent Orange related topics. He is also author of the 2006 *History of the US Department of Defense Programs for the Testing, Evaluation, and Storage of Tactical Herbicides*, which is used by VA's Compensation Service when evaluating the

merits of Veteran's claims for Agent Orange exposure outside Vietnam, which are received from VA regional offices through the Agent Orange Mailbox. It is clear from his background that he is eminently qualified to conduct the proposed activity.

Dr. Young, with assistance from his principal researcher, Kristina L. Young, proposes to search for, identify, and catalog all available government documents related to Agent Orange held by the National Archives and Records Administration and other government repository systems. These systems contain all such documents that are available as the result of a 1979 Agent Orange related class action lawsuit court order. He is requesting payment of $600,000 for a two-year project that will produce an "Agent Orange Directory and Index." He believes this fee is justified based on the fact that these documents consist of at least 100,000 pages, in more than 5,000 boxes, and are stored at multiple locations, including the National Archives at College Park, MD, the Washington National Records Center, Suitland, MD, and the Archives in Atlanta, GA and Montgomery, AL. In addition to this cataloging effort, Dr. Young would gather together relevant documents on specific Agent Orange related topics, geographic locations, or incidents and prepare summary reports, similar to the one he recently produced for the US 8th Army in Korea. He has provided a detailed outline of research and travel expenses justifying his requested fee and a "mock directory" illustrating the index format.

Dr. Young thinks that his proposed Agent Orange Directory and Index would be valuable for VA as a means to assist with resolving individual disability claims based on alleged exposure. It would provide access to all available Agent Orange related documents on a particular geographic location or incident. With such documentary evidence, claims could be resolved with greater assurance that all has been done to assist the Veteran claimant. Dr. Young points out that VA's current procedures for adjudicating these claims relies primarily on incomplete information provided by the Department of Defense (DoD), which, in general, has been obtained from Dr. Young himself. The proposed directory and index would provide the most complete information available. Additionally, Dr. Young thinks the annotated reports he would produce on specific locations or incidents would serve to address unsupported media allegations of Agent Orange use at these locations and government "cover-ups" and serve to limit the public's acceptance of such allegations.

Potential Benefits for VA and Veterans

Under current VA policy, when a disability claim based on Agent Orange exposure outside Vietnam or the Korean DMZ is received by a regional office, a description of the exposure is forwarded to the Compensation Service Agent Orange Mailbox. The location and circumstances of exposure are then evaluated based on information provided by DoD and a response is sent back to the regional office regarding whether or not the DoD evidence can support the claimed exposure. If not, then the regional office is instructed to send a request to DoD's Army and Joint Services Records Research Center (JSRRC) for any supporting evidence it can supply. The initial Agent Orange Mailbox review is based primarily on the 2006 *History of the US Department of Defense Programs for the Testing, Evaluation, and Storage of Tactical Herbicides*, which was produced for DoD by Dr. Young. The subsequent JSRRC review is conducted based on military unit records, which, as Dr. Young points out, are general records, not specific Agent Orange related documents.

Based on this current procedure, the question arises as to whether Dr. Young's proposal would benefit VA and the Veteran community.

Agent Orange has always been a contentious topic, with two main threads of controversy. One relates to potential exposure locations and the other to potential long-term health effects. The issue of potential exposure locations is of primary concern for Compensation Service. A presumption of exposure has already been established for Vietnam Veterans through the Agent Orange Act of 1991 and recent VA

regulations have extended that presumption to certain Veterans with service on the Korean DMZ during the Vietnam era. However, Compensation Service receives a continuous flow of Agent Orange exposure claims from Veterans, forwarded by regional offices, based on service in other locations worldwide. The usual Compensation Service response is that there is insufficient evidence to support the claim and this is generally confirmed by the JSRRC response. If Dr. Young's proposed directory and index were available, it would enhance VA's duty to assist by providing a more complete response to these claims, with citations to specific documents for the claimed location. Such authoritative responses may prove more satisfactory to Veteran claimants and their representatives and could reduce the appeal rate. Additionally, if the documents in this directory could be copied, digitalized, and made available electronically to regional offices, Agent Orange related claims might be resolved locally without the need for Compensation Service or JSRRC input and processing timeliness could be improved.

Mr. Young has also proposed to collect documents on specific geographic locations and produce annotated reports on the use or non-use of Agent Orange at those locations. Compensation Service receives numerous claims of exposure from a range of locations worldwide. Specific reports on such areas could supplement the responses to individual Veteran claimants. More importantly, these reports could be used to counter unsubstantiated news media and Internet stories of Agent Orange "cover-ups." Over the past year, Compensation Service has been approached by representatives of the governments of Korea and Japan because of their concern over media stories of Agent Orange use in Korea outside the DMZ and on the Japanese island of Okinawa. These stories have alleged US government cover-ups of Agent Orange use based on accusations from Veterans who served in these locations and from media disclosures of VA disability decisions granting service connection for Agent Orange exposure at these locations. A thoroughly researched and annotated report on such locations could be extremely useful to counter media stories with documented factual information. These reports could be made available to concerned foreign governments as well as those in the Veteran community willing to accept documentary evidence over anecdotal accusations.

Along with his proposal, Dr. Young has provided an example of the type of location or area report he would produce for VA. His example is a recent report for the US 8th Army in Korea, produced as a means to address allegations by Veterans who served in Korea during 1978 that they buried numerous drums of Agent Orange at Camp Carroll. This base was not on the Korean DMZ and, therefore, the allegations resulted in much attention from the Korean news media and much concern among the people of Korea. Along with no residual chemical evidence of Agent Orange at this site, Dr. Young's thorough report provided evidence from herbicide supply manifests, herbicide use directives, after action reports, and other documents, that Agent Orange use in Korea was strictly limited to the DMZ and only applied during 1968. Reports of this type would be valuable for numerous foreign and domestic locations such as Guam, Okinawa, the Philippines, Panama, Puerto Rico, Hawaii, Johnston Island, Eglin AFB, Edgewood Arsenal, Fort Detrick, etc., where exposure to Agent Orange is alleged by many Veterans. Additionally, Mr. Young's reviews and scientific experience would be valuable for other incidents of claimed Agent Orange exposure that VA must address. This would include the recent claims of "secondary" or "remote" exposure from Veterans who flew stateside aboard C-123 aircraft that were formerly used to spray Agent Orange in Vietnam during Operation Ranch Hand. The issue here is the exposure bioavailability for humans of Agent Orange residue that is remote in time and place from its original use. Dr. Young's knowledge of, and contribution to, relevant scientific investigations could assist with developing a sound VA policy on this issue.

In summary, Dr. Young's proposal has the potential to assist VA with the resolution of many Agent Orange related issues. These issues are of great concern to the Veteran community, especially to Veterans of the Vietnam era. He is an acknowledged scientific leader in the field, which implies neutrality and expertise that would lend credibility to his work and to any VA policies that evolve from it. He has the ability to consolidate all available documents on Agent Orange into a single database for use

by VA. Details of the project would need to be worked out and the reasonableness of his fee considered. However, if not done now by Dr. Young, then when and by whom?

(b)(5); (b)(6)

PART IV - REPRESENTATIONS AND INSTRUCTIONS

SECTION K - REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS

See attached document SAM CCR.

K.1 52.252-1 SOLICITATION PROVISIONS INCORPORATED BY REFERENCE (FEB 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

http://www.acquisition.gov/far/index.html
http://www.va.gov/oamm/oa/ars/policyreg/vaar/index.cfm

(End of Provision)

FAR NUMBER	TITLE	DATE
52.203-11	CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	SEP 2007
52.222-38	COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS	SEP 2010
52.225-25	PROHIBITION ON CONTRACTING WITH ENTITIES ENGAGING IN SANCTIONED ACTIVITIES RELATING TO IRAN--REPRESENTATION AND CERTIFICATION	NOV 2011

K.2 52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (MAY 2012)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is 541620.

(2) The small business size standard is .

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b)(1) If the clause at 52.204-7, Central Contractor Registration, is included in this solicitation, paragraph (d) of this provision applies.

(2) If the clause at 52.204-7 is not included in this solicitation, and the offeror is currently registered in CCR, and has completed the ORCA electronically, the offeror may choose to use paragraph (d) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The offeror shall indicate which option applies by checking one of the following boxes:

[X] (i) Paragraph (d) applies.
[ ] (ii) Paragraph (d) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(c)(1) The following representations or certifications in ORCA are applicable to this solicitation as indicated:

(i) 52.203-2, Certificate of Independent Price Determination. This provision applies to solicitations when a firm-fixed-price contract or fixed-price contract with economic price adjustment is contemplated, unless--

(A) The acquisition is to be made under the simplified acquisition procedures in Part 13;

(B) The solicitation is a request for technical proposals under two-step sealed bidding procedures; or

(C) The solicitation is for utility services for which rates are set by law or regulation.

(ii) 52.203-11, Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions. This provision applies to solicitations expected to exceed $150,000.

(iii) 52.204-3, Taxpayer Identification. This provision applies to solicitations that do not include the clause at 52.204-7, Central Contractor Registration.

(iv) 52.204-5, Women-Owned Business (Other Than Small Business). This provision applies to solicitations that--

(A) Are not set aside for small business concerns;

(B) Exceed the simplified acquisition threshold; and

(C) Are for contracts that will be performed in the United States or its outlying areas.

(v) 52.209-2, Prohibition on Contracting with Inverted Domestic Corporations--Representation. This provision applies to solicitations using funds appropriated in fiscal years 2008, 2009, 2010, or 2012.

(vi) 52.209-5, Certification Regarding Responsibility Matters. This provision applies to solicitations where the contract value is expected to exceed the simplified acquisition threshold.

(vii) 52.214-14, Place of Performance--Sealed Bidding. This provision applies to invitations for bids except those in which the place of performance is specified by the Government.

(viii) 52.215-6, Place of Performance. This provision applies to solicitations unless the place of performance is specified by the Government.

(ix) 52.219-1, Small Business Program Representations (Basic & Alternate I). This provision applies to solicitations when the contract will be performed in the United States or its outlying areas.

(A) The basic provision applies when the solicitations are issued by other than DoD, NASA, and the Coast Guard.

(B) The provision with its Alternate I applies to solicitations issued by DoD, NASA, or the Coast Guard.

(x) 52.219-2, Equal Low Bids. This provision applies to solicitations when contracting by sealed bidding and the contract will be performed in the United States or its outlying areas.

(xi) 52.222-22, Previous Contracts and Compliance Reports. This provision applies to solicitations that include the clause at 52.222-26, Equal Opportunity.

(xii) 52.222-25, Affirmative Action Compliance. This provision applies to solicitations, other than those for construction, when the solicitation includes the clause at 52.222-26, Equal Opportunity.

(xiii) 52.222-38, Compliance with Veterans' Employment Reporting Requirements. This provision applies to solicitations when it is anticipated the contract award will exceed the simplified acquisition threshold and the contract is not for acquisition of commercial items.

(xiv) 52.223-1, Biobased Product Certification. This provision applies to solicitations that require the delivery or specify the use of USDA-designated items; or include the clause at 52.223-2, Affirmative Procurement of Biobased Products Under Service and Construction Contracts.

(xv) 52.223-4, Recovered Material Certification. This provision applies to solicitations that are for, or specify the use of, EPA-designated items.

(xvi) 52.225-2, Buy American Act Certificate. This provision applies to solicitations containing the clause at 52.225-1.

(xvii) 52.225-4, Buy American Act--Free Trade Agreements--Israeli Trade Act Certificate. (Basic, Alternates I, II, and III.) This provision applies to solicitations containing the clause at 52.225-3.

(A) If the acquisition value is less than $25,000, the basic provision applies.

(B) If the acquisition value is $25,000 or more but is less than $50,000, the provision with its Alternate I applies.

(C) If the acquisition value is $50,000 or more but is less than $77,494, the provision with its Alternate II applies.

(D) If the acquisition value is $77,494 or more but is less than $100,000, the provision with its Alternate III applies.

(xviii) 52.225-6, Trade Agreements Certificate. This provision applies to solicitations containing the clause at 52.225-5.

(xix) 52.225-20, Prohibition on Conducting Restricted Business Operations in Sudan--Certification. This provision applies to all solicitations.

(xx) 52.225-25, Prohibition on Contracting with Entities Engaging in Sanctioned Activities Relating to Iran--Representation and Certification. This provision applies to all solicitations.

(xxi) 52.226-2, Historically Black College or University and Minority Institution Representation. This provision applies to--

(A) Solicitations for research, studies, supplies, or services of the type normally acquired from higher educational institutions; and

(B) For DoD, NASA, and Coast Guard acquisitions, solicitations that contain the clause at 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns.

(2) The following certifications are applicable as indicated by the Contracting Officer:

[](i) 52.219-22, Small Disadvantaged Business Status.

[](A) Basic.

[](B) Alternate I.

[](ii) 52.222-18, Certification Regarding Knowledge of Child Labor for Listed End Products.

[](iii) 52.222-48, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment Certification.

[](iv) 52.222-52 Exemption from Application of the Service Contract Act to Contracts for Certain Services--Certification.

[](v) 52.223-9, with its Alternate I, Estimate of Percentage of Recovered Material Content for EPA-Designated Products (Alternate I only).

[](vi) 52.227-6, Royalty Information.

[](A) Basic.

[](B) Alternate I.

[](vii) 52.227-15, Representation of Limited Rights Data and Restricted Computer Software.

(d) The offeror has completed the annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website accessed through https://www.acquisition.gov. After reviewing the ORCA database information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in paragraph (c) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified

(End of Provision)

K.3 52.209-5 CERTIFICATION REGARDING RESPONSIBILITY MATTERS (APR 2010)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that -

(i) The Offeror and/or any of its Principals -

(A) Are [] are not [X] presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have [ ] have not [X], within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) contract or subcontract; violation of Federal or State antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property (if offeror checks "have," the offeror shall also see 52.209-7, if included in this solicitation);

(C) Are [ ] are not [X] presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in subdivision (a)(1)(i)(B) of this provision; and

(D) Have [ ], have not [X], within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds $3,000 for which the liability remains unsatisfied.

(1) Federal taxes are considered delinquent if both of the following criteria apply:

(i) The tax liability is finally determined. The liability is finally determined if it has been assessed. A liability is not finally determined if there is a pending administrative or judicial challenge. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(ii) The taxpayer is delinquent in making payment. A taxpayer is delinquent if the taxpayer has failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(2) Examples.

(i) The taxpayer has received a statutory notice of deficiency, under I.R.C. Sec. 6212, which entitles the taxpayer to seek Tax Court review of a proposed tax deficiency. This is not a delinquent tax because it is not a final tax liability. Should the taxpayer seek Tax Court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(ii) The IRS has filed a notice of Federal tax lien with respect to an assessed tax liability, and the taxpayer has been issued a notice under I.R.C. Sec. 6320 entitling the taxpayer to request a hearing with the IRS Office of Appeals contesting the lien filing, and to further appeal to the Tax Court if the IRS determines to sustain the lien filing. In the course of the hearing, the taxpayer is entitled to contest the underlying tax liability because the taxpayer has had no prior opportunity to contest the liability. This is

not a delinquent tax because it is not a final tax liability. Should the taxpayer seek tax court review, this will not be a final tax liability until the taxpayer has exercised all judicial appeal rights.

(iii) The taxpayer has entered into an installment agreement pursuant to I.R.C. Sec. 6159. The taxpayer is making timely payments and is in full compliance with the agreement terms. The taxpayer is not delinquent because the taxpayer is not currently required to make full payment.

(iv) The taxpayer has filed for bankruptcy protection. The taxpayer is not delinquent because enforced collection action is stayed under 11 U.S.C. 362 (the Bankruptcy Code).

(ii) The Offeror has [ ] has not [X], within a 3-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) Principal, for the purposes of this certification, means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a division or business segment; and similar positions).

THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER SECTION 1001, TITLE 18, UNITED STATES CODE.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of Provision)

K.4 52.209-7 INFORMATION REGARDING RESPONSIBILITY MATTERS (FEB 2012)

(a) Definitions. As used in this provision--

"Administrative proceeding" means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative Proceedings, Civilian Board of Contract Appeals Proceedings, and Armed Services Board of Contract

Appeals Proceedings). This includes administrative proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include agency actions such as contract audits, site visits, corrective plans, or inspection of deliverables.

"Federal contracts and grants with total value greater than $10,000,000" means--

(1) The total value of all current, active contracts and grants, including all priced options; and

(2) The total value of all current, active orders including all priced options under indefinite-delivery, indefinite-quantity, 8(a), or requirements contracts (including task and delivery and multiple-award Schedules).

"Principal" means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a division or business segment; and similar positions).

(b) The offeror [ ] has [ ] does not have current active Federal contracts and grants with total value greater than $10,000,000.

(c) If the offeror checked "has" in paragraph (b) of this provision, the offeror represents, by submission of this offer, that the information it has entered in the Federal Awardee Performance and Integrity Information System (FAPIIS) is current, accurate, and complete as of the date of submission of this offer with regard to the following information:

(1) Whether the offeror, and/or any of its principals, has or has not, within the last five years, in connection with the award to or performance by the offeror of a Federal contract or grant, been the subject of a proceeding, at the Federal or State level that resulted in any of the following dispositions:

(i) In a criminal proceeding, a conviction.

(ii) In a civil proceeding, a finding of fault and liability that results in the payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more.

(iii) In an administrative proceeding, a finding of fault and liability that results in--

(A) The payment of a monetary fine or penalty of $5,000 or more; or

(B) The payment of a reimbursement, restitution, or damages in excess of $100,000.

(iv) In a criminal, civil, or administrative proceeding, a disposition of the matter by consent or compromise with an acknowledgment of fault by the Contractor if the proceeding could have led to any of the outcomes specified in paragraphs (c)(1)(i), (c)(1)(ii), or (c)(1)(iii) of this provision.

(2) If the offeror has been involved in the last five years in any of the occurrences listed in (c)(1) of this provision, whether the offeror has provided the requested information with regard to each occurrence.

(d) The offeror shall post the information in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision in FAPIIS as required through maintaining an active registration in the Central Contractor Registration database via https://www.acquisition.gov (see 52.204-7).

(End of Provision)

K.5 52.219-1 SMALL BUSINESS PROGRAM REPRESENTATIONS (APR 2012)

(a)(1) The North American Industry Classification System (NAICS) code for this acquisition is--
541620.

(2) The small business size standard is .

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations.

(1) The offeror represents as part of its offer that it [X] is, [ ] is not a small business concern.

(2) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, for general statistical purposes, that it [ ] is, [X] is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents as part of its offer that it [ ] is, [X] is not a women-owned small business concern.

(4) Women-owned small business (WOSB) concern eligible under the WOSB Program. [Complete only if the offeror represented itself as a women-owned small business concern in paragraph (b)(3) of this provision.] The offeror represents as part of its offer that--

(i) It [ ] is, [X] is not a WOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [ ] is, [Xis not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (b)(4)(i) of this provision is accurate for each WOSB concern eligible under the WOSB Program participating in the joint venture. [The offeror shall enter the name or names of the WOSB concern eligible under the WOSB Program and other small businesses that are participating in the joint venture:_____.] Each WOSB concern eligible under the WOSB Program participating in the joint venture shall submit a separate signed copy of the WOSB representation.

(5) Economically disadvantaged women-owned small business (EDWOSB) concern. [Complete only if the offeror represented itself as a women-owned small business concern eligible under the WOSB Program in (b)(4) of this provision.] The offeror represents as part of its offer that--

(i) It [ ] is, [X] is not an EDWOSB concern eligible under the WOSB Program, has provided all the required documents to the WOSB Repository, and no change in circumstances or adverse decisions have been issued that affects its eligibility; and

(ii) It [ ] is, [X] is not a joint venture that complies with the requirements of 13 CFR part 127, and the representation in paragraph (b)(5)(i) of this provision is accurate for each EDWOSB concern participating in the joint venture. [The offeror shall enter the name or names of the EDWOSB concern and other small

businesses that are participating in the joint venture: _____.] Each EDWOSB concern participating in the joint venture shall submit a separate signed copy of the EDWOSB representation.

(6) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents as part of its offer that it [X] is, [ ] is not **a veteran-owned small business concern.**

(7) [Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(6) of this provision.] The offeror represents as part of its offer that it [ ] is, [X] is not a service-disabled veteran-owned small business concern.

(8) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, as part of its offer, that--

(i) It [ ] is, [X] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business Administration, and no material changes in ownership and control, principal office, or HUBZone employee percentage have occurred since it was certified in accordance with 13 CFR Part 126; and

(ii) It [ ] is, [X] is not a HUBZone joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (b)(8)(i) of this provision is accurate for each HUBZone small business concern participating in the HUBZone joint venture. [The offeror shall enter the names of each of the HUBZone small business concerns participating in the HUBZone joint venture: _____.] Each HUBZone small business concern participating in the HUBZone joint venture shall submit a separate signed copy of the HUBZone representation.

(c) Definitions. As used in this provision--

"Economically disadvantaged women-owned small business (EDWOSB) concern" means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127. It automatically qualifies as a women-owned small business concern eligible under the WOSB Program.

"Service-disabled veteran-owned small business concern"--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a service-disabled veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) "Service-disabled veteran" means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern" means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and

qualified as a small business under the criteria in 13 CFR Part 121 and the size standard in paragraph (a) of this provision.

"Veteran-owned small business concern" means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern" means a small business concern--

(1) That is at least 51 percent owned by one or more women; or in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

"Women-owned small business (WOSB) concern eligible under the WOSB Program" (in accordance with 13 CFR part 127), means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States.

(d) Notice.

(1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a business concern that is small, HUBZone small, small disadvantaged, service-disabled veteran-owned small, economically disadvantaged women-owned small, or women-owned small eligible under the WOSB Program in order to obtain a contract to be awarded under the preference programs established pursuant to section 8, 9, 15, 31, and 36 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

(End of Provision)

K.6 52.222-22 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FEB 1999)

The offeror represents that--

(a) It [ ] has, [X] has not participated in a previous contract or subcontract subject to the Equal Opportunity clause of this solicitation; the clause originally contained in Section 310 of Executive Order No. 10925, or the clause contained in Section 201 of Executive Order No. 11114;

(b) It [X] has, [ ] has not filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

(End of Provision)

K.7 52.222-25 AFFIRMATIVE ACTION COMPLIANCE (APR 1984)

The offeror represents that--

(a) It [ ] has developed and has on file, [ ] has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (b) It [X] has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

(End of Provision)

K.8 52.225-20 PROHIBITION ON CONDUCTING RESTRICTED BUSINESS OPERATIONS IN SUDAN--CERTIFICATION (AUG 2009)

(a) Definitions. As used in this provision-- "Business operations" means engaging in commerce in any form, including by acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, or any other apparatus of business or commerce.

"Marginalized populations of Sudan" means--

(1) Adversely affected groups in regions authorized to receive assistance under section 8(c) of the Darfur Peace and Accountability Act (Pub. L. 109-344) (50 U.S.C. 1701 note); and

(2) Marginalized areas in Northern Sudan described in section 4(9) of such Act.

"Restricted business operations" means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate-

(1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;

(2) Are conducted pursuant to specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;

(3) Consist of providing goods or services to marginalized populations of Sudan;

(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;

(5) Consist of providing goods or services that are used only to promote health or education; or

(6) Have been voluntarily suspended.

(b) Certification. By submission of its offer, the offeror certifies that the offeror does not conduct any restricted business operations in Sudan.

(End of Provision)

WAGE DETERMINATION : AGENT ORANGE R&D CONTRACT

WD 05-2103 (Rev.-12) was first posted on www.wdol.gov on 06/19/2012

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REGISTER OF WAGE DETERMINATIONS UNDER | U.S. DEPARTMENT OF LABOR
THE SERVICE CONTRACT ACT | EMPLOYMENT STANDARDS ADMINISTRATION
By direction of the Secretary of Labor | WAGE AND HOUR DIVISION
| WASHINGTON D.C. 20210
|
|
|
| Wage Determination No.: 2005-2103
Diane C. Koplewski Division of | Revision No.: 12
Director Wage Determinations| Date Of Revision: 06/13/2012

States: District of Columbia, Maryland, Virginia

Area: District of Columbia Statewide
Maryland Counties of Calvert, Charles, Frederick, Montgomery, Prince George's, St Mary's
Virginia Counties of Alexandria, Arlington, Fairfax, Falls Church, Fauquier, King George, Loudoun, Prince William, Stafford

Fringe Benefits Required Follow the Occupational Listing

OCCUPATION CODE - TITLE	FOOTNOTE	RATE
01000 - Administrative Support And Clerical Occupations		
01011 - Accounting Clerk I		15.08
01012 - Accounting Clerk II		16.92
01013 - Accounting Clerk III		22.30
01020 - Administrative Assistant		31.41
01040 - Court Reporter		21.84
01051 - Data Entry Operator I		14.38
01052 - Data Entry Operator II		15.69
01060 - Dispatcher, Motor Vehicle		17.87
01070 - Document Preparation Clerk		14.21
01090 - Duplicating Machine Operator		14.21
01111 - General Clerk I		14.88
01112 - General Clerk II		16.24
01113 - General Clerk III		18.74

01120 - Housing Referral Assistant 25.29
01141 - Messenger Courier 13.62
01191 - Order Clerk I 15.12
01192 - Order Clerk II 16.50
01261 - Personnel Assistant (Employment) I 18.15
01262 - Personnel Assistant (Employment) II 20.32
01263 - Personnel Assistant (Employment) III 22.65
01270 - Production Control Clerk 22.03
01280 - Receptionist 14.43
01290 - Rental Clerk 16.55
01300 - Scheduler, Maintenance 18.07
01311 - Secretary I 18.07
01312 - Secretary II 20.18
01313 - Secretary III 25.29
01320 - Service Order Dispatcher 16.98
01410 - Supply Technician 28.55
01420 - Survey Worker 20.03
01531 - Travel Clerk I 13.29
01532 - Travel Clerk II 14.36
01533 - Travel Clerk III 15.49
01611 - Word Processor I 15.63
01612 - Word Processor II 17.67
01613 - Word Processor III 19.95
05000 - Automotive Service Occupations
05005 - Automobile Body Repairer, Fiberglass 25.26
05010 - Automotive Electrician 23.51
05040 - Automotive Glass Installer 22.15
05070 - Automotive Worker 22.15
05110 - Mobile Equipment Servicer 19.04
05130 - Motor Equipment Metal Mechanic 24.78
05160 - Motor Equipment Metal Worker 22.15
05190 - Motor Vehicle Mechanic 24.78
05220 - Motor Vehicle Mechanic Helper 18.49
05250 - Motor Vehicle Upholstery Worker 21.63
05280 - Motor Vehicle Wrecker 22.15
05310 - Painter, Automotive 23.51
05340 - Radiator Repair Specialist 22.15
05370 - Tire Repairer 14.44
05400 - Transmission Repair Specialist 24.78
07000 - Food Preparation And Service Occupations
07010 - Baker 13.85
07041 - Cook I 12.55
07042 - Cook II 14.60
07070 - Dishwasher 10.11
07130 - Food Service Worker 10.66
07210 - Meat Cutter 18.08
07260 - Waiter/Waitress 9.70
09000 - Furniture Maintenance And Repair Occupations
09010 - Electrostatic Spray Painter 19.86
09040 - Furniture Handler 14.06
09080 - Furniture Refinisher 20.23

09090 - Furniture Refinisher Helper 15.52
09110 - Furniture Repairer, Minor 17.94
09130 - Upholsterer 19.86
11000 - General Services And Support Occupations
11030 - Cleaner, Vehicles 10.54
11060 - Elevator Operator 10.54
11090 - Gardener 17.52
11122 - Housekeeping Aide 11.83
11150 - Janitor 11.83
11210 - Laborer, Grounds Maintenance 13.07
11240 - Maid or Houseman 11.26
11260 - Pruner 11.58
11270 - Tractor Operator 16.04
11330 - Trail Maintenance Worker 13.07
11360 - Window Cleaner 12.85
12000 - Health Occupations
12010 - Ambulance Driver 20.41
12011 - Breath Alcohol Technician 20.27
12012 - Certified Occupational Therapist Assistant 23.11
12015 - Certified Physical Therapist Assistant 21.43
12020 - Dental Assistant 17.18
12025 - Dental Hygienist 44.75
12030 - EKG Technician 27.67
12035 - Electroneurodiagnostic Technologist 27.67
12040 - Emergency Medical Technician 20.41
12071 - Licensed Practical Nurse I 19.07
12072 - Licensed Practical Nurse II 21.35
12073 - Licensed Practical Nurse III 24.13
12100 - Medical Assistant 15.01
12130 - Medical Laboratory Technician 18.04
12160 - Medical Record Clerk 17.42
12190 - Medical Record Technician 19.50
12195 - Medical Transcriptionist 18.77
12210 - Nuclear Medicine Technologist 37.60
12221 - Nursing Assistant I 10.80
12222 - Nursing Assistant II 12.14
12223 - Nursing Assistant III 13.98
12224 - Nursing Assistant IV 15.69
12235 - Optical Dispenser 20.17
12236 - Optical Technician 15.80
12250 - Pharmacy Technician 18.12
12280 - Phlebotomist 15.69
12305 - Radiologic Technologist 31.11
12311 - Registered Nurse I 27.64
12312 - Registered Nurse II 33.44
12313 - Registered Nurse II, Specialist 33.44
12314 - Registered Nurse III 40.13
12315 - Registered Nurse III, Anesthetist 40.13
12316 - Registered Nurse IV 48.10
12317 - Scheduler (Drug and Alcohol Testing) 21.73
13000 - Information And Arts Occupations

13011 - Exhibits Specialist I 19.86
13012 - Exhibits Specialist II 24.61
13013 - Exhibits Specialist III 30.09
13041 - Illustrator I 20.48
13042 - Illustrator II 25.38
13043 - Illustrator III 31.03
13047 - Librarian 33.88
13050 - Library Aide/Clerk 14.21
13054 - Library Information Technology Systems Administrator 30.60
13058 - Library Technician 19.89
13061 - Media Specialist I 18.73
13062 - Media Specialist II 20.95
13063 - Media Specialist III 23.36
13071 - Photographer I 16.65
13072 - Photographer II 18.90
13073 - Photographer III 23.67
13074 - Photographer IV 28.65
13075 - Photographer V 33.76
13110 - Video Teleconference Technician 20.39
14000 - Information Technology Occupations
14041 - Computer Operator I 18.92
14042 - Computer Operator II 21.18
14043 - Computer Operator III 23.60
14044 - Computer Operator IV 26.22
14045 - Computer Operator V 29.05
14071 - Computer Programmer I (see 1) 26.36
14072 - Computer Programmer II (see 1)
14073 - Computer Programmer III (see 1)
14074 - Computer Programmer IV (see 1)
14101 - Computer Systems Analyst I (see 1)
14102 - Computer Systems Analyst II (see 1)
14103 - Computer Systems Analyst III (see 1)
14150 - Peripheral Equipment Operator 18.92
14160 - Personal Computer Support Technician 26.22
15000 - Instructional Occupations
15010 - Aircrew Training Devices Instructor (Non-Rated) 36.47
15020 - Aircrew Training Devices Instructor (Rated) 44.06
15030 - Air Crew Training Devices Instructor (Pilot) 52.81
15050 - Computer Based Training Specialist / Instructor 36.47
15060 - Educational Technologist 35.31
15070 - Flight Instructor (Pilot) 52.81
15080 - Graphic Artist 26.80
15090 - Technical Instructor 25.08
15095 - Technical Instructor/Course Developer 30.67
15110 - Test Proctor 20.20
15120 - Tutor 20.20
16000 - Laundry, Dry-Cleaning, Pressing And Related Occupations
16010 - Assembler 9.88
16030 - Counter Attendant 9.88
16040 - Dry Cleaner 12.94

16070 - Finisher, Flatwork, Machine 9.88
16090 - Presser, Hand 9.88
16110 - Presser, Machine, Drycleaning 9.88
16130 - Presser, Machine, Shirts 9.88
16160 - Presser, Machine, Wearing Apparel, Laundry 9.88
16190 - Sewing Machine Operator 13.78
16220 - Tailor 14.66
16250 - Washer, Machine 10.88
19000 - Machine Tool Operation And Repair Occupations
19010 - Machine-Tool Operator (Tool Room) 21.14
19040 - Tool And Die Maker 23.38
21000 - Materials Handling And Packing Occupations
21020 - Forklift Operator 18.02
21030 - Material Coordinator 22.03
21040 - Material Expediter 22.03
21050 - Material Handling Laborer 13.83
21071 - Order Filler 15.09
21080 - Production Line Worker (Food Processing) 18.02
21110 - Shipping Packer 15.09
21130 - Shipping/Receiving Clerk 15.09
21140 - Store Worker I 11.72
21150 - Stock Clerk 16.86
21210 - Tools And Parts Attendant 18.02
21410 - Warehouse Specialist 18.02
23000 - Mechanics And Maintenance And Repair Occupations
23010 - Aerospace Structural Welder 27.21
23021 - Aircraft Mechanic I 25.83
23022 - Aircraft Mechanic II 27.21
23023 - Aircraft Mechanic III 28.53
23040 - Aircraft Mechanic Helper 17.54
23050 - Aircraft, Painter 24.73
23060 - Aircraft Servicer 19.76
23080 - Aircraft Worker 21.01
23110 - Appliance Mechanic 21.75
23120 - Bicycle Repairer 14.43
23125 - Cable Splicer 26.02
23130 - Carpenter, Maintenance 21.40
23140 - Carpet Layer 20.49
23160 - Electrician, Maintenance 27.98
23181 - Electronics Technician Maintenance I 24.94
23182 - Electronics Technician Maintenance II 26.47
23183 - Electronics Technician Maintenance III 27.89
23260 - Fabric Worker 19.13
23290 - Fire Alarm System Mechanic 22.91
23310 - Fire Extinguisher Repairer 17.62
23311 - Fuel Distribution System Mechanic 22.81
23312 - Fuel Distribution System Operator 19.38
23370 - General Maintenance Worker 21.43
23380 - Ground Support Equipment Mechanic 25.83
23381 - Ground Support Equipment Servicer 19.76
23382 - Ground Support Equipment Worker 21.01

23391 - Gunsmith I	17.62
23392 - Gunsmith II	20.49
23393 - Gunsmith III	22.91
23410 - Heating, Ventilation And Air-Conditioning Mechanic	23.89
23411 - Heating, Ventilation And Air Contditioning Mechanic (Research Facility)	25.17
23430 - Heavy Equipment Mechanic	22.91
23440 - Heavy Equipment Operator	22.91
23460 - Instrument Mechanic	22.59
23465 - Laboratory/Shelter Mechanic	21.75
23470 - Laborer	14.98
23510 - Locksmith	21.90
23530 - Machinery Maintenance Mechanic	23.12
23550 - Machinist, Maintenance	22.91
23580 - Maintenance Trades Helper	18.27
23591 - Metrology Technician I	22.59
23592 - Metrology Technician II	23.80
23593 - Metrology Technician III	24.96
23640 - Millwright	28.19
23710 - Office Appliance Repairer	22.96
23760 - Painter, Maintenance	21.75
23790 - Pipefitter, Maintenance	24.63
23810 - Plumber, Maintenance	22.29
23820 - Pneudraulic Systems Mechanic	22.91
23850 - Rigger	22.91
23870 - Scale Mechanic	20.49
23890 - Sheet-Metal Worker, Maintenance	22.91
23910 - Small Engine Mechanic	20.49
23931 - Telecommunications Mechanic I	29.95
23932 - Telecommunications Mechanic II	31.55
23950 - Telephone Lineman	27.41
23960 - Welder, Combination, Maintenance	22.91
23965 - Well Driller	22.91
23970 - Woodcraft Worker	22.91
23980 - Woodworker	17.62
24000 - Personal Needs Occupations	
24570 - Child Care Attendant	12.79
24580 - Child Care Center Clerk	17.77
24610 - Chore Aide	10.57
24620 - Family Readiness And Support Services Coordinator	16.90
24630 - Homemaker	18.43
25000 - Plant And System Operations Occupations	
25010 - Boiler Tender	27.30
25040 - Sewage Plant Operator	20.84
25070 - Stationary Engineer	27.30
25190 - Ventilation Equipment Tender	19.49
25210 - Water Treatment Plant Operator	20.84
27000 - Protective Service Occupations	
27004 - Alarm Monitor	20.57

27007 - Baggage Inspector 12.71
27008 - Corrections Officer 22.80
27010 - Court Security Officer 24.72
27030 - Detection Dog Handler 20.57
27040 - Detention Officer 22.80
27070 - Firefighter 24.63
27101 - Guard I 12.71
27102 - Guard II 20.57
27131 - Police Officer I 26.52
27132 - Police Officer II 29.67
28000 - Recreation Occupations
28041 - Carnival Equipment Operator 13.59
28042 - Carnival Equipment Repairer 14.63
28043 - Carnival Equpment Worker 9.24
28210 - Gate Attendant/Gate Tender 13.01
28310 - Lifeguard 11.59
28350 - Park Attendant (Aide) 14.56
28510 - Recreation Aide/Health Facility Attendant 10.62
28515 - Recreation Specialist 18.04
28630 - Sports Official 11.59
28690 - Swimming Pool Operator 18.21
29000 - Stevedoring/Longshoremen Occupational Services
29010 - Blocker And Bracer 23.13
29020 - Hatch Tender 23.13
29030 - Line Handler 23.13
29041 - Stevedore I 21.31
29042 - Stevedore II 24.24
30000 - Technical Occupations
30010 - Air Traffic Control Specialist, Center (HFO) (see 2) 39.92
30011 - Air Traffic Control Specialist, Station (HFO) (see 2) 26.84
30012 - Air Traffic Control Specialist, Terminal (HFO) (see 2) 29.56
30021 - Archeological Technician I 20.19
30022 - Archeological Technician II 22.60
30023 - Archeological Technician III 27.98
30030 - Cartographic Technician 27.98
30040 - Civil Engineering Technician 26.41
30061 - Drafter/CAD Operator I 20.19
30062 - Drafter/CAD Operator II 22.60
30063 - Drafter/CAD Operator III 25.19
30064 - Drafter/CAD Operator IV 31.00
30081 - Engineering Technician I 22.92
30082 - Engineering Technician II 25.72
30083 - Engineering Technician III 28.79
30084 - Engineering Technician IV 35.64
30085 - Engineering Technician V 43.61
30086 - Engineering Technician VI 52.76
30090 - Environmental Technician 27.41
30210 - Laboratory Technician 23.38
30240 - Mathematical Technician 28.94
30361 - Paralegal/Legal Assistant I 21.36
30362 - Paralegal/Legal Assistant II 26.47

30363 - Paralegal/Legal Assistant III 32.36
30364 - Paralegal/Legal Assistant IV 39.16
30390 - Photo-Optics Technician 27.98
30461 - Technical Writer I 21.93
30462 - Technical Writer II 26.84
30463 - Technical Writer III 32.47
30491 - Unexploded Ordnance (UXO) Technician I 24.74
30492 - Unexploded Ordnance (UXO) Technician II 29.93
30493 - Unexploded Ordnance (UXO) Technician III 35.88
30494 - Unexploded (UXO) Safety Escort 24.74
30495 - Unexploded (UXO) Sweep Personnel 24.74
30620 - Weather Observer, Combined Upper Air Or Surface Programs (see 2) 25.19
30621 - Weather Observer, Senior (see 2) 27.98
31000 - Transportation/Mobile Equipment Operation Occupations
31020 - Bus Aide 14.32
31030 - Bus Driver 20.85
31043 - Driver Courier 13.98
31260 - Parking and Lot Attendant 10.07
31290 - Shuttle Bus Driver 15.66
31310 - Taxi Driver 13.98
31361 - Truckdriver, Light 15.66
31362 - Truckdriver, Medium 17.90
31363 - Truckdriver, Heavy 19.18
31364 - Truckdriver, Tractor-Trailer 19.18
99000 - Miscellaneous Occupations
99030 - Cashier 10.03
99050 - Desk Clerk 11.58
99095 - Embalmer 23.05
99251 - Laboratory Animal Caretaker I 11.30
99252 - Laboratory Animal Caretaker II 12.35
99310 - Mortician 31.73
99410 - Pest Controller 17.69
99510 - Photofinishing Worker 13.20
99710 - Recycling Laborer 18.50
99711 - Recycling Specialist 22.71
99730 - Refuse Collector 16.40
99810 - Sales Clerk 12.09
99820 - School Crossing Guard 13.43
99830 - Survey Party Chief 21.94
99831 - Surveying Aide 13.63
99832 - Surveying Technician 20.85
99840 - Vending Machine Attendant 14.43
99841 - Vending Machine Repairer 18.73
99842 - Vending Machine Repairer Helper 14.43

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

HEALTH & WELFARE: $3.71 per hour or $148.40 per week or $643.07 per month

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 5 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year, New Year's Day, Martin Luther King Jr's Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4174)

THE OCCUPATIONS WHICH HAVE NUMBERED FOOTNOTES IN PARENTHESES RECEIVE THE FOLLOWING:

1) COMPUTER EMPLOYEES: Under the SCA at section 8(b), this wage determination does not apply to any employee who individually qualifies as a bona fide executive, administrative, or professional employee as defined in 29 C.F.R. Part 541. Because most Computer System Analysts and Computer Programmers who are compensated at a rate not less than $27.63 (or on a salary or fee basis at a rate not less than $455 per week) an hour would likely qualify as exempt computer professionals, (29 C.F.R. 541. 400) wage rates may not be listed on this wage determination for all occupations within those job families. In addition, because this wage determination may not list a wage rate for some or all occupations within those job families if the survey data indicates that the prevailing wage rate for the occupation equals or exceeds $27.63 per hour conformances may be necessary for certain nonexempt employees. For example, if an individual employee is nonexempt but nevertheless performs duties within the scope of one of the Computer Systems Analyst or Computer Programmer occupations for which this wage determination does not specify an SCA wage rate, then the wage rate for that employee must be conformed in accordance with the conformance procedures described in the conformance note included on this wage determination.

Additionally, because job titles vary widely and change quickly in the computer industry, job titles are not determinative of the application of the computer professional exemption. Therefore, the exemption applies only to computer employees who satisfy the compensation requirements and whose primary duty consists of:

(1) The application of systems analysis techniques and procedures, including consulting with users, to determine hardware, software or system functional specifications;

(2) The design, development, documentation, analysis, creation, testing or modification of computer systems or programs, including prototypes, based on and related to user or system design specifications;

(3) The design, documentation, testing, creation or modification of computer programs related to machine operating systems; or

(4) A combination of the aforementioned duties, the performance of which requires the same level of skills. (29 C.F.R. 541.400).

2) AIR TRAFFIC CONTROLLERS AND WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY: If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work).

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees employed in a position that represents a high degree of hazard when working with or in close proximity to ordinance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordance, explosives, and incendiary material differential pay.

** UNIFORM ALLOWANCE **

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary

affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of $3.35 per week (or $.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations", Fifth Edition, April 2006, unless otherwise indicated. Copies of the Directory are available on the Internet. A links to the Directory may be found on the WHD home page at http://www.dol.gov/esa/whd/ or through the Wage Determinations On-Line (WDOL) Web site at http://wdol.gov/.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

1) When preparing the bid, the contractor identifies the need for a conformed occupation(s) and computes a proposed rate(s).

2) After contract award, the contractor prepares a written report listing in order proposed classification title(s), a Federal grade equivalency (FGE) for each proposed classification(s), job description(s), and rationale for proposed wage rate(s), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative, the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.

3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).

4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.

5) The contracting officer transmits the Wage and Hour decision to the contractor.

6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.

VA | U.S. Department of Veterans Affairs

November 9, 2020

Via Email

Re: FOIA Request 20-09301-F

This is the Initial Agency Decision (IAD) to your August 28, 2020 Freedom of Information Act (FOIA) request to Department of Veterans Affairs (VA), VBA FOIA Service. You requested a copy of the contract file for Contract VA10112C0006, a firm fixed price federal contract award on September 28, 2012 for $599,884 funded by the Veteran's Benefits Administration. I also request a copy of the contract file checklist and any memos included in the contract file.

On September 3, 2020 our office provided you with 75 pages of responsive records. You further advised us on September 11, 2020 to specifically include the reports and indexes provided under the contract that was referenced in the Statement of Work.

We conducted additional searches within the following offices; Veterans Health Administration (VHA), Veterans Benefits Administration Central Office (VBACO), the Office of Compensation Services and the Office of Mission Support (OMS), Acquisitions Division. The OMS Acquisitions Division was the only office that had responsive records pertaining to your request. A total of 104 pages were located.

After careful review and consideration, we have made the determination to release the 104 pages of responsive records in its entirety.

FOIA Mediation

As part of the 2007 FOIA amendments, the Office of Government Information Services (OGIS) was created to offer mediation services to resolve disputes between FOIA requesters and Federal agencies as a non-exclusive alternative to litigation. Using OGIS services does not affect your right to pursue litigation. Under the provisions of the FOIA Improvement Act of 2016 the following contact information is provided to assist FOIA requesters in resolving disputes:

VBA Office FOIA Public Liaison
Name: Angela Davis
Email Address: FOIA.VBACO@va.gov

Office of Government Information Services (OGIS)
Email address: ogis@nara.gov

Fax: 202-741-5769
Mailing address:
National Archives and Records Administration
8601 Adelphi Road
College Park, MD 20740-6001

FOIA Appeal

Please be advised that should you desire to do so; you may appeal the determination made in this response to:

Office of General Counsel (024)
Department of Veterans Affairs
810 Vermont Avenue, NW
Washington, DC 20420

If you choose to file an appeal, please include a copy of this letter with your written appeal and clearly indicate the basis of your disagreement with the determination set forth in this response. Please be advised that in accordance with VA's implementing FOIA regulations at 38 C.F.R. § 1.559, your appeal must be postmarked no later than ninety (90) days of the date of this letter

Sincerely,

Paula G. Presley 3422255
Digitally signed by Paula G. Presley 3422255
Date: 2020.11.09 08:17:21 -05'00'

Paula Presley
VBA Program Specialist

Contract: VA-101-12-C-0006

Agent Orange Briefs:

Special Topics

Brief No. 6

Discussion of the Presentation to the Institute of Medicine on C-123K Exposure Issues

Compensation Service

Department of Veterans Affairs

810 Vermont Ave., NW

Washington, DC 20420

June 30, 2014

A. L .Young Consulting, Inc.

Alvin L. Young, PhD

Kristian L. Young, MA

A. L. Young Consulting, Inc.
1810 Tranquility Road
Cheyenne, WY, 82009-2903

30 June 2014

Mr. Michael D. Pharr
Contract Officer's Representative
Compensation Service
Department of Veterans Affairs
810 Vermont Ave., NW
Washington, DC 20420

Dear Mr. Pharr,

Please find attached to this letter the Agent Orange Brief No. 6 titled: **"Discussion of the Presentation to the Institute of Medicine on C-123K Exposure Issues."** This brief is the sixth of many briefs that will be prepared upon request by Compensation Services to address special topics that are germane to issues supporting the ***Agent Orange Investigative Report Series.*** These briefs are prepared in fulfillment of Contract VA-101-12-C-0006, *Development of an Archival Directory of Agent Orange.*

Sincerely,

Alvin L. Young

Alvin L. Young, PhD
Professor of Environmental Toxicology
Colonel, USAF, Retired

DISCLAIMER

The conclusions reached in this report are based upon a comprehensive review of the historical records maintained in the publicly available files of the National Archives and Records Administration, and other archival repositories. However, the conclusions reached do not necessarily represent those of the Department of Veterans Affairs or any other Department or Agency of the United States Government.

This "Discussion Point Brief" is part of the ***Agent Orange Investigative Report Series***, and should be considered as an amendable or living document. If additional authenticated documents or records are found that address the topic of this report, a re-evaluation of the conclusions may be necessary.

DISCUSSION OF THE PRESENTATION TO THE INSTITUTE OF MEDICINE ON C-123K EXPOSURE ISSUES

On 16 June 2014, Dr. Alvin L. Young made a presentation to the Institute of Medicine's Committee selected "***To Evaluate the Potential Exposure to Agent Orange/TCDD Residue and Level of Risk of Adverse Health Effects for Aircrew of Post-Vietnam C-123 Aircraft***." Dr. Young did not represent the Veterans Benefit Administration of the Department of Veterans Affairs, but he did represent their "point of view" relative to the issue. He noted that the focus of his contractual support to the Department is to retrieve, catalog, analyze, and prepare reports on the historical records related to Agent Orange and the Vietnam War.

To assist the Committee in their deliberations, Mr. James Sampsel, Compensation Service, presented to the Committee a June 10, 2014 Report titled: **Supplement to Investigative Report: New Information on Former UC-123K Post Vietnam Issue.** This report was prepared Dr. Alvin Young and Mr. Kristian Young and consisted of supplemental data that were obtained from recent in-depth searches of the historical records maintained by that Air Force Reserve Command History Office, the Air Force Historical Research Agency, and other repositories.

This current Agent Orange Brief is intended to provide the slides, talking points and supporting information that were provided and or discussed to/with the Committee on behalf of the Veterans Benefit Administration during its Open Session on 16 June 2014.

THE INSTITUTE OF MEDICINE: MATERIALS FOR THE PUBLIC

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

Project Scope

An ad hoc committee under the auspices of the Institute of Medicine (IOM) will determine whether there is an excess risk of adverse health among crew members who, after the Vietnam War flew and/or maintained C-123 aircraft that had been used to Spray Agent Orange in Vietnam. The committee will:

- Evaluate the reliability (including representativeness, consistency, methods used) of the available information for establishing exposure; and,
- Address (qualitatively as a degree of certainty, rather than in a quantitative fashion) whether any documented residues represent potentially harmful exposure, i.e., consider biological availability and the degree to which absorption might be expected, and place in context.

The Project is sponsored by the Department of Veterans Affairs. The start date of the project was March 14, 2014 and a report will be issued at the end the project, anticipated in September 2014.

Committee Roster

Robert F. Herrick, (Chair), Harvard School of Public Health
Robert Canalas, University of Arizona
Kenny S. Crump, Independent Consultant
Melissa Gonzales, University of New Mexico
John C. Kissel, University of Washington
Chensheng (Alex) Lu, Harvard School of Public Health
Linda A. McCauley, Emory University
Clifford P. Weisel, Rutgers University

Staff

Mary Burr Paxton, Study Director
Jennifer A. Cohen, Program Officer
Healther L. Chiarello, Senior Program Assistant

June 16, 2014 Location: Keck Building, Rm100, 500 5th Street, NW, Washington DC

Agenda

Welcome, Goals, Conduct of Meeting, Introduction of Committee Members

8:30 a.m. Robert Herrick, Committee Chair

Panel 1: Post-Vietnam Handling and Use of the C-123s *

8:45 a.m. Wesley Carter, C-123 Veterans Association

8:50 a.m. Alvin L. Young, A.L. Young Consulting, Inc.

8:55 a.m. Comments and Questions from Committee Members

Panel 2: Collection and Analysis of Samples

9:45 a.m. Peter Lurker, Germantown Consultants, LLC

9:50 a.m. Peter C. Kahn, AESOP, Rutgers University

9:55 p.m. Thomas E. McKone, University of California, Berkeley

10:00 a.m. Comments and Questions from Committee Members

10:45 a.m. BREAK

Panel 3: Exposure Modeling with Existing Data

11:00 a.m. Thomas H. Sinks, Deputy Director of NCEH, ATSDR

11:05 a.m. Jeanne M. Stellman, Columbia University

11:10 a.m. Patrick Finley, Sandia National Laboratories

11:15a.m. Jeffrey H. Driver, RiskScience.net

11:20 a.m. Comments and Questions from Committee Members

12:15 p.m. LUNCH

Interpretations of Resulting Exposure Estimates and General Discussion

1:00 p.m. Comments and Questions from Attendees (Make request to staff for a 5-minute slot before lunch)

1:15 p.m. **Additional Comments and Questions from Committee Members**

1:30 p.m. General Discussion

2:30 p.m. Adjourn Open Session

Closed Session have been scheduled for June 17 and 18 with the Committee Members.

* As stated by the Study Director**: "The Panel Members were assembled for the open session exclusively to answer the Committee's outstanding questions related to exposure**

assessment working from the available sampling data and related information with the intention of gauging (in a qualitative fashion) the degree of risk that might be associated with the C-123 situation according to various established national and international guidelines for TCDD exposure. The provisions of the Agent Orange Act are off the Committee's radar."

Each Panel Member was allocated 5 minutes to answer questions provided in advance of the meeting by the Committee. During discussion, additional relevant material could be presented. Appendix I lists the questions for each Panel. The questions were drawn from issues identified in the following article:

Lurker PA, Berman F, Clapp RW, Stellman JM (2014): Post-Vietnam military herbicide exposures in UC-123 Agent Orange spray aircraft. Environmental Research 130: 34-42.

PRESENTATION BY DR. YOUNG

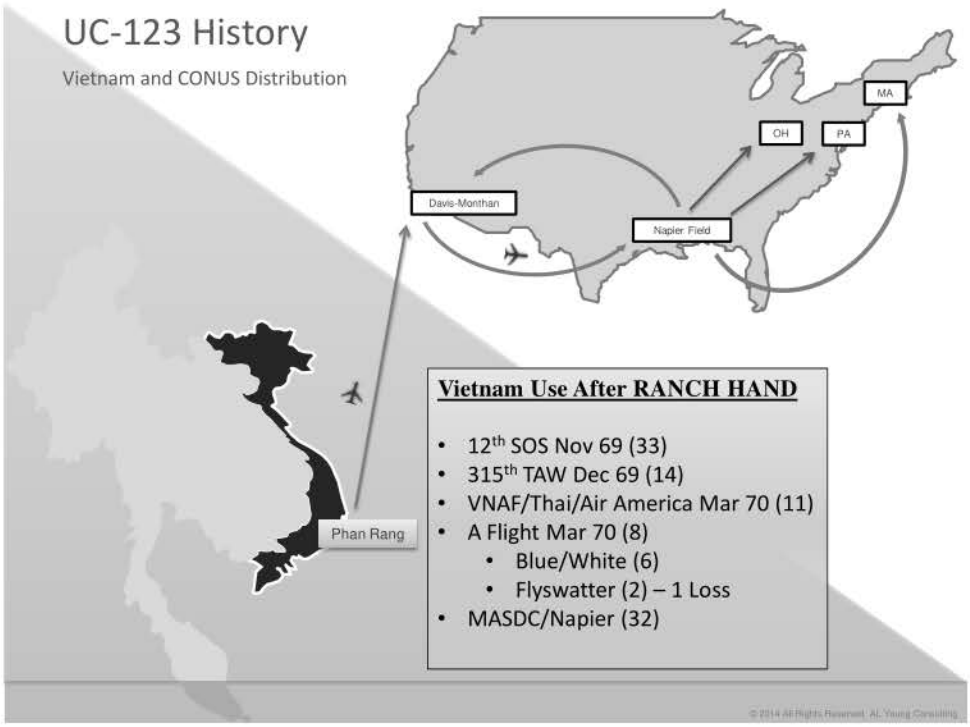
SLIDE 1 INTRODUCTION TO THE COMMITTEE

Thank you for the opportunity of addressing this Committee.

I'm here today to represent the point of view of the Veterans Benefit Administration, Department of Veterans Affairs. The focus of our contractual

support to the Department is to retrieve, catalog, analyze, and prepare reports on the historical records related to Agent Orange and the Vietnam War.

The Veterans Benefit Administration has provided you this morning with a supplement that we prepared detailing those appropriate historical records and data on the various questions this Committee has raised.



SLIDE 2 A Brief History of the Former RANCH HAND AIRCRAFT

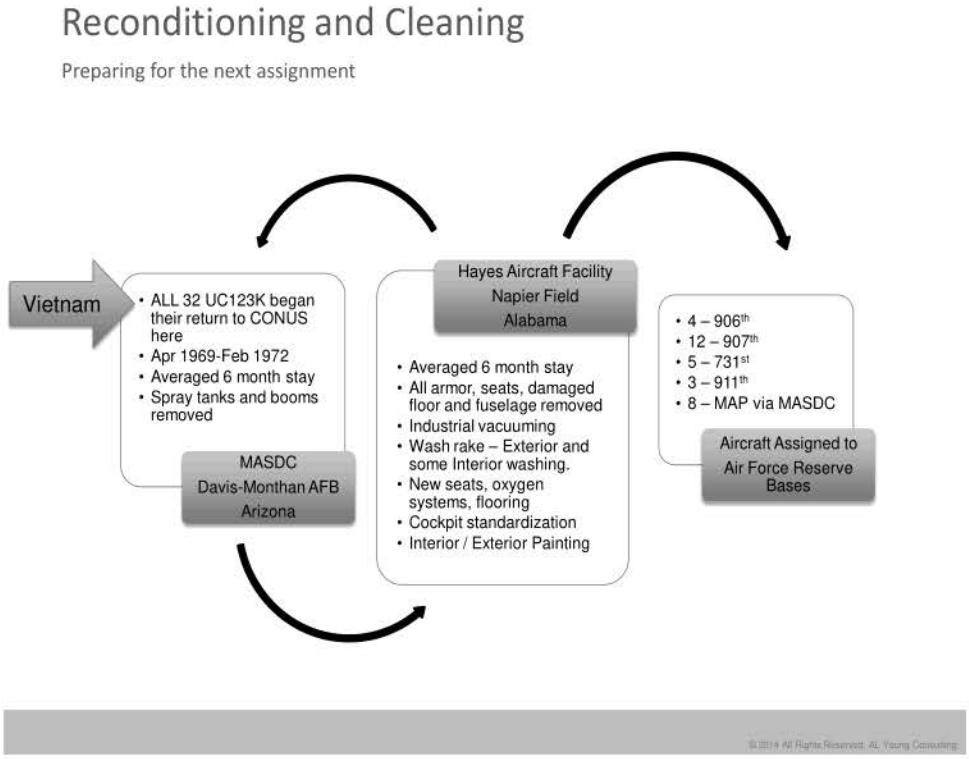
Of the 46 C-123 aircraft converted for use by RANCH HAND, only 12 were pre-1968 and were later converted to the "K" model. These aircraft sprayed approximately 70% of the Agent Orange. Twenty one (21) newly converted C-123Ks joining the fleet between May 1968 and November 1969, brought the fleet to a total of 33 UC-123K. These later aircraft saw minimal spraying of Agent Orange because of the restrictions placed in November 1969 to restrict the use of Orange herbicide to "areas remote from populations." On 15 April 1970, RANCH HAND was directed to terminate all use of Herbicide Orange.

Beginning in December 1969, RANCH HAND was directed to send 14 UC-123Ks to the 315th Tactical Air Wing, Phan Rang and these aircraft were converted to

transport duty. The A/A 45Y-1 Internal Defoliant Dispenser consisted of a 1,000-gallon supply tank, pump, and engine all mounted on a frame pallet that could be easily rolled on and off of the aircraft. Eleven (11) additional UC-123Ks were transferred to temporary duty with the Vietnamese Air Force (VNAV), the Thailand Air Force, and Air America. The A/A 45Y-l Dispensers were left on pallets presumably at Phan Rang when RANCH HAND closed.

Six of the remaining 8 aircraft became "A" Flight in March 1970 spraying only Agents Blue and White. The two other aircraft, including "Patches", were part of Operation FLYSWATER, the spraying of the insecticide Malathion.

All 32 UC-123K aircraft were transferred to the Military Aircraft Storage and Disposal Center (MASDC) at Davis-Monthan AFB AZ.



SLIDE 3 Reconditioning and Cleaning of the Aircraft

The Arrival at the Military Aircraft Storage and Disposal Center (MASDC), Davis-Monthan AFB, Arizona

Upon arrival at MASDC a series of actions occurred:

- The pilots were debriefed and where details of in-flight discrepancies were recorded;
- Aircraft records obtained and MASDC took custody of the aircraft;
- The aircraft was tied down in the receiving area and samples were taken of the engine oil, hydraulic fluid and landing gear lubrication and analyzed by a laboratory;
- Pre-induction safing procedures were implemented:
  - Removal of hazardous ad dangerous components, Ex: spray tanks, piping, spray systems, and fuel bladders; and,
  - High pressure systems were bled and spring loaded systems were relieved, e.g., the lifts of the rear cargo door.
- Washing and Evaluating Aircraft:
  - On the wash rack, the aircraft was thoroughly cleaned and inspected for corrosion; and,
  - Aircraft components were evaluated and after documentation of the extensive damage, the aircraft were sent to Hayes Aircraft Facility in Napier Field, Dothan, Alabama.
- The aircraft waited from one to twelve months with an average wait time of 6 months before they were ferried from Davis-Monthan to Napier Field.

The Arrival and Departure at Hayes Aircraft Facility, Napier Field, Dolthan, Alabama:

Upon arrival at Napier Field a series of actions occurred:

- These facilities specialized in handling the overhaul and repair of all components of the C-123 aircraft;
- First a complete heavy maintenance inspection was conducted;
- All armor, seats, portions of the console, and any modifications made in Vietnam were removed;
- The aircraft was vacuumed by an industrial high performance vacuum;
- The aircraft was both internally and externally cleaned with a power washing spray containing Varsol degreasing compound, along with a vapor degreasing system for the cockpit;

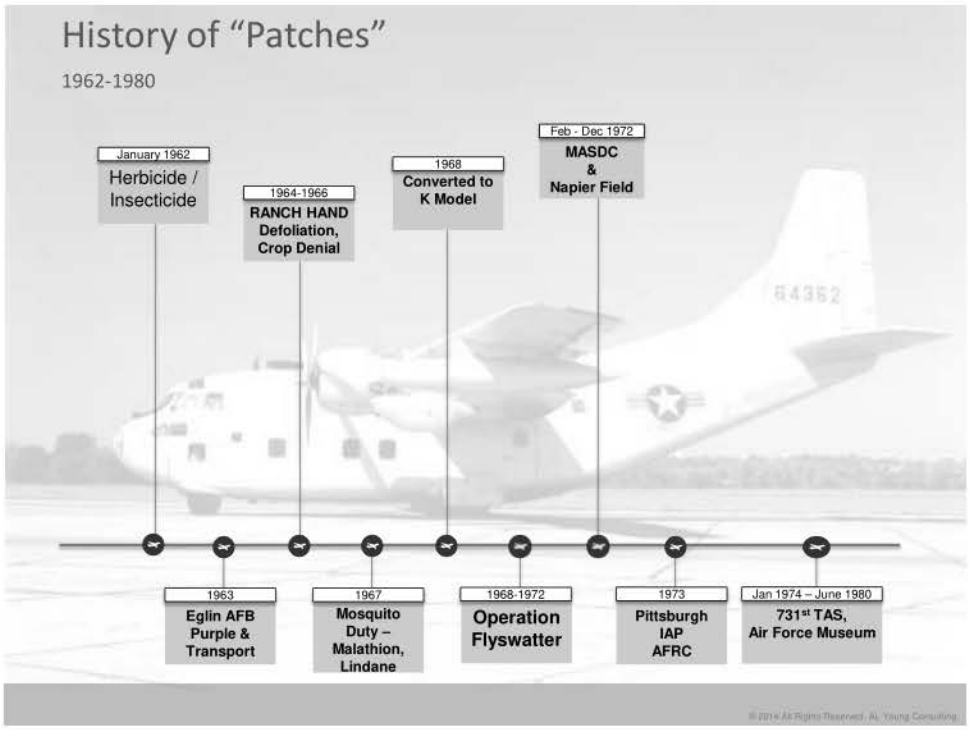
- All major repairs to the fuselage, wings, tail section and floor matting were done;
- Internal and external painting were completed;
- All new seats including those in the cockpit were installed;
- Portions of the console were replaced, new oxygen and heating systems were installed;
- For aero-medical use, new stanchions were installed; and,
- Generally the average aircraft stay at Napier Field was six months before the aircraft were ferried to their Air Force Reserve assignments.

Of the 32 former RANCH HAND aircraft (not all transferred at the same time)

4 were transferred to the 906th TAG, Lockbourne/Rickenbacker AFB OH;
12 were transferred to the 907th TAG, Lockbourne/Rickenbacker AFB OH;
5 were transferred to the 731st TAS, Westover AFB MA;
3 were transferred to the 911th TAG, Pittsburg IAP PA; and,
8 were transferred to the Military Assistance Program via MASDC.

Summary Analysis of the History of the Former RANCH HAND Aircraft

- Historical Records have been found on 46 former RANCH HAND or UC-123B/K aircraft;
- Of the 32 RANCH HAND aircraft that returned to the Continental United States (CONUS), all were assigned to the Military Aircraft Storage and Disposal Center (MASDC), Davis-Monthan AFB AZ between April 1969 and February 1972;
- Generally the aircraft were stationed at MASDC between 3 and 6 months;
- Each aircraft was ferried to the Hayes Aircraft Facility, Napier Field, Dothan AL and underwent reconditioning to the "Standard C-123K";
- Generally the aircraft were stationed at Napier Field between 3 and 6 months;
- The reconditioned "standard status" aircraft were ferried to the assigned Air Force or Air Force Reserve units. Those aircraft designated to be transferred to the Military Assistance Program were returned to MASDC; and,
- Twenty-six aircraft were eventually assigned to Air Force Reserve Tactical Air Squadrons.



SLIDE 4 A Brief History of "Patches" from January 1962 to June 1980

Aerospace Vehicle Inventory History and Posting Report of the UC-123K, s/n 56-3462 "Patches":

- Manufactured by Fairchild Aircraft, Hagerstown MD;
- Sep 1957: To **419th Troop Carrier** (Medium) Group (Tactical Air Command), Ardmore AFB OK;
- Dec 1957: To **463rd Troop Carrier** (M) Wing (TAC), Ardmore AFB;
- Jul 1958: To **463rd Troop Carrier** (Assault) Wing (TAC), Pope AFB NC;
- Dec 1961: To **346th Troop Carrier (A) Squadron** (TAC), Pope AFB;
- May 1962: To **4500th Air Base Wing** (TAC), Langley AFB VA, Insecticide Spray System Installed;
- Jul 1963: To **315th Air Division**, Headquarters (Pacific Air Forces, PACAF), Tan Son Nhut AB, RVN;
- Dec 1963: To **2nd Air Division** HQ (PACAF), Tan Son Nhut AB, RVN;
- Apr 1966: To **377th Combat Support Group** (PACAF), Tan Son Nhut AB, RVN;
- Sep 1966: To **315th Air Commando Wing** (PACAF), Tan Son Nhut AB, RVN;
- Jan 1967: To **315th Air Command Wing** (PACAF), Bien Hoa AB, RVN (now designated a UC-123B aircraft);

- Jun 1968: To Fairchild Aircraft, Hagerstown, MD for conversion to UC-123;
- Sep 1968: To **315th Air Command Wing** (PACAF), Phan Rang AB and Bien Hoa AB, RVN;
- Jan 1970: To **315th Tactical Airlift Wing** (PACAF), Bien Hoa AB and Phan Rang AB, conversion to insecticide sprayer for Operation FLYSWATTER;
- Jan 1972: To **377th Air Base Wing** (PACAF), Tan Son Nhut AB, RVN
- Feb 1972: To **MASDC**, Davis-Monthan AFB, temporarily transferred to Air Force Logistics Command (AFLC) to Napier Field, Dothan AL for depot level maintenance to a "standard C-123K";
- Aug 1972: To **911th Tactical Airlift Group** (US Air Force Reserves), Greater Pittsburgh Airport, PA as C-123K;
- Dec 1972: To **901st Tactical Airlift Group** (AFRES), Laurence G. Hanscom AFB, MA;
- Sep 1973: Unit moved to Westover AFB MA;
- Apr 1974: To **731st Tactical Airlift Squadron** (AFRES), Westover AFB;
- Apr 1975: To Napier Field, Dothan, AL for AFLC depot maintenance;
- April 1975: To **731st Tactical Airlift Squadron** (AFRES), Westover AFB;
- June 1980; Dropped from the 731st Tactical Air Squadron inventory by transfer to museum status; and,
- Placed in the United States Air Force Museum, Wright-Patterson AFB OH.

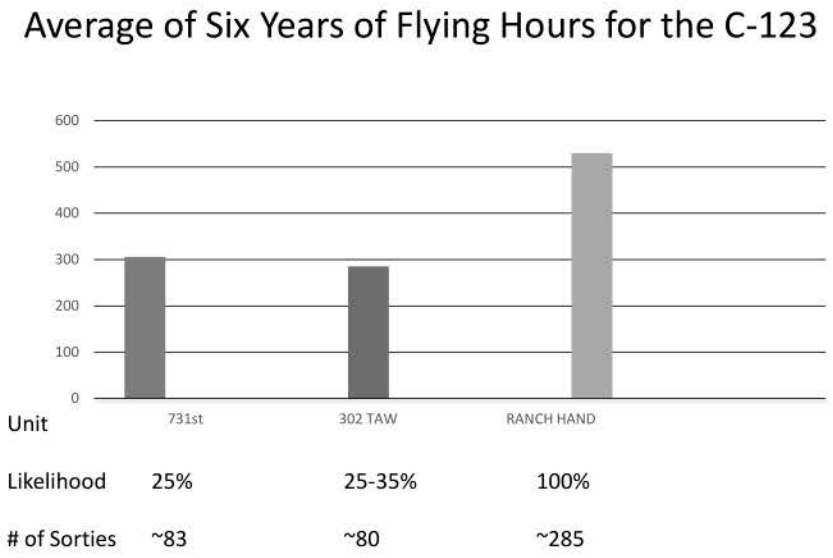
Disposition of Non-RANCH HAND C-123Ks from Vietnam

Records indicated that 183 of 227 C-123s assigned to the war effort in Southeast Asia were modified to "K" models. As previously, noted only 33 were assigned to RANCH HAND. Most of C-123Ks that returned to CONUS were reconditioned at Robins AFB GA before they were assigned to Air Force Reserve Units. This issue has not been raised by the C-123 Veteran Association, but many of these aircraft had been assigned to transport duty that placed significant stress on the aircraft in a combat environment. Robins AFB was a major Air Force Logistics Command Depot for maintenance of aircraft, including non-RANCH HAND C-123K aircraft. As noted, it was far more likely for Air Force Reserve Aircrews to fly in a C-123K that had served in Vietnam but was never associated with Operation RANCH HAND. The conditions of these aircraft, when assigned to a Air Force Reserve Unit is undocumented.

Appendix II documents the history and final disposition of each of the aircraft assigned to Operation RANCH HAND. **In summary**:

- 18 Aircraft were destroyed at in April 2010 by the 309th Aerospace Maintenance and Regeneration Group (AMARG), Davis-Monthan AFB AZ;
- 04 Aircraft were preserved by transfer to museums in the United States;
- 14 Aircraft were transferred to other nations under the Military Assistance Program (Note: the "White Whale" was a UC-123K, but not RH in SEA);
- 11 Aircraft were lost/crashed in Southeast Asia on in the United States.

ADDITIONAL SLIDES AND COMMENTS DURING DISCUSSION



SLIDE 5 COMPARISON OF USE OF UC-123K BETWEEN AIR RESERVE UNITS AND OPERATION RANCH HAND

Historical Data on C-123K Aircraft at Air Force Reserve Bases

- Five former RANCH HAND aircraft were assigned to the 731st TAS, Westover AFB MA between April 1973 and March 1981;

- Over the years between 1973 and 1981, the probability of flying a former RANCH HAND aircraft at Westover AFB was 25%;
- The average flying hours per aircraft per year at Westover was 306 hours;
- The average number of sorties per year at Westover was 83;
- The 911th TAG, 906th TAG, and the 907th TAG were under the 302nd Tactical Airlift Wing with HQ at Rickenbacker AFB OH;
- Over the years from 1972 to 1981, the probability of flying a former RANCH HAND aircraft varied from <20% to ~35%;
- For the 911th TAG, 906th TAG and 907th the average hours per year was 285 hours; and,
- The 16 former RANCH HAND aircraft assigned with the 906th and 907th TAG were primarily used in the Aerial Spray Flight for spraying insecticides.

Historical Data from Aircrews in Operation RANCH HAND

In Operation RANCH HAND, the average tour of duty was 1 year and the men routinely worked 12-15-hour shifts without a change of clothing. In May 2014 a request was sent to the Historian of the RANCH HAND Vietnam Association asking for data from members of the Association taken from the Form 5, "Official Flight Record", a military record retained by the Air Force, and by aircrew members received at retirement, that documented the number of flying hours in various aircraft including combat hours in the UC-123, year/days/time in the RANCH HAND unit, and the number and length of time of sorties. In addition, data were requested on the number of hits received during missions, the number of emergency landings, and the number of Purple Hearts award for injuries incurred combat missions.

A total of 25 e-mails were received from former members of Operation RANCH HAND. All 25 responding individuals were either pilots or co-pilots during their tour in Vietnam, and the period of their tours ranged from between 1964 – 1971.

The average number of combat flying hours (one year tour) = 525 hrs

The average number of sorties (one year tour) = 285

The average number of hits to the aircraft during the tour = 60

The average number of emergency landings = 3

The total number of Purple Hearts awarded for the group = 22

These data confirmed that the aircraft flown in Operation RANCH HAND were required to be completely reconfigured and reconditioned upon returning to CONUS before re-assignment to an Air Force Reserve Unit. The data also provided an idea as to the amount of exposure, stress and injury that occurred in the men who flew the UC-123 under combat conditions in Vietnam.

The initial RANCH HAND population consisted of 1261 RANCH HAND veterans with 1043 eligible to participate in the 20-year Air Force Health Study (AFHS). Of those eligible, 776 participated throughout the entire study. In the final AFHS report, analyses were conducted on over 300 health-related endpoints in 12 clinical areas. The results of the AFHS did not provide evidence of disease in the RANCH HAND veterans caused by their elevated levels of exposure to Agent Orange.

AFHS / RANCH HAND

Summary of Lipid-adjusted Dioxin Results (ppt)

	Number	Median	Range
Officer	307	7.3	0.4-36
Enlisted Flyer	132	16.0	0.4-196
Enlisted Groundcrew	337	24.0	0.4-618
Total	776	11.4	0.4-618
Comparison (C-130)	1174	4.0	0.4-32

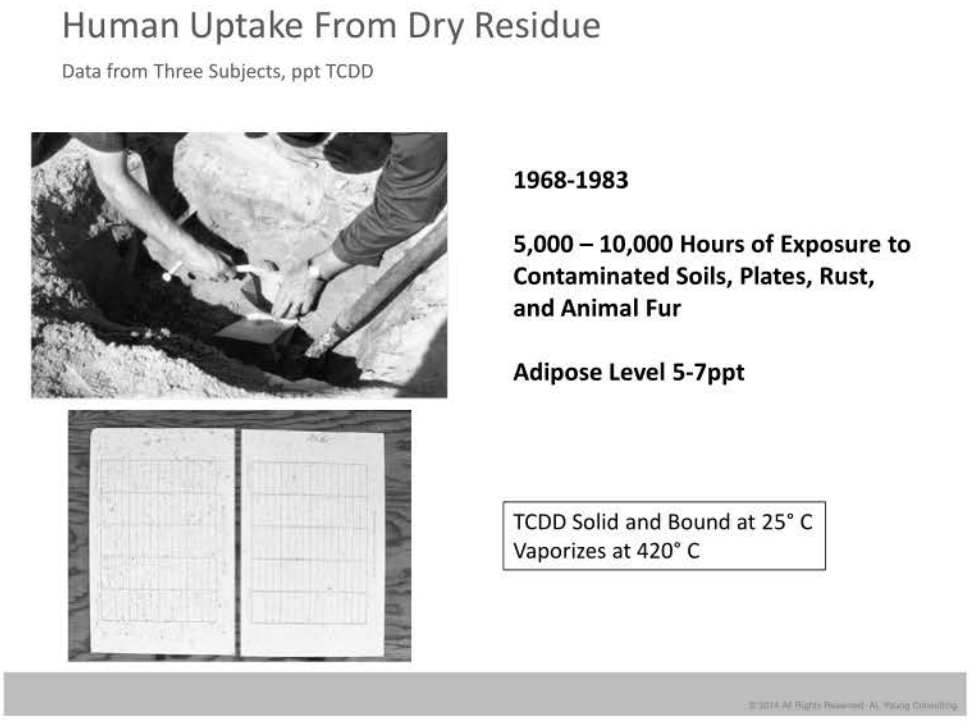
SLIDE 6 TCDD DATA, 2002 FOLLOW-UP EXAM CONFIRMING LONG TERM PERSISTENCE FROM EXPOSURE TO LIQUID HERBICIDE

The flight crew consisted of three officers – a pilot, a copilot, and a navigator – and a spray equipment console operator (enlisted personnel) who was positioned in the rear of the C-123 aircraft. The navigator flew in the lead aircraft. On the ground, the non-flying (maintenance) personnel were responsible for loading the herbicide into the planes, cleaning the spray equipment post mission and maintaining and

repairing the aircraft. A typical herbicide mission took approximately 1 hour to reach the assigned spray area and the spraying lasted 5-10 minutes. The aircraft returned to base and often turned around and completed a second spray run.

Source:

Buffler PA, Ginevan ME, Mandel JS, Watkins DK (2011): The Air Force Health Study: An Epidemiologic Retrospective. Annals of Epidemiology 9: 673-687.



SLIDE 7 TCDD BINDS TIGHTLY TO SOIL PARTICLES AND WEATHERING PRODUCES TIGHTER BINDING TO THE PARTICLE SURFACE

For PCDD/Fs, extensive studies of accidental discharges of these compounds have failed to correlate increases in human tissue concentrations with their levels in soils. This outcome is likely due in part to the relatively tight binding of the chemical to the soil particles, sharply reducing their bioavailability for humans via ingestion, inhalation, and skin contact. The near absence of volatility precludes vaporization and thus inhalation of the compounds themselves and the presence of organic matter in the soil reduced absorption by the GI tract. Contact with soils contaminated with dioxins, furans, or PCBs will contribute no more than 1% (and

probably considerably less) over the long term to the body burden. These findings should be considered as part of the overall body of evidence when authorities propose either to set levels of concern or to formulate risk management approaches.

SOURCES

Kimbrough RD et al (2010): Human uptake of persistent chemicals from contaminated soil: PCDD/Fs and PCBs. Reg Toxicol Pharmacol 57: 43-54

Young AL (2002): The Volunteers: The First Human Biopsy Studies of TCDD from Agent Orange Exposure. Environ Sci Pollut Res 9(3): 157

APPENDIX I

IOM Questions for Speakers
JUNE 16, 2014

Panel 1 - Post-Vietnam handling and use of the C-123s

What were the methods of cleaning, painting, etc., performed on the C-123s that had sprayed herbicides before they were provided to the Air Force Reserve? How and with what?

While they were being used by the AF reservists? Particularly for Patches? How frequently were the aircraft cleaned? How and with what?

What was the **usual duration** of crew members being inside the C-123s (both in flight and on the ground such as training exercises)? Please include preparation time for a flight, flight time and unloading time. And, what would be a **plausible range** of time (in hours or parts of an hour) spent in /on the planes? On a single weekend? Over the summer weeks?

Was any food consumed during a flight, and if so what type and how often?

What type of activities (on the ground and in the air) were crew members involved in while using the C-123s? (e.g., activities that might result in contact with surfaces, generate dust, exposure to new areas, clean surfaces) – Please estimate the duration of each activity.

How were the reservists assigned to the airplanes? (e.g., always flying the same planes? Or different assignments made each time? etc.)

What protective clothing (e.g., gloves, shirts, pants were worn by pilots, other flight crew, and maintenance personnel when in an aircraft? Did this change seasonally? What facilities were available for cleaning hands within the aircraft?

Panel 2 - Collection and analysis of samples

What would be the effect of **environmental factors** (e.g., sunlight, heat, etc.) on TCDD degradation? Are there other factors that might affect degradation? What would be the extent of difference on residues on the planes' interiors and exteriors?

What is the nature of TCDD's **physiochemical properties**? How would they influence human exposures from herbicide residues on the aircrafts' interiors? How would they influence the content of samples obtained over an extended period of time? Should these physiochemical properties be considered when interpreting the sampling results?

What environmental factors of activities in the C-123 could have affected the stability of TCDD in the interior of a plane?

How might TCDD in the surface residues be transferred to dust? What conditions might promote or decrease that process?

What solvents were used in gathering surface wipes in each period of sampling? Are there any implications for the comparability of the samples?

What do you think would constitute representative samples(s) for estimating the TCDD exposure of the C-123 reservists, and why? What combination of available sampling data comes closest to this standard?

Do you have any opinions or thoughts as to why the 1994 and 1995 samples from Patches are so different?

Under what conditions were the air samples collected (plane on ground with or without door open; plane in flight?)

Panel 3 - Modeling with existing data

What is the **plausible range of values** that could be used as inputs for each of the parameters in the **various models**?

The specific values quoted for **Model 1** in Lurker's abstract of 0.92 and 5.4 pg/kg-BW-day for the flight crew and maintainers differ from the results the Committee obtained(3.0 for 60 kg and 2.5 for 70 kg BW) from equation 2 and using 42 days/yr from **Table 4** and 250 days/yr. Please go through the calculations for the **Model 1** results given in the paper, as we were unable to reproduce it from the input parameters given in **Table 4** using equation 2.

When modeling ingestion, what would you consider the most appropriate estimate and the plausible range for:

- hand to mouth frequency and
- transfer of TCDD from hand to mouth (either equivalent surface area in the mouth and saliva removal efficient) would you propose due to eating food, such as a sandwich , on a flight.

How do the assumptions governing TCDD ingestion applied in Lurker et al. (2014) compare with those used in the NRC (1988) approach to establishing re-entry criteria after PCB transformer fires? What is the impact on resulting estimates?

Please explain how the physiochemical properties of TCDD would, or would not, make the application of **Model 3** by Lurker et al. (2014) appropriate.

All Panel Members - Interpretations of resulting exposure estimates

(*A brief response from each speaker would be appreciated)*

What are your opinions of the applicability of various existing health guidelines for TCDD for the case of the Air Force reservists who served on C-123s that had previously been used to spray herbicides in Vietnam?

What existing guidelines would be most appropriate for application to these situations?

Appendix II

Assignments and Dispositions of Former RANCH HAND Aircraft

Assignments and Disposition of the former 18 RANCH HAND Aircraft at AMARG

The following data on the individual aircraft provide a history of major assignments. However, a more detailed history of the movement with dates is provided in the Aerospace Vehicle Inventory History/Posting Reports which are available for each aircraft from the Air Force Historical Research Agency, Maxwell, AFB, Alabama.

UC-123K, 54-0583:

- Assigned to the 12 Special Operations Squadron (**12th SOS**), Bien Hoa, RVN
- Assigned to the 315 Tactical Air Wing (**315th TAW**), Phan Rang, RVN
- Arrived Military Aircraft and Disposal Center (**MASDC**), Davis-Monthan AFB, AZ, on **6 June 1970**
- Assigned to Air Force Logistic Command (**AFLC**), Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the 1st Special Operations Wing (**1st SOW**), Hurlburt Field, FL
- Assigned to the 901St Tactical Airlift Group (**901st TAG**), an Air Force Reserve unit, Hanscom Field, MA, and received C-123K "Providers", 1972 - 1974 (Unit inactivated on 1 April 1974);
- Final assignment to 731st Tactical Airlift Squadron (**731st TAS**), Air Force Reserves (**AFRES**), Westover AFB, MA, with the first record of flying duty at Westover AFB during the period 1 April – 31 December 1974. Westover AFB became the home of the 439th Airlift Wing (**439th AW**), a unit of the Air Force Reserve Command (**AFRC**) on 19 May 1974.
- Retired to the Aerospace Maintenance and Regeneration Center (**AMARC**), Davis-Monthan AFB, AZ, on 13 September 1982 as PCN CP085.
- Demilitarized (destroyed) in April 2010 by the 309th Aerospace Maintenance and Regeneration Group (**AMARG**) at the direction of the 508th Aerospace Sustainment Wing (**508th ASW**), Headquarters Ogden Air Logistics Center, Air Force Materiel Command, Hill AFB, UT.

UC-123K, 54-0585:

- Assigned to the **12th SOS**, Bien Hoa, RVN;
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 6 June 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to 24th Special Operation Wing (**24th SOW**), AFRES rotational element, Howard AFB, Panama on 12 October 1970
- Assigned to the 4500th Air Base Wing (**4500th ABW**), Langley AFB, VA
- Assigned 1 April 1973 to the AFRES 906th Tactical Airlift Group (**906th TAG**) at Lockbourne AFB, and subsequently to the 355th Tactical Airlift Squadron (**355th TAS**), and the 356 Tactical Airlift Squadron (**356th TAS**), Rickenbacker AFB, OH. The **355th TAS** and **356th TAS** received the upgraded C-123K in 1972 and 1973.
- Retired to **AMARC** on 11 June 1986 as PCN CP091.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 54-0586

- Assigned to the **12th SOS**, Bien Hoa RVN, from July 1968- March 1970 received heavy ground fire while spraying defoliants
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 22 May 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the 911th Tactical Airlift Group (**911th TAG**), AFRES on 29 March 1972, Greater Pittsburg Airport, PA, with the first record of flying duties 1 October - 31 December 1972
- Re-assigned to the **731st TAS**, AFRES, Westover AFB on 31 January 1981 with the first record of flying duties during the period 1 January-31 March 1981.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 20 September 1982 as PCN CP0088.
- Demilitarized (destroyed) in April 2010 at **AMARG.**

UC-123K, 54-0605:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from December 1966- July 1968 received heavy ground fire while spraying defoliants
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 8 July 1970
- Assigned to **AFLC,** Hayes Aircraft Facility, Napier Field, Dothan, AL on 30 July 1971
- Assigned to the **907 TAG**, AFRES, Lockbourne AFB, OH, and subsequently, the 355th Tactical Airlift Squadron (**355th TAS**), and the 356 Tactical Airlift Squadron (**356th TAS**), Rickenbacker AFB, OH.
- Assigned duty with the **356th TAS** in April 1973 as part of the Aerial Spray Flight.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 5 June 1984 as PCN CP090.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 54-0607:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from December 1966- April 1969 received heavy ground fire while spraying defoliants
- Assigned for Inspection and Repair As Necessary (IRAN), Tainan, Taiwan;
- Returned to Da Nang, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** in 1971
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned **1st SOW**, Hurlburt Field, FL
- Assigned on 28 February 1973 to the **24th SOW**, AFRES rotational element, Howard AFB, Panama
- Assigned to the **907 TAG**, AFRES, Lockbourne AFB, OH on 21 May 1975, and subsequently, the **355th TAS**, and the **356th TAS**, Rickenbacker AFB, AFRES, OH;
- Assigned to the 439th Air Wing (**439th AW**), and the **731st TAS,** AFRES, Westover AFB on 11 March 1976 with the first record of flying duties 1 April -31 December 1976.

- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 16 February 1982 as PCN CP067.
- Demilitarized (destroyed) in April 2010 at **AMARG.**

UC-123K, 54-0618:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from December 1966- April 1969 received heavy ground fire while spraying defoliants
- Assigned to the 309th Special Operations Squadron (**309th SOS**), Phan Rang, RVN, on 15 November 1969 for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Returned to Da Nang, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 5 July 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Returned to service at Air Development and Test Center (ADTC), Eglin AFB, FL
- Assigned on 2 August 1971 to 302d Tactical Airlift Wing (**302d TAW**), AFRES, with flying duties with **906th TAG** at Lockbourne AFB and subsequently the **355th TAS**, Rickenbacker AFB, OH. The first record of flying duties was 1 January 1972 and continued through March 1981.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 14 April 1982 as PCN CP071.
- Demilitarized (destroyed) in April 2010 at **AMARG.**

UC-123K, 54-0628:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from December 1966- October 1968 received heavy ground fire while spraying defoliants
- Assigned **309th SOS** in October 1969 for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Returned to Tan Son Nhut, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 1 July 1970

- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL on 19 October 1971
- Assigned to the **355th TAS**, AFRES, Rickenbacker AFB, OH
- Retired to **AMARC**, Davis-Monthan AFB, AZ, 4 May 1982 as PCN CP076.
- Demilitarized (destroyed) in April 2010 at **AMARG.**

UC-123K, 54-0635:

- Assigned to the **12th SOS**, Bien Hoa, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC**, Davis-Monthan AFB, AZ
- Assigned on 28 January 1972 to the **1st SOW**, Hurlburt Field, FL
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL on 3 April 1972
- Assigned to the 4410th Combat Crew Tactical Wing (**4410th CCTW**), Hurlburt Field, FL, and ferried to the **1st SOW**, Hurlburt Field, FL
- Assigned to the **901st TAG**, an AFRES unit, Hanscom Field, MA on 26 March 1973
- Final duty station with the **731st TAS**, AFRES, Westover AFB, MA on 1 April 1974, with the first record of flying duty at Westover AFB during the period 1 April-31 December 1974
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 13 September 1982 as PCN CP087
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 54-0685:

- Assigned to the **12th SOS**, Bien Hoa, RVN
- Assigned to the 315th Special Operations Wing (**315th SOW**), Phan Rang, RVN
- Arrived at **MASDC** on 5 July 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to **4410th CCTW**), Hurlburt Field, FL, and ferried to the **1st SOW**, Hurlburt Field, FL

- Assigned on 2 August 1971 to 302d Tactical Airlift Squadron (**302d TAS**) at Lockbourne AFB
- Assigned in 1973 to the **302d TAW** and the **355th TAS**, Rickenbacker AFB, OH.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 12 May 1982 as PCN CP077.
- Demilitarized (destroyed) in April 2010 at **AMARG.**

UC-123K, 54-0693:

- Assigned to the **12th SOS**, Bien Hoa, RVN and from July 1967-July 1968 received heavy ground fire while spraying defoliants
- Assigned on 1 December 1969 to **309th SOS**, and sent for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Re-assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC**, Davis-Monthan AFB, AZ, on 6 July 1970
- Assigned on 22 May 1971 to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Returned to service with the **1st SOW**, Hurlburt Field, FL
- Assigned to the **355th TAS**, and the **356th TAS**, Rickenbacker AFB, AFRES, OH.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 15 July 1982 as PCN CP081.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 54-0701:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from September1968-March 1970 received heavy ground fire while spraying defoliants
- Assigned to the **309th SOS** for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Returned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 22 May 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL

- Returned to service on 12 October 1970 with the **4500th ABW**, Langley AFB, VA,
- Assigned to the **906 TAG**, AFRES, Lockbourne AFB, OH,
- Assigned to the **355th TAS** at Rickenbacker AFB, AFRES, OH.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 12 April 1982 as PCN CP073.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 55-4520:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from September1968-April 1969 received heavy ground fire while spraying defoliants
- Assigned **310th SOS** on 1 December 1969 for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Returned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 1 July 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL, on 19 April 1971
- Brief assignments with the 51st Air Base Wing (**51st ABW**), South Korea and the 56th Air Base Wing (**56th ABW**), Luke AFB, AZ
- Assigned to the **907 TAG**, AFRES, Lockbourne AFB, OH
- Assigned to the **356th TAS**, Rickenbacker AFB, AFRES, OH
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 17 November 1981 as PCN CP065.
- Demilitarized (destroyed) in April 2010 at **AMARC**.

UC-123K, 55-4532

- Assigned to the **12th SOS**, Da Nang, RVN and from September 1968-March 1970 received heavy ground fire while spraying defoliants
- Assigned to the **310th SOS** and sent for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Upon return to the **315th TAW**, Phan Rang the aircraft was immediately sent to **MASDC**, Davis-Monthan AFB, AZ, arriving on 15 May 1970
- 28 May 1970 was assigned to **24th SOW**, Howard AFB, Panama

- Returned to **AMARC** on 8 June 1970
- Assigned on 1 July 1971 to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the **911th TAG**, AFRES, Greater Pittsburg Airport, PA.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 29 June 1980 as PCN CP047.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 55-4544:

- In March 1964 assigned to the 7th Air Commando Squadron (7th ACS/USAFE) at Sembach Air Base, Germany
- 15 July 1968, the aircraft was returned to CONUS and converted to a UC-123K
- Assigned to the **12th SOS**, Bien Hoa, RVN
- Re-assigned to the 315th Tactical Airlift Wing (**315th TAW**), Phan Rang, RVN;
- Arrived at **MASDC** in 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to **4410th CCTW**, Hurlburt Field, FL, and ferried to the **1st SOW**, Hurlburt Field, FL;
- Assigned in 1972 to **302d TAW**, AFRES, **906th TAG, 907th TAG,** and the **355th TAS**, Rickenbacker AFB, OH
- Assigned duty with the **906th TAG** in January 1972 and flew with the **302d TAW** through March 1981.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 17 July 1981 as PCN CP056.
- Demilitarized (destroyed) in April 2010 at **AMARG.**

UC-123K, 55-4547

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from September1968-April 1969 received heavy ground fire while spraying defoliants
- Assigned **310th SOS** on 1 December 1969 for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan

- Returned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 10 July 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Returned to service with the **4500th ABW**, Langley AFB, VA, on 9 October 1970 where it was modified on 10 July 1972 for the spraying of insecticides with the Aerial Spray Flight stationed at Langley.
- 1 April 1973, the UC-123K spray aircraft and Air Force Entomologists transferred from active duty's 4500th Aerial Spray Flight to AFRES' **906 TAG**, **355th TAS** and to the **356th TAS** at Rickenbacker AFB, OH.
- Retired to **AMARC**, Davis-Monthan AFB, AZ, on 17 June 1986 as PCN CP093.
- Demilitarized (destroyed) in April 2010 at **AMARC**.

UC-123K, 55-4571:

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from September1968-April 1969 received heavy ground fire while spraying defoliants
- Assigned **310th SOS** on 1 December 1969 for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan
- Returned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** on 10 July 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the **24th SOW**, AFRES rotational element, Howard AFB, Panama
- Assigned to the **907 TAG**, AFRES, Lockbourne AFB, OH
- Assigned to the **355th TAS** and to the **356th TAS** at Rickenbacker AFB, AFRES, OH
- Returned to **MASDC** on 11 June 1986 as PCN CP0092.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 55-4577

- Assigned to the **12th SOS**, Bien Hoa, RVN, and from March 1967-July 1968 received heavy ground fire while spraying defoliants

- Assigned **310th SOS** for Inspection and Repair As Necessary (**IRAN**), Tainan, Taiwan; returned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC** in July 1971
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the **911th TAG**, AFRES, Greater Pittsburg Airport, PA with assignment to the 758th Tactical Airlift Squadron (**758th TAS**) within the **911th Airlift Wing**. The first record of duty with the **911th** was in October 1972.
- Returned to **MASDC** on 14 July 1980 as PCN CP0049.
- Demilitarized (destroyed) in April 2010 at **AMARG**.

UC-123K, 56-4371

- Converted to K "model" in September 1968
- Assigned to the **12th SOS**, Bien Hoa, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC**, Davis-Monthan AFB, AZ, on 6 July 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL on 30 June 1971
- Assigned to **906th TAG**, Lockbourne AFB, and in June 1975 to the **355th TAS**, Rickenbacker AFRB, OH
- Returned to **MASDC** on 27 July 1982 as PCN CP082
- Demilitarized (destroyed) in April 2010 **at AMARG**.

COMMENTS

MASDC - Military Aircraft Storage and Disposal Center, Davis-Monthan AFB, AZ. In October 1982, it became **AMARC**, the Aerospace Maintenance and Regeneration Center, a facility managed by the US Air Force Material Command and located in Tucson, AZ. Today, Davis-Monthan AFB is the location of the 309th Aerospace Maintenance and Regeneration Group (**AMARG**).

Operation RANCH HAND, Vietnam – During its nine years of operation, the 46 C-123 aircraft assigned to RANCH HAND received more than 5,000 hits, lost nine

spray aircraft and had 28 RANCH HAND personnel die in Vietnam. Its organizational designations were as follows:

- Special Aerial Spray Flight – TDY from Tactical Air Command, November 1961 – July 1964;
- Special Aerial Spray Flight - subordinate to the 315th Troop Carrier Group, later the 315th Air Commando Group, July 1964 – 15 October 1966;
- 12th Air Commando Squadron – 15 October 1966 – 1 August 1968;
- 12th Special Operations Squadron – 1 August 1968 – 31 July 1970;
- A Flight, 310th Tactical Airlift Squadron – 31 July 1970 – 28 January 1971.

UC-123 – The designation adopted in November 1965 for the transport aircraft used by USAF to spray herbicides in Southeast Asia. The UC-123B had two reciprocating engines, while the UC-123K in addition had two jet engines. The first "K" model arrived in April 1968 and the last "B" model left Vietnam in January 1969. In November 1969, RANCH HAND reached its peak of 33 assigned UC-123Ks.

IRAN – Inspection and Repair As Necessary (IRAN), Tainan, Taiwan. In February 1963, the USAF negotiated a contract with Air Asia for the provision of services and material to accomplish IRAN of 12 C-123s. Reference: ***Leeker JF (2013): University of Texas, Dallas, Special Collection on Taiwan and the Vietnam War***

UNITED STATE AIR FORCE FERRY FLIGHT CREWS

4410th Combat Crew Tactical Wing (**4410th CCTS**), Hurlburt Field, FL, and the **4413th CCTS**, Lockbourne AFB, OH assumed responsibility for providing Ferry Flight Crew Orders for moving C-123 aircraft from AFLC Maintenance Depots to/and from Air Force active duty and Reserve units, 1967-1986.

UNITED STATE AIR FORCE RESERVE BASES RECEIVING UC-123Ks

- **Westover AFB, Chicopee, MA (now Westover Air Reserve Base, designated on 19 May 1974)**: The 439th Airlift Wing (**439th AW**) became the 439th Tactical Airlift Wing (**439th TAW**) in March 1974 and is a unit of the Air Force Reserve Command, which has its headquarters at Westover Air Reserve Base. The 731st Tactical Airlift Squadron (**731st TAS**) and the 74th Aeromedical Evacuation Squadron (**74th AES**) were located at Westover

and flew the C-123K aircraft. Both units were designated on 1 October 1972. The members of the 74th deployed as squadron "Medical Element Members" with the operational **731st TAS**. The **731st TAS** relocated to Westover in September 1973 with the **901st Tactical Airlift Group (901st TAG)** from Hanscom Field AFB, Bedford, MA. They joined with the **905th TAG** and its **337th TAS** to form the **439th TAW**. The 901st Organizational Maintenance Squadron had responsibility for maintaining the C-123K aircraft. For the period 1 July 1972 – 1 April 1974, the **901st TAG was** component of the 302d Tactical Airlift Wing (**302d TAW**), which subsequently was re-located to Rickenbacker AFB, OH. The **901st TAG** was inactivated in 1974.

- **Pittsburgh International Airport Pennsylvania Air Reserve Station (Pittsburgh IAP ARS)** is the home station of the Air Force Reserve Command's 911th Airlift Wing (**911th AW**). The 911 AW is part of the 22nd Air Force and its 758th Airlift Squadron (**758th AS**) flew the C-123K transport. The 911th Aeromedical Evacuation Squadron deployed as Squadron "Medical Element Members" with the 758th Airlift Squadron. The 911th Aircraft Maintenance Squadron had responsibility for maintaining the C-123K aircraft.

- **Lockbourne AFB, OH subsequently Rickenbacker AFB, OH, and later Rickenbacker Air National Guard Base (ANGB):** Lockbourne was the home of the 302nd Tactical Airlift Wing (302d TAW, fondly known as the 302nd Buckeye Wing). In 1971, the 302nd TAW as an Air Force Reserve Base assumed responsibility for three Tactical Airlift Groups, the **911th TAG**, the **906th** TAG, and the **907th TAG**. In 1972 the **901st TAG** was transferred to Lockbourne AFB, and was inactivated in 1974. On 1 April 1973, UC-123K aircraft and Air Force entomologists transferred from active duty's 4500th Aerial Spray Flight (**4500th ASF**), Langley, VA to AFRES's 355th Tactical Airlift Squadron (**355th TAS**), Lockbourne AFB, OH assigned to the **906th TAG**. The **906th TAG** had received its first C-123 "Provider" in 1967. On 18 May 1974, Lockbourne AFB became Rickenbacker AFB. The **356th TAS** was assigned to the **907th TAG**, and in 1981, the **356th TAS** assumed the final responsibility for the Aerial Spray Flight. Most of the UC-

123Ks were retired from the 355th and 356th in 1982, but four UC-123Ks were deployed with the **356th TAS** as the remaining component flying the UC-123K as the Aerial Spray Flight until June 1986. The Aerial Spray Mission was assigned later in 1986 to the **910th Airlift Wing** (AFRC), Youngstown Air Reserve Station, Vienna OH replacing the UC-123s with the C-130A's.

Source Material:

AFHRA (2013-2014): Data on RANCH HAND aircraft. The Air Force Historical Research Agency (AFHRA), Maxwell AFB, Montgomery AL

AMARG (1997): UC-123 Aircraft Suspected of Dioxin Contamination. Provided to the Director of Operations, 505 Aircraft Sustainment Squadron, 75th Air Base Wing, Hill AFB, UT is support of the Report "Dioxin and Herbicide Characterization of UC-123K Aircraft", May 2009

Cecil, PF (1986): Herbicidal Warfare: The RANCH HAND Project. Praeger Special Studies, Praeger Scientific, New York NY

Joe Baugher's Pages (Update 19 January 2014): USAF Serial Number Search Results UC-123K. wwwjoebaugher.com

RANCH HAND Vietnam.org: About Operation RANCH HAND Vietnam, Southeast Asia 1961-1971: C-123Survivors http://www.ranchhandvietnam.org/csurvivors

Preservation of Former RANCH HAND Aircraft

The following four former RANCH HAND aircraft were preserved by transfer to museums in the United States. All four aircraft had served in Air Force Reserve units in the United States.

UC-123K, 54-0633:

- Assigned to the **12th SOS**, Bien Hoa, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC**, Davis-Monthan AFB, AZ
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the 1st Special Operations Wing (1st SOW), Hurburt Field, FL
- Assigned to the 907th Tactical Airlift Group (**907th TAG**), the 906th Tactical Airlift Group (**906th TAG**), and the 355th Tactical Airlift Squadron (**355th TAS**), AFRES, Rickerbacker AFB, OH
- Retired to MASDC on 28 April 1982. The aircraft was declared surplus and dropped from AF inventory.
- The aircraft was retired for preservation on 6 November 1984 to the **Museum of Aviation, Robins AFB, GA.**

UC-123K, 54-0658:

- Assigned to the **12th SOS**, Bien Hoa, RVN
- Assigned to the **315th TAW**, Phan Rang, RVN
- Arrived at **MASDC**, Davis-Monthan AFB, AZ on 28 May 1970
- Assigned to **AFLC**, Hayes Aircraft Facility, Napier Field, Dothan, AL
- Assigned to the **24th SOW**, AFRES rotational element, Howard AFB, Panama
- Assigned to the **906 TAG**, AFRES, Lockbourne AFB, OH and subsequently the **355th TAS** at Rickenbacker AFB, AFRES, OH
- Returned to MASDC on 8 July 1982, and ferried to the **Mobility Command Museum, Dover AFB, DE** in 1987 for preservation.

UC-123K, 54-0664:

- Assigned to 1st Command Wing (**1st CW**), Tactical Air Command, Hurlburt Field, FL for the training of RANCH HAND aircrews
- Assigned to the **Aeronautical Systems Division**, Air Force Systems Command, Wright-Patterson AFB, OH for reconfiguration to a UC-123B
- Assigned to 315th Air Commando Group (**315th ACG**), Bien Hoa, in Operation RANCH HAND, RVN
- Arrived at **MASDC** and to Hayes Aircraft, Napier Field Dothan AL, April 1969
- Arrived at Fairchild Aircraft Hagerstown, MD for conversion to C-123K
- Assigned to the 317th Tactical Airlift Wing (**317th TAW**), Lockbourne AFB, OH in October 1969;
- Assigned to MASDC, Davis-Monthan AFB, AZ in July 1970
- Assigned in July 1970 to Hayes Aircraft, Napier Field, Dothan, AL
- Assigned to the 906th Tactical Airlift Squadron (**906th TAS**), AFRES, Lockbourne, AFB and deployed to England AFB, LA
- Assigned to the 355th Tactical Airlift Squadron (**355th TAS**) to Lockbourne AFB and subsequently Rickenbacker AFB as a UC-123K spraying mosquitoes as part of the Aerial Spray Flight
- Retired to **AMARC** in June 1981; declared surplus in May 1985 and dropped from AF inventory
- The aircraft was retired for preservation to the **Air Heritage Museum, Beaver Falls, PA** on 14 May 1994, with the final resurrection of RANCH HAND's "Thunderpig"!

UC-123K, 56-4362 "Patches":

- Assigned to the 346th Troop Carrier (A) Squadron (**346th TCS**), Tactical Air Command, Pope AFB, NC in November 1961
- Arrived at Tan Son Nhut Airport, RVN, on 7 January 1962 assigned with the Special Aerial Spray Flight with Operation RANCH HAND
- Assigned in May 1962 to the 4500th Air Base Wing (4500th ABW) Langley AFB VA with the installation of an Insecticide Spray System Installed
- Returned in July 1963 to the 315th Air Division Headquarters (Pacific Air Forces, PACAF), Tan Son Nhut AB, RVN

- Assigned in December 1963 to the 2nd Division HQ (PACAF), Tan Son Nhut AB, RVN
- Assigned in April 1966 to the 377th Combat Support Group (**377th CSG**, PACAF), Tan Son Nhut AB, RVN
- Assigned in September 1966 to the 315th Air Commando Wing (**315 ACW**, PACAF), Tan Son Nhut AB, RVN
- Assigned in January 1967 to 315th Air Command Wing (**315 ACW**, PACAF), Bien Hoa AB, RVN (now designated a UC-123B aircraft)
- Assigned in June 1968 to Fairchild Aircraft, Hagerstown, MD for conversion to UC-123K
- Returned in September 1968 to **315th ACW,** at Phan Rang AB, and Bien Hoa AB, RVN
- Assigned to the **315th TAW** in January 1970 for conversion to insecticide sprayer, Operation FLYSWATTER
- Assigned to **377th AFW** in January 1972, Tan Son Nhut AB;
- Arrived in February 1972 at **MASDC**, Davis-Monthan AFB, and temporarily transferred to Air Force Logistics Command (AFLC) at Napier Field, AL for depot maintenance;
- Assigned to **911th TAG**, US Air Force Reserves), Greater Pittsburgh Airport, Pennsylvania as C-123K
- Assigned in December 1972 to the **901st TAG** (AFRES), Hanscom AFB MA; moved in September 1973 to Westover AFB, MA, and in April 1974 assigned to the **731st TAS**, AFRES, at Westover AFB
- The aircraft was transferred to museum status in June 1980 to the **United States Air Force Museum, Wright-Patterson AFB, Dayton.**

Crashes/Losses of RANCH HAND Aircraft in SEA & CONUS

Aircraft s/n	Date	Unit	Location
56-4370	2/02/1962	464th TCW	Vietnam
56-4368	4/20/1962	464th TCW	Vietnam
56-4378	6/20/1966	309th ACS	Vietnam
54-0597	10/31/1966	12th ACS	Vietnam
54-0611	1/31/1967	12th ACS	Laos
54-0630	7/20/1967	12th ACS	Vietnam
54-0621	9/04/1967	19th ACS	Vietnam
54-0602	4/16/1968	1st SOS	Florida
54-0588	5/24/1968	12th ACS	Vietnam
56-4373	2/10/1971	310 TAS	Vietnam
57-6291	10/16/1980	302nd TAW*	Oklahoma

*Assigned with the 12th SOS; assigned with the 315th SOW, Vietnam; arrived MASDC 15 May 1970; assigned to AFLC, Hayes Aircraft, Napier, AL; assigned to the 302nd Tactical Air Wing, the 906th TAG, and subsequently the 355th TAS, Rickenbacker AFB, OH.

Sources:

Cecil PF (1986): Herbicidal Warfare: The RANCH HAND Project in Vietnam. Praeger Special Studies, Praeger Scientific, New York, NY

AFHRA (2013): Data on RANCH HAND aircraft. The Air Force Historical Research Agency (AFHRA), Maxwell AFB, Montgomery AL

C-123 Losses in SEA, http://c-123sinsea/org/C-123-Crashes.php

Former RANCH HAND or UC-123K Spray Aircraft Transferred to other Nations under The Military Assistance Program (MAP)

The Military Assistance Program (MAP) began after WWII to provide other nations with aircraft that would strengthen their military and domestic programs. For the C-123 aircraft, the MAP program was administered through MASDC and subsequently AMARC.

UC-123B, 54-0558; UC-123B, 54-0570; UC-123B, 54-0575:

- These three aircraft were all spray-gear equipped UC-123Bs with the 4500th Air Base Wing (**4500th ABW**) (TAC) at Langley AFB, VA when transferred via the MAP to Thailand in 1971. These aircraft served in the Royal Thai Air Force through 1989. There was no record of reconditioning.

UC-123K, 54-0576:

- Following assignment with the **12th SOS**, the aircraft was assigned to the 56th Special Operations Wing (**56th SOW**) at NKP Thailand
- Assigned to the 405th Fighter Wing at Clark AB, The Philippines
- Transferred to the VNAF (South Vietnamese Air Force) on 17 July 1971
- Assigned to **MASDC**, Davis-Monthan AFB, AZ
- Assigned to **AFLC** at Napier Field, AL for restoration on 12 December 1972
- Transferred via the MAP to Thailand and the Royal Thai Air Force on 16 June 1973.

UC-123K, 54-0577:

- Following assignment with the **12th SOS**, the aircraft was assigned to the **315th TAW** at Phan Rang, and subsequently to the VNAF
- Returned to the USAF duty and assigned to **MASDC**, Davis-Monthan AFB, AZ and subsequently to AFLC at Napier Field, AL for restoration
- Assigned to Air America on 21 February 1973

- It was transferred via the MAP to the Royal Lao Air Force (French: Aviation Royale Laotienne – AVRL), best known to the Americans by its English acronym 'RLAF' where it remained.

UC-123K, 54-0578:

- Following assignment with the **12th SOS**, the aircraft was sent to Tainan, Taiwan for IRAN (Inspection and Repair AS Necessary)
- Assigned to the 56th Special Operations Wing (**56th SOW)** at NKP Thailand
- The aircraft was transferred via the MAP to the South Vietnamese Air Force (VNAF) in July 1973.The final disposition is not in the records.

UC-123K, 54-0584:

- Following assignment with the **12th SOS**, the aircraft was assigned to the 315th TAW at Phan Rang, and sent to Tainan, Taiwan for IRAN (Inspection and Repair As Necessary)
- Transferred to the VNAF on 2 July 1971
- The aircraft was returned to USAF and assigned to **MASDC**, Davis-Monthan AFB, AZ and subsequently to **AFLC** at Napier Field, AL for restoration on 20 December 1972
- Transferred via the MAP to Thailand and the Royal Thai Air Force on 21 June 1973.

UC-123K, 54-589:

- Following assignment with the **12th SOS**, the aircraft was assigned to the **315th TAW** at Phan Rang, and sent to Taihli Royal Air Force Base
- Received heavy ground fire over the Ho Chi Minh Trail and sent to Tainan, Taiwan for IRAN (Inspection and Repair As Necessary)
- Returned to MASDC and ferried to Napier Field for additional restoration
- Transferred via the MAP to Thailand and the Royal Thai Air Force
- Records indicate that it was destroyed in combat operations in Thailand

UC-123K, 54-591:

- Assigned to the **12th SOS** at Da Nang, RVN
- Assigned to the **315th TAW**;

- Assigned to the VNAF in 1970;
- Returned to USAF and sent to **MASDC** and to Napier Field for restoration
- Returned to **MASDC** and transferred via MAP to the Philippines Air Force.

UC-123K, 55-4511:

- The aircraft was assigned in November1968 after receiving the "K" modification to the **12th SOS** at Bien Hoa AB, RVN
- Following significant damage from ground fire, the aircraft was sent to Tainan, Taiwan for **IRAN** (Inspection and Repair As Needed)
- Returned to Da Nang AB, RVN prior to
- Transferred to the **315th TAW** at Phan Rang;
- Aircraft was sent to **MASDC**, Davis-Monthan AFB, AZ and transferred to **AFLC** and ferried to Napier Field, AL for restoration
- Returned to **MASDC** and transferred via the MAP to the Republic of Korea.

UC-123K, 56-4375, "The White Whale":

- Assigned to the 464th Tactical Carrier Wing (**464th TCW**) in December 1961 and deployed to South Vietnam (RVN) as part of Operation Mule Train
- Assigned to the 2nd Advanced Echelon (ADVON), Tan Son Nhut, RVN on 8 February 1962 and re-designated VC-123 and assigned to transport the Commander Military Assistance Command-Vietnam (**COM MACV**)
- Assigned to the 460th Tactical Reconnaissance Wing (**460th TRW**), Tan Son Nhut, RVN
- Assigned to Robbins AFB, GA for conversion to VC-123K in 1968;
- Arrived at **MASDC** on 16 April 1970
- Assigned on 21 November 1970 to the 24th Special Operations Wing (**24th SOW**), Howard AFB, Panama
- Assigned in 1973 to the **302nd TAW, 356th TAS** in 1973 and was converted to a UC-123K and participated in the Special Spray Flight stationed at Rickenbacker AFB, OH.
- The aircraft retired to **MASDC** as PIN CP059 on 9 September 1981. The aircraft was provided to El Salvador's Military Service on 29 March 1984 and is stationed at Ilopango Air Base near San Salvador.

UC-123K, 55-4570:

- Transferred from the **12th SOS** to the **311th SOS** on 15November 1969 and sent to Tainan, Taiwan for **IRAN** (Inspection and Repair AS Necessary)
- Assigned to the **315th TAW**
- Arrived **MASDC** on 16 July 1970; assigned to the **AFLC** and ferried to Napier Field, AL for restoration "to standard C-123K"
- Assigned to the 51st Air Base Wing (**51st ABW**), Osan Air Base, Republic of Korea
- Returned to USAF and assigned to the **907th TAG**, Rickenbacker AFB, OH
- Retired to **AMARC** and transferred via MAP on 17 April 1975 to the Royal Thai Air Force. The aircraft is currently in the museum at Chiang Mai, Thailand.

UC-123K, 56-4384:

- Assigned with the **12th SOS**, Bien Hoa; transferred to the 310th SOS on 15 November 1969 and sent to Tainan, Taiwan for **IRAN** (Inspection and Repair AS Necessary) on 29 November 1969
- Returned to **the 315th TAW**, Phan Rang, RVN
- Arrived MASDC, transferred to **AFLC** and ferried to Napier Field, AL for restoration "to standard C-123K"
- The aircraft returned to **MASDC** and was transferred via the MAP to undisclosed location.

UC-123K, 57-6289:

- Assigned with the 12th SOS, Bien Hoa, RVN
- Assigned to the 315th TAW, Phan Rang, RVN
- Assigned to the 405 Fighter Wing, Clarke AFB in the the Philippines
- Departed Phan Rang on 20 May 1970 with Captain Edward B. Mucho as pilot, back to US (arriving 21 May 1970 at **MASDC**, Davis-Monthan AFB, AZ)
- Returned to service with the VNAF on 15 July 1971
- Restored at Napier Field, AL on 15 January 1973
- Returned to MASDC and transferred via the MAP to Royal Thai Air Force on 13 June 1973

- Aircraft was preserved on Highway 3 at Bang Wua, Bangkok, Thailand, 2001.

COMMENTS

Many of the records for some of the above aircraft were incomplete.

Source Material:

AFHRA (2013-2014): Data on RANCH HAND aircraft. The Air Force Historical Research Agency (AFHRA), Maxwell AFB, Montgomery AL

AMARG (1997): UC-123 Aircraft Suspected of Dioxin Contamination. Provided to the Director of Operations, 505 Aircraft Sustainment Squadron, 75th Air Base Wing, Hill AFB, UT is support of the Report "Dioxin and Herbicide Characterization of UC-123K Aircraft", May 2009

Cecil, PF (1986): Herbicidal Warfare: The RANCH HAND Project. Praeger Special Studies, Praeger Scientific, New York NY

Joe Baugher's Pages (Update 19 January 2014): USAF Serial Number Search Results UC-123K. wwwjoebaugher.com

RANCH HAND Vietnam.org: About Operation RANCH HAND Vietnam, Southeast Asia 1961-1971: C-123Survivors http://www.ranchhandvietnam.org/csurvivors

Subject:

Subject:

Agent Orange Investigative Report Series, No. 2

Contract: VA-101-12-C-0006

INVESTIGATIONS INTO THE ALLEGATIONS OF AGENT ORANGE/DIOXIN EXPOSURE FROM FORMER RANCH HAND AIRCRAFT

Compensation Service

Department of Veterans Affairs

810 Vermont Ave., NW

Washington, DC 20420

A. L. Young Consulting, Inc.

Alvin L. Young, PhD

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November 2012

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1810 Tranquility Road
Cheyenne, WY, 82009-2903

30 November 2012

Mr. Michael D. Pharr
Contract Officer's Representative
Compensation Service
Department of Veterans Affairs
810 Vermont Ave., NW
Washington, DC 20420

Dear Mr. Pharr,

Please find attached to this letter the Final Report on : **Investigations into the Allegations of Agent Orange/Dioxin Exposure from Former RANCH HAND Aircraft.** This report is the second of many reports that will be prepared in fulfillment of Contract VA-101-12-C-0006, *Development of an Archival Directory of Agent Orange Documents.* The goal of developing this directory is to search and identify the thousands of documents, reports, and correspondence located within our National Archives and Records Administration and other document repositories that relate to the use of "Tactical Herbicides" including Agent Orange, *outside of Vietnam.*

As in the case of the UC-123K controversy, the Compensation Service did not have the records related to history of the aircraft, nor the detailed scientific studies conducted at Hill Air Force Base Utah on the quarantined UC-123K aircraft that were stored by the 309th Aerospace Maintenance and Regeneration Group at Davis-Monthan Air Force Base Arizona. Thus, the Department of Veterans Affairs has been dependent on limited documentation related to events involving possible exposure to Agent Orange.

This current report documents three factors critical for exposure assessment that were identified by former United States Air Force Reserve personnel who flew or maintained the UC-123K and the C-123K Post-Vietnam from 1972 to 1982. The 1st factor included a detailed history of the more than 200 C-123B aircraft that were modified to meet the needs of various military activities during the Vietnam War. The 2nd factor included a detailed examination of the various alleged "dry" Agent Orange residues that remained within the UC-123K aircraft assigned to Reserve units. The 3rd factor examined whether the residues were actually available through dermal or inhalation routes to the aircrews flying the UC-123Ks, and if the exposure was significant to cause disease. **The results could not prove that the Air Force Reserve personnel were not exposed to Agent Orange or its associated dioxin contaminant, but all the analytical and scientific studies suggested that if they were exposed, that exposure was negligible.**

Sincerely,

Alvin L. Young, PhD

Professor

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The conclusions reached in this report are based upon a comprehensive review of the historical records maintained in the publicly available files of the National Archives and Record Administration, and other archival repositories. However, the conclusions reached do not necessarily represent those of the Department of Veterans Affairs or any other Department or Agency of the United States Government.

This report is part of the Agent Orange Investigative Report Series, and should be considered as an amendable or living document. If additional authenticated documents or records are found that address the topic of this report, a re-evaluation of the conclusions may be necessary.

INVESTIGATIONS INTO THE ALLEGATIONS OF AGENT ORANGE/DIOXIN EXPOSURE FROM FORMER RANCH HAND AIRCRAFT

EXECUTIVE SUMMARY

Allegations made by former Air Force Reserve aircrews and maintenance personnel have raised health concerns about residual amounts of Agent Orange remaining in Post-Vietnam C-123K aircraft, that had been deployed by the Reserves between 1972 and 1982. Despite a recent exposure assessment by the Air Force Research Laboratory, Wright-Patterson AFB Ohio and a recent Advisory Opinion by the Department of Veteran Affairs, that "*it was unlikely that any dioxins from such residues would lead to adverse health effects*", the controversy has continued. The present report on "***Investigations into the Allegations of Agent Orange/Dioxin Exposure from Former RANCH HAND Aircraft***" is intended to present factors not previously evaluated by the earlier assessment and Advisory Opinion.

There were three factors identified that were critical to the investigation. The first factor was a critical need to search the historical records on the history of the aircraft series C-123K and UC-123K. The "U" designation was for those aircraft used in defoliation and crop destruction missions in Operation RANCH HAND during the Vietnam War. The second factor was to understand the nature of the "dry" Agent Orange residues that were found in some of the aircraft, but especially those found in "Patches", an aircraft "retired" to the Air Force Museum in 1980 and that underwent decontamination in 1994 prior to its display to the public. The third factor was to determine how the exposures could have occurred and their significance to the health of the Air Force Reserve personnel who comprised the aircrews and who serviced the aircraft after they were returned to the United States and used as cargo aircraft during the period of 1972-1982.

Results of the investigation into Factor Number 1. Twenty-three of 34 UC-123Ks were returned to the United States in 1970-1971, and after reconditioning were assigned to Air Force Reserve units. These aircraft had been assigned to RANCH HAND beginning in May 1968, but most of the UC-123Ks arrived in Vietnam between December 1968 and November 1969, a time when defoliation

operations were significantly reduced. Moreover, after November 1969, the Department of Defense directed that the use of Agent Orange be restricted and the tactical herbicides Agents Blue and White be substituted. Four of the UC-123K were reassigned to the Aerial Spray Flight at Rickenbacker AFB Ohio. Thus, Air Force Reserve crews were more likely to have flown in the 47 C-123Ks that were returned from Vietnam, rather than assigned to one of the 19 remaining aircraft that had been flown in Operation RANCH HAND, or if formerly assigned to RANCH HAND, an aircraft that very likely did not spray Agent Orange. Verification of the tail numbers provided in a veteran-prepared report confirmed that only 6 of 26 aircraft assigned to the 731st Tactical Airlift Squadron, Westover AFB Massachusetts were former RANCH HAND aircraft.

Results of the Investigations in Factor Number 2. The allegations put forth by former Air Force Reserve crew and maintenance personnel were that the residues within the 19 UC-123Ks reassigned post-Vietnam to their Reserve units were from Agent Orange, and that the magnitudes of these residues were exemplified by analytical studies conducted during the decontamination of "Patches", a former RANCH HAND aircraft donated to the National Museum of the US Air Force, Wright-Patterson AFB Ohio. A search of the historical records provided a detailed history of "Patches" to include its assignments in international locust control programs, its use in tests and evaluations of spray equipment at Eglin AFB, Florida, to its use in Vietnam not only in Operation RANCH HAND, but frequently reconfigured for its use in hauling cargo or for insecticide missions in Operation FLYSWATTER. The extensive activities of "Patches" put in doubt the analytical results of the 4 (and only 4) samples analyzed for dioxin and furans in 1994. Indeed, the fingerprint of the analytical results suggested the potential contamination or cross contamination by PCBs, the insecticide Lindane, and other aromatic materials. Clearly "Patches" was not a representative aircraft for determining Agent Orange residues. Certainly the odors reported by veterans could be attributed to such pesticides as DDT or Carbanyl (Sevin®) rather than Agent Orange.

In 1996 and 2009, UC-123K aircraft in quarantine storage at the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan AFB were sampled for the residual Agent Orange constituents 2,4-D, 2,4,5-T and the associated dioxin, TCDD. One hundred forty samples (140) were collected from 4

aircraft with known histories of defoliation missions in Vietnam. The results indicated that no Agent Orange residues were found on the exterior of any aircraft or in air samples taken inside the tightly-closed aircraft. Two of the aircraft had trace levels of residues, near the lowest limit of analytical detection, on the fuselage floor, and were essentially considered "clean". The other two aircraft had levels of Agent Orange residues on all interior fuselage surfaces that were tested. The average concentrations found in these two aircraft were statistically near the risk-based screening level for dioxins, based on a one-year industrial exposure scenario. The question remained, were these residues actually capable of providing a measureable exposure or dose to aircrew or maintenance personnel?

Results of the Investigation into Factor Number 3. The contaminant TCDD found in the dry residues within Post-Vietnam UC-123Ks was not water soluble. The only method for extracting and measuring TCDD within the aircraft interior surfaces was through the use of wipe samples "wetted" with the organic solvent hexane. Although there were measurable levels of TCDD within these dried residues, studies of dermal contact with TCDD have found that any exposures that occurred were "negligible" because the skin is a major barrier to TCDD uptake, contributing less than 1% over the long term to the body burden. Vapor exposures to TCDD at near ambient temperatures were extremely unlikely to result in any significant dose because TCDD is not volatile below 420° C (~ 780 °F).

Four epidemiological or analytical studies of Vietnam veterans or professional sprayers of 2,4,5-T herbicide provided supporting evidence that "primary" or "secondary" exposure to TCDD associated with the spraying of Agent Orange would not have resulted in diseases caused by the herbicides or its associated TCDD. However, it is important to note that all the analytical and scientific studies cannot prove that the Air Force Reserve aircrews and maintenance personnel assigned to the UC-123K were not exposed to Agent Orange and its associated dioxin contaminant. ***However, all the analytical and scientific studies suggested that if they were exposed, that exposure was negligible.***

INTRODUCTION

In the March/April 2008 issue of Orion Magazine, an article was published titled: "***Agent Orange: A Chapter from History That Just Won't End***- The author's article focused on his visit to the Aerospace Maintenance and Regeneration Center (AMARC) on Davis-Monthan Air Force Base (AFB), Arizona where the remaining UC-123K RANCH HAND aircraft were stored for more than 22 years [1]. Why the visit? "*Because I've come to bear witness to American folly, to rest my eyes on the flying machines that flattened the forest of Southeast Asia, poisoned its people, and changed my life.*" The author, Ben Quick, described how his father had served in Vietnam and was the victim of a "*chemical rain (i.e., Agent Orange) that falls on American troops as they slink through the hinterlands of Vietnam in search of Viet Cong.*" Mr. Quick cited stories of Agent Orange and its associated dioxin, and thus concluded that the reason the UC-123K aircraft remained in an isolated location at AMARC was because the aircraft were contaminated by Agent Orange and its associated dioxin. This very sincere and emotional article triggered a cascade of concern by various Air Force Reserve aircrews that had flown some of those aircraft from 1972 – 1982, some 2 to 10 years after cessation of the RANCH HAND defoliation program during the Vietnam War [2].

In 2011, a retired Air Force officer who had served with an Air Force Reserve Unit filed a complaint with the Air Force Inspector General alleging that the Air Force knew that UC-123Ks were used for spraying Agent Orange in Vietnam and that the Air Force had failed to properly inform post-Vietnam aircrews of the risks [3]. The Air Force issued a "Consultative Letter" released on 27 April 2012 and prepared by the Air Force Research Laboratory, Wright-Patterson AFB, Ohio titled: ***UC-123 Agent Orange Exposure Assessment*** [4]. Subsequently, on 25 September 2012, the Veterans Benefits Administration, Department of Veterans Affairs issued an "Advisory Opinion" on "***Service-connection based on exposure to Agent Orange due to flying C-123 aircraft***" [5]. Both the Consultative Letter and the Advisory Opinion essentially agreed that it was unlikely that "*any dioxins from residual Agent Orange on aircraft surfaces, or that any exposure would lead to adverse health effects.*" The Compensation Service recommended that such claims associated with Agent Orange exposure be denied service-connection. Never-the-less, the Department of Veterans Affairs released a Public Health Notice on **Agent Orange Residue on Post-Vietnam War Airplanes** that concluded: "*Although the*

risk of long-term health problems from exposure to Agent Orange residue on post-Vietnam C-123 airplanes is minimal, Veterans who believe they have exposure-related health problems may file a claim for disability compensation. These claims will be decided on a "case-by-case basis" [6].

Despite the actions and conclusions by the Department of the Air Force and the Department of Veterans Affairs, the controversy has continued. Although the allegations were primarily related to the potential of remaining residues to provide a source for exposure and dose, there are other factors that need to be evaluated.

FACTORS CRITICAL TO THE EVALUATION OF THE ALLEGATIONS

In October 2012, a veteran-prepared report "***Request for Congressional Assistance with C-123 Veterans' Claims: Establishing Agent Orange Exposure to Veterans"*** was distributed to various Congressional delegations [7]. The essence of the report focused on the following three issues or factors critical to establishing that the United States Air Force Reserve crews and maintenance personnel were exposed to toxic chemical residues from post-Vietnam aircraft, and were thus entitled to service-connected compensation:

- That the aircraft alleged to be the sources of the exposure to residues of Agent Orange and its associated dioxin (2,3,7,8-tetrachlorodibenzo-*p*-dioxin, TCDD) were the former RANCH HAND UC-123Ks, and that these aircraft were generally the only aircraft that Air Force Reserve personnel at selected Air Reserve units flew or maintained;
- That the residues within these remaining UC-123Ks were from Agent Orange, and that the magnitudes of these residues were exemplified by analytical studies conducted during the decontamination of "Patches", a RANCH HAND aircraft donated to the National Museum of the US Air Force, Wright-Patterson AFB Ohio; and,
- That the Agent Orange/ dioxin residue within the aircraft was a primary route of exposure and posed a far greater risk than those experienced by the RANCH HAND crews that flew the UC-123Ks in Vietnam because those crews were exposed for generally just one year, not multiple years as were the Air Force Reserve crews.

A BRIEF HISTORY OF THE C-123, UC-123B, AND THE UC-123K

In order to understand how many UC-123K aircraft were available to Air Force Reserve units after the termination of the RANCH HAND program in Vietnam, it was necessary to review the history of the C-123 aircraft. That history began in July 1955 when the Tactical Air Command's 309th Troop Carrier Group, Ardmore AFB Oklahoma took delivery of the first Fairchild C-123B "Provider", a twin-engine transport designed for assault operations into landing zones that had been only rudimentarily prepared. Fairchild Corporation of Hagerstown, Maryland produced 300 C-123B aircraft between the years 1954-1958 [8].

In November 1961, six Providers were sent to South Vietnam to start Operation RANCH HAND, the defoliation program. In December 1961, an additional squadron of C-123Bs (16 aircraft/squadron) were deployed to Vietnam from the 464th Troop Carrier Wing, Pope AFB, North Carolina. By the fall of 1964 there were four USAF C-123B squadrons flying airlift and airdrop missions. All of these squadrons, including RANCH HAND aircraft, were assigned to the 315th Air Commando Wing (later renamed the 315th Special Operations Wing) and which would remain the principal organization for all C-123B squadrons until 1970 [8].

By March 1965, RANCH HAND (now designated as the 12th Air Commando Squadron) was deploying seven UC-123Bs (the "U" designating spray aircraft) for defoliation and crop destruction missions [9]. In April 1968, the first UC-123Ks arrived at Bien Hoa Air Base, Vietnam. The 12th Air Commando Squadron was the last of the five units in the 315th Wing to get the improved aircraft [8].The UC-123 "K" models were reworked "B" models with a powerful J-85-17 jet engine on each wing outboard of the conventional engines, improved engine armor plating, a strengthened windshield, a larger spray pump, and a flowmeter to assure a constant chemical flow rate of 3 gallons per acre [9].

Additional UC-123Ks continued to arrive in May 1968. By the end of June 1969, 29 UC-123Ks were assigned to the RANCH HAND squadron, and by November 1969, shortly after it reached a peak of 34 assigned aircraft, the squadron was suddenly reduced to 14 aircraft with the released aircraft reassigned to airlift units or returned to the Continental United States (CONUS) [8, 9]. On 1 January 1970,

the 315th Special Operations Wing was re-designated as the 315th Tactical Airlift Wing, while the RANCH HAND unit retained its Special Operations Squadron title. On 31 March 1970, USAF Headquarters again directed reduction of the spray squadron to eight aircraft – six for herbicide and two for insecticide – by the end of June 1970 [8]. In July 1970, the remaining aircraft were moved to Phan Rang, the Headquarters of the 315th Tactical Airlift Wing. On 28 January 1971, the Joint Chief of Staff officially cancelled all further USAF herbicide missions. RANCH HAND crewmen continued flying the two insecticide missions (Operation FLYSWATTER) until December 1971 [9].

A total of 46 aircraft were modified for spray operations in the ten years of herbicide and insecticide operations in Vietnam. This included 12 UC-123Bs that were never modified as "K" models, and 34 UC-123Ks. The last "B" model aircraft left Vietnam in January 1969. Nine RANCH HAND aircraft were lost to crashes, including 1 UC-123K in February 1971 [9]. As previously noted, beginning in November 1969 many of the UC-123Ks were either transferred to USAF airlift squadrons, or transferred to the South Vietnam Air Force, or assigned to Air America operations. These transfers required the removal of the spray systems including the 1,000-gallon tank, console, and spray boom. Never-the-less, the aircraft retained their designation as "UC-123Ks". The tanks and spray booms were not returned to CONUS, but left at Da Nang, Bien Hoa, or Phan Rang.

A search of the historic records concluded that 183 C-123Bs were modified to "K" models, to include the 34 UC-123Ks assigned to RANCH HAND. Between 2 February 1962 and 27 December 1971, 62 of the various modified C-123s were lost to crashes/accidents in Vietnam. Like the UC-123Ks, the remaining C-123K aircraft were also widely distributed as the gradual withdrawal of US Forces from the Republic of Vietnam occurred. A large number of C-123Ks were transferred to the South Vietnam Air Force, with the first squadron transferred in 1970, and three additional USAF C-123K Squadrons by September 1971. Air America received 35 various C-123Bs, C-123Ks, or UC-123Ks; these were primarily assigned to airlift missions in Laos [10].

The records indicated that a total of 47 USAF C-123Ks and 23 UC-123Ks returned to CONUS throughout 1970 – 1971 with most of these aircraft being initially assigned to 309th Aerospace Maintenance and Regeneration Group (AMARG),

Davis-Monthan AFB Arizona. All of these aircraft underwent a reconditioning prior to reassignments to selected USAF Air Reserve units in 1971-1972. It should be noted that 4 of the UC-123Ks were assigned directly to the Air Force Reserves 907th Tactical Airlift Group, Rickenbacker Air National Guard Base Ohio. These 4 aircraft retained their special configuration for aerial spraying as part of USAF's aerial insecticide operations [11]. Eighteen of the 23 UC-123Ks returned to AMARG between 1980 and 1986.

CONCLUSIONS

Contrary to the allegation, both C-123K and UC-123Ks aircraft were assigned to USAF Reserve units during the period 1972 -1982. A few of the UC-123Ks had been assigned to RANCH HAND beginning in May 1968, but most of the UC-123Ks arrived in Vietnam between December 1968 and November 1969, a time when defoliation operations were significantly reduced. Moreover, after November 1969, the Department of Defense directed that the use of Agent Orange be restricted and the tactical herbicides Agents Blue and White be substituted. Thus, Air Force Reserve crews were more likely to have flown in C-123Ks, rather than assigned to an aircraft that had been formerly assigned to RANCH HAND, or if formerly assigned, an aircraft that very likely did not spray Agent Orange. Verification of the tail numbers provided in the veteran-prepared report confirmed that only 6 of 26 aircraft assigned to the 731st Tactical Airlift Squadron, Westover AFB Massachusetts were former RANCH HAND aircraft [7].

THE ALLEGATIONS ON THE RESIDUE REMAINING IN THE UC-123Ks

The October 2012 veteran-prepared report repeatedly emphasized that the residues remaining within the UC-123K aircraft assigned to Air Force Airlift Reserve units were those related to Agent Orange [7]. The basis for this conclusion came primarily from the analyses conducted in 1994 on one aircraft, namely "Patches" (tail number 56-4362) that had been donated to the National Museum of the United States Air Force, Wright-Patterson AFB Ohio in 1980 [12]. During its service in RANCH HAND, the aircraft had taken more than 600 hits from enemy ground fire, hence, the name "Patches" [13].

The history of "Patches" is informative as to the types of potential residues that could be present within its air frame. "Patches" was one of the original six C-

123Bs located at Pope AFB North Carolina that was modified for aerial spraying and was sent to South Vietnam, arriving in January 1962. However, before it was involved in defoliation missions, it was diverted at the request of the Department of State to the Middle East for locust control. It departed 2 May 1962 from Saigon to Tehran, Iran where it sprayed over 17,000 acres in Iran and Afghanistan with the insecticide Lindane [9, 14], returning to Langley AFB Virginia on 10 June 1962. On 14 June 1962, it was redeployed to Eglin AFB Florida to participate in a 30-day test of aerial spray equipment on Test Range C-52A of the Eglin Military Reservation [9]. While at Eglin, it sprayed the tactical herbicide "Purple" in the first tests of the modified aerial spray equipment [15]. Following its return to Vietnam, it was immediately dispatched to treat locust infestations with 57% Malathion [16]. From January through May 1963, it was temporarily converted to supporting logistical operations delivering ammunition, general cargo including maintenance supplies, and personnel [9].

From June 1963 through most of 1966, "Patches" supported RANCH HAND operations in both defoliation and crop destruction missions. However, on 14 October, "Patches" was reconfigured and dispatched again to treat locust infestations in Thailand with 95% Malathion [9, 16]. In April 1967, Patches was ordered permanently assigned to Malathion duty under the direction of the MACV (Military Assistance Command, Vietnam) Surgeon General's Office and in support of Operation FLYSWATTER [17]. In June 1968, "Patches" left the insecticide flight to return to the United States for modification as a K model. In October 1968, "Patches", now a UC-123K, returned to Vietnam and temporarily returned to flying defoliation missions, primarily involving- White (from a review of the Daily Air Activity Reports, 1 October – 1 December 1968). However, in late November 1968, it was returned to mosquito control duty. After termination of Operation FLYSWATTER in December 1971, "Patches" returned to CONUS in 1972 and served in the Air Force Reserves in an airlift capacity until it was retired to the USAF Museum in 1980 [13].

A 1994 – 1997 decontamination of "Patches" at the USAF Museum focused exclusively on the presence of dioxins and furans with the data converted to 2,3,7,8-TCDD equivalents (TEQs) and reported in nanograms per wipe sample. The assumption was that the 17 congeners identified of polychlorinated dibenzo-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) were congeners that

confirmed the residue was from Agent Orange [12]. There were only four wipe samples reported in the 1994 analyses, and the TEQ equivalents ranged from 4.1 ng/m^2 to 1,400 ng/m^2. An analytical study conducted by Dow Chemical Company of 82 samples of 2,4,5-T confirmed that the only quantifiable dioxin in 2,4,5-T was the 2,3,7,8-TCDD, although some samples showed traces of the penta (PnCDD), hexa (HxCDD), and hepta (HpCDD) PCDDs [18]. The wipe sample having the largest concentration of TCDD may have been a result of the aircraft spraying Agent Purple while at Eglin AFB in 1962, since Purple had much higher levels of TCDD than Agent Orange [15]. The other PCDDs and the PCDFs may have been present as a result of PCB-leaking electric transformers, and pentachlorophenol-treated ammunition boxes, both frequently transported as cargo in Vietnam [19]. The potential presence of PCBs and pentachlorophenol contributing to the residue also presented the possibility that the actual analytical methods may have had interferences from polychlorinated aromatics, and the values were not accurately determined [20]. This may have been especially true of the potential presence of 2,3,4,6-tetrachlorobenzene and 2,3,4,6-tetrachloro-phenylmethyl ether, both persistent products of the breakdown of Lindane, the insecticide sprayed by "Patches" in 1962 [14, 20]. Two subsequent wipe samples taken after decontamination in 1995 showed an average interior 2,3,7,8-TCDD concentration of 45 ng/m^2 [12].

The above assessment suggested that residues in "Patches" may not have been "representative" of the residues that may have persisted in other UC-123K aircraft deployed by Air Force Reserve units. From 1986 through 2010, there were 18 UC-123K aircraft being stored with AMARG at Davis-Monthan AFB. These aircraft were owned and managed by the 505th Aircraft Sustainment Squadron (ACSS), Hill AFB Utah. Four of the 18 aircraft were sampled for residual Agent Orange components, namely the herbicides 2,4-D and 2,4,5-T and the associated dioxin contaminant 2,3,7,8-TCDD [21]. The history of all 4 aircraft indicated they had been deployed in RANCH HAND missions in Vietnam (tail numbers 54-086, 54-4571, 55-4532, and 55-4544) [9, 10]. A total of 140 samples were collected from the 4 aircraft. The wipe samples consisted of gauze pads wetted with hexane for dioxin samples and with water for herbicide samples. Importantly, a comprehensive sampling protocol ensured that all key internal and external

surfaces were sampled in replicate for all four aircraft. Additionally, air samples were taken from within each aircraft [21].

The results of the sampling and analyses for the four aircraft are shown in Figures 1 and 2. The dioxin data were expressed in TEQs to be consistent with the data from "Patches", although the primary dioxin was 2,3,7,8-TCDD with traces of the HpCDD and Octadibenzo-p-dioxin (OCDD) being detected in a few samples [21]. The fingerprint pattern of the 17 congeners identified in samples from "Patches" was not present in samples from the 4 aircraft sampled at AMARG. The analytical results for the 4 former RANCH HAND aircraft sampled at AMARG indicated:

There were no detectable levels of the phenoxy herbicides or associated TCDD on the exterior of the 4 aircraft that were sampled;

There were no detectable levels of the phenoxy herbicides or TCDD found in any of the air samples collected inside the 4 aircraft sampled;

Two of the 4 aircraft had trace levels of 2,4-D and 2,4,5-T at the detection level of 230 $\mu g/m^2$ and 150 $\mu g/m^2$, respectively (these were considered very low values); and

Two of the 4 aircraft had low levels of dioxin and phenoxy herbicides on all interior surfaces that were sampled (average concentrations of 14.6 and 18.2 ng/m^2 TEQ, 518 and 502 $\mu g/m^2$ 2,4,5-T, and 587 and 453 $\mu g/m^2$ 2,4-D for aircraft 55-4571 and 55-4532, respectively) [21].

Some additional observations: **1**. Interior floor areas were not found to be more heterogeneously contaminated than interior wall surfaces. In fact, interior floor concentrations were uniform in the two aircraft with measureable residual contamination; **2**. The results were consistent with previous sampling for phenoxy herbicides that was conducted in 1996. Both aircraft that were found to have trace concentrations (55-4544 and 54-0585) had non-detectable levels of herbicides on the fuselage floor in the 1996 samples. The two aircraft that had low levels of dioxins (TEQs) and herbicide concentrations in all interior surface samples (55-4532 and 55-4571) also had detectable herbicide levels in samples taken from the floor in 1996; and, **3**. Concentrations of dioxins found during the 2009 sampling

event were significantly lower than concentrations found in "Patches" in 1994, or composite samples collected in 1995 after decontamination, i.e., 45ng/m^2 [21].

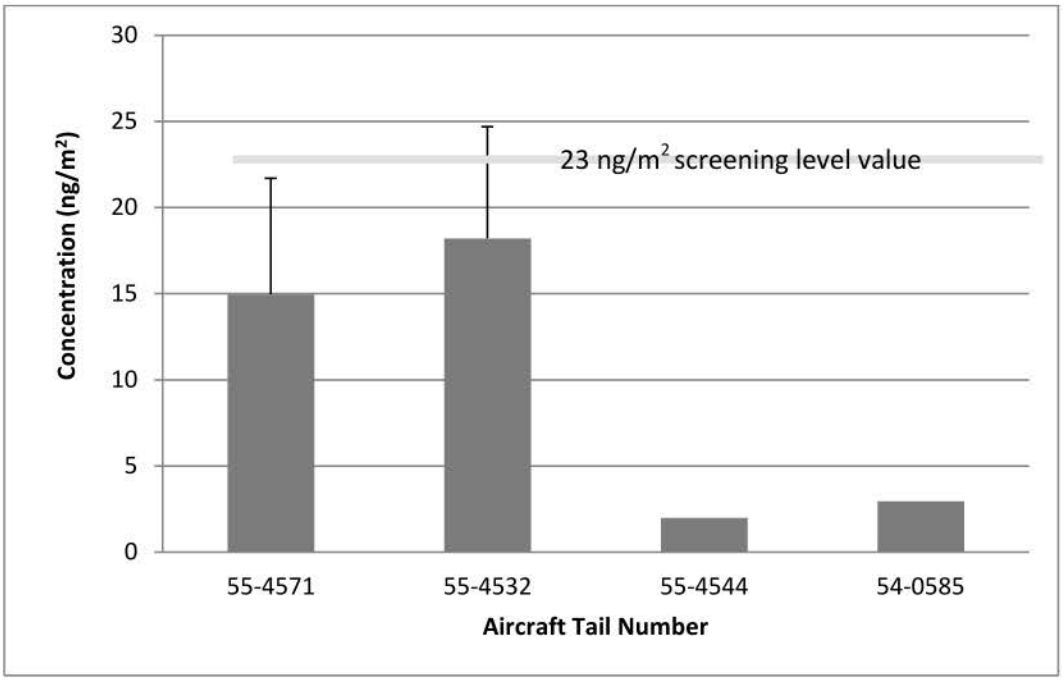

Figure 1. Average Interior Concentrations of Dioxins Reported as ng/m^2 TEQ, Compared to the Risk-Based Screening Level Value of 23 ng/m^2. Error bars indicate 95% upper confidence limits for average values approaching the risk-based standard [21].

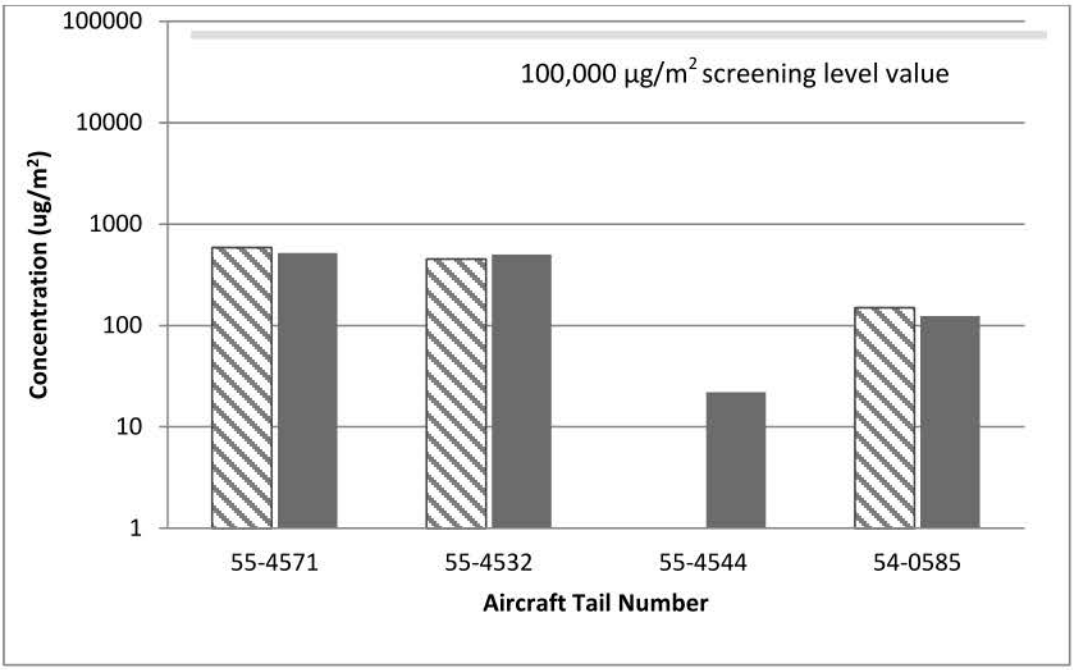

Figure 2. Average Interior Concentrations of 2,4-D (blue, diagonal fill) and 2,4,5-T (red, solid fill), Compared to the Risk-Based Screening Level Value of 100,000 µg/m^2. Note log scale of concentration axis [21].

In Figure 2, note that aircraft 55-4544 had no detectable levels of 2,4,5-T, suggesting that this UC-123K was a late arrival in 1969 to RANCH HAND and was very likely used primarily for spraying of Agent White, a formulation of picloram (Tordon) and 2,4-D.

Another issue related to the UC-123Ks controversy, was the issue of "smells/odors" in the aircraft. All three of the tactical herbicides had distinct odors. Although TCDD does not have an odor, Agent Orange had a "butanol-like" odor that was very persistent, i.e., years. Malathion and Lindane also had persistent odors, but there was another source not identified in the C-123Ks that returned from Vietnam, and that had to do with the odor associated with the quarantine procedures used for all returning aircraft and equipment from Vietnam [22].

During the gradual withdrawal of US Forces from the Republic of Vietnam, equipment and material which were not designated for turnover to the Vietnamese Air Force (VNAF) were returned to CONUS for further utilization. This "retrograde cargo" was required to undergo international quarantine procedures designed to eradicate disease vectors, insects and other pests, thus preventing their

introduction into the United States [22]. If a UC-123K or any of the C-123K models transported cargo in Vietnam and were reassigned to CONUS, they were frequently tasked to carry retrograde cargo, and hence were required to undergo quarantine procedures. The Military Quarantine Inspector was responsible for the inspection and certification of aircraft and retrograde cargo. The processing and quarantine procedures were conducted at major military installations in Vietnam. When the cargo was palletized and loaded onto the aircraft and ready for treatment, it was covered with plastic and tied down with cargo nets. The treatment consisted of a micronized DDT and Carbaryl (Sevin®) forcefully injected under the plastic covers. Even when the cargo was removed at destination, the odor of these insecticides persisted in the aircraft for many years [22]. It should be noted that EVERY C-123 aircraft, including the C-123K models, returning from Vietnam was subjected to quarantine procedures. The odors from these persistent pesticides were present in these aircraft for many years, and were likely those odors mistaken for Agent Orange, i.e., noting that 20 of the 26 aircraft identified in the October 2012 report "***Establishing Agent Orange Exposures to Veterans***" were not RANCH HAND aircraft but alleged to have been, based on odors presumably associated with residues [7].

CONCLUSIONS

The allegations put forth by former Air Force Reserve crew and maintenance personnel were that the residues within the 19 UC-123Ks reassigned post-Vietnam to their Reserve units were from Agent Orange, and that the magnitudes of these residues were exemplified by analytical studies conducted during the decontamination of "Patches", a former RANCH HAND aircraft donated to the National Museum of the US Air Force, Wright-Patterson AFB Ohio. A search of the historical records provided a detailed history of "Patches" to include its assignments in international locust control programs, its use in tests and evaluations of spray equipment at Eglin AFB, Florida, to its use in Vietnam not only in Operation RANCH HAND, but frequently reconfigured for its use in hauling cargo or for insecticide missions in Operation FLYSWATTER. This extensive multiple activities of "Patches" put in doubt the analytical results of the 4 (and only 4) samples analyzed for dioxin and furans in 1994. Indeed, the fingerprint of the analytical results suggested the potential contamination by PCBs, the insecticides Lindane , and other aromatic materials. Clearly "Patches" was not

a representative aircraft for determining Agent Orange residues. Certainly the odors reported by veterans could be attributed to pesticides rather than Agent Orange, namely DDT and Carbanyl (Sevin®).

In 1996 and 2009, UC-123K aircraft in quarantine storage at the 309th Aerospace Maintenance and Regeneration Group (AMARG) at Davis-Monthan AFB were sampled for the residual Agent Orange constituents 2,4-D, 2,4,5-T and the associated dioxin, TCDD. One hundred forty samples (140) were collected from 4 aircraft with known histories of defoliation missions in Vietnam. The results indicated that no Agent Orange residues were found on the exterior of any aircraft or in air samples taken inside the tightly-closed aircraft. Two of the aircraft had trace levels of residues, near the lowest limit of analytical detection, on the fuselage floor, and were essentially considered "clean". The other two aircraft had levels of Agent Orange residues on all interior fuselage surfaces that were tested. The average concentrations found in these two aircraft were statistically near the risk-based screening level for dioxins, based on a one-year industrial exposure scenario. The question remained, were these residues actually capable of providing a measureable exposure or dose to aircrew or maintenance personnel?

THE ALLEGATIONS THAT SIGNIFICANT EXPOSURE OCCURRED

The most important and relevant allegation was that the herbicide and dioxin (Agent Orange) "dry residues" within the UC-123K aircraft represented a primary route of exposure and, thus potentially posed a far greater risk than those experienced by the RANCH HAND crews that flew those same UC-123Ks in Vietnam. The supposition was that RANCH HAND aircrews and maintenance personnel were exposed to Agent Orange for generally just one year, not the multiple years as were contended by the post-Vietnam Air Force Reserve crews.

The assumption that analytical values of the "dry dioxin residues", obtained through the use of "wipe" samples taken from within the interior surfaces of Post-Vietnam UC-123Ks, are determinants of the degree and level of individual exposures is simply not valid. The dioxin, 2,3,7,8-TCDD, tenaciously adheres to surfaces and is essentially inert because it is not susceptible to chlorination or dechlorination reactions, thus its long persistence time [23]. Extensive studies on the photodegradation of TCDD were conducted by Crosby et al., [24]. They found

that in sunlight and in the presence of Agent Orange, the TCDD molecule was readily dechlorinated (destroyed) because the n-butyl formulation of Agent Orange provided a hydrogen donor essential for the dechlorination of TCDD [24]. The acid forms of 2,4-D and 2,4,5-T (the forms founds in the 2009 studies of residues in 4 UC-123Ks at AMARG, Figure 2) do not contribute the necessary organic hydrogen donor, and hence the continued persistence of TCDD [21]. The studies of TCDD persistence at Eglin AFB Florida confirmed that in the absence of the herbicide and sunlight, TCDD residues were still detected 25 years after massive levels of Agents Purple and Orange had been aerially sprayed on Test Area C-52A in the early and mid-1960s [15].

In their assessments of exposure to the TCDD within the UC-123K aircraft, Air Force Reserve personnel suggested that there were two major routes of exposure. The first was the residue that aircrews or maintenance personnel came in dermal contact with, and the time (duration and frequency) of that contact. The second route of exposure was through inhalation. It was logical for the aircrews to assume that if they could smell an odor, then through inhalation they were being exposed to what was in the odor [7, 25].

Dermal Exposure: Dioxin (TCDD) is essentially water insoluble. In both the studies conducted with "Patches" (1994) and the 4 aircraft at AMARG (2009), the TCDD residues on the interior surfaces of the aircraft were removed through the use of wipes "wetted" with the organic solvent hexane [12, 21]. Although there were measurable levels of TCDD in the residues, extensive studies have shown that actual dermal contact with TCDD contributes no more than 1% (and probably considerably less) over the long term to the body burden, and that 1% was considered by the Center for Disease Control and Prevention (CDC) to be a "negligible" exposure [26]. Thus, the skin is a major barrier to exposure from TCDD [26]. The risk assessments that have used the analytical data from the hexane wipe samples failed to recognize that those analytical values cannot be extrapolated to represent a human "dose". This approach has been labeled the "big leap" in defining exposure in a population, e.g., aircrews, and the environmental matrix, e.g., the residues on the interior walls, and the storage of dioxin in the human body [27].

Inhalation Exposure: In considering inhalation of TCDD from the air contained within the UC-123K aircraft, the single most important property of TCDD is its "volatility". To understand how the values of volatility for TCDD are derived, see **Appendix 1**.The data in **Figure 2 of the Appendix** clearly shows that the vapor pressure of 2,3,7,8-TCDD is extremely low, including at elevated temperatures. At ambient temperature (around 25° C, 77° F) TCDD is essentially in a solid state and its vapor pressure is about 9 to 11 orders of magnitude lower than that of liquid water. The 2,3,7,8-TCDD will only melt around 420° C (788° F). At 100° C (212° F), the boiling temperature of water, the vapor pressure of 2,3,7,8-TCDD is 7 to 8 orders of magnitude lower than that of water. As a consequence vapor exposures to TCDD vapors at or near ambient temperatures are extremely unlikely to result in a significant dose. To explain it in more practical terms, to have had TCDD volatilize within the crew compartment of the UC-123K, the air temperature would have had to be approximately 420° C or 788° F.

Supporting Epidemiologic Studies: The veteran-prepared report "***Request for Congressional Assistance with C-123 Veterans' Claims: Establishing Agent Orange Exposures to Veterans"*** claimed that that the exposures received by Air Force Reserve personnel were "primary exposures", while RANCH HAND exposures were "secondary exposures". In reality, a pathway that would have represented a primary exposure to Agent Orange and its associated TCDD would have been a direct exposure to the liquid herbicide. A "secondary exposure" would have been through secondary pathways such as the consumption of contaminated food, or the drinking of water with contaminated sediments. These are called "environmental exposures" and represent an indirect exposure [28].

There are two examples of veterans allegedly receiving environmental exposures. The first study compared the blood serum TCDD levels in 646 ground combat troops who served in heavily sprayed areas of Vietnam against 97 veterans who did not serve in Vietnam [29]. The 646 combat veterans had served one tour in III Corps, a heavily sprayed part of Vietnam near Saigon. Exposure estimates were based on military records and on self-reporting. For the Vietnam veterans, the fact that military records appeared to validate that they were exposed, coincided with their own perception of being exposed. However, the concentration of TCDD levels in Vietnam and non-Vietnam veterans were nearly identical, ~ 4 parts per trillion (ppt) [29]. To the Vietnam veterans in this study, the perception of

exposure and the reality of exposure were not the same, and the use of military records to determine locations of combat veterans in relation to RANCH HAND missions were also not good indicators for validating exposure to Agent Orange.

The second study was a 30-year postservice mortality study of a cohort of 9,324 male US Army veterans who had served in Vietnam, and whose presumption of exposure would have been consistent with the Department of Veterans Affairs policy [30]. The Vietnam veteran cohort was matched with a cohort of 8989 male non-Vietnam veterans [30]. The conclusion as reported in 2004:

Vietnam veterans continued to experience higher mortality than non-Vietnam veterans from unintentional poisonings and drug-related causes. Death rates from disease-related conditions, including cancers and circulatory diseases, did not differ between Vietnam veterans and their peers, despite the increasing age of the cohort (mean age, 53) and the longer follow-up (average, 30 years) [30].

There are two examples of long term populations studies where the cohorts were exposed to either Agent Orange in Vietnam or to the spraying of 2,4,5-T herbicide. The first study was the Air Force Health Study (AFHS). In 1982, the US Air Force initiated the Air Force Health Study, a study of the men of Operation RANCH HAND, the US-Vietnam allied program for the aerial application of herbicides during the Vietnam War [31]. For the 20-year study there were two cohorts; one cohort included 1,261 RANCH HAND veterans, and the other cohort represented the comparison group that consisted of 19,109 veterans who flew C-130s in Vietnam. The protocol used a matched retrospective cohort design intended to independently determine mortality, morbidity, and reproductive health [31].

The strength of AFHS was enhanced during the second physical examination in 1987 with the development of TCDD determination in blood serum at the parts per trillion level (ppt). Of the 995 RANCH HAND who were fully compliant in 1987 for the physical examination, 932 had serum specimens analyzed by CDC. The serum values for TCDD ranged from less than 10 ppt (considered “background”) to 618 ppt. The highest values were found in the maintenance personnel who came into direct contact with the liquid herbicide, and who were responsible for loading the herbicide into the planes, cleaning the spray equipment and repairing the aircraft [31]. During the six examinations conducted over the 20 years, the AFHS

investigated over 300 health endpoints on multiple occasions. ***The results of the AFHS did not provide evidence of disease in the RANCH HAND veterans caused by their elevated levels of exposure to Agent Orange and its associated TCDD contaminant*** [31]**.**

The second study of a populations exposed to TCDD involved 2,4,5-T herbicide applicators in New Zealand [32]. Of 548 men employed as professional pesticide applicators in New Zealand from 1979 through 1982, nine were selected who had sprayed 2,4,5-T over a range of 7 to 30 years. Their blood serum levels ranged from 3 to 131 ppt (mean of 53 ppt TCDD), where the variation in TCDD was related to their duration of work exposure to 2,4,5-T. ***The authors concluded that increased risks from brief exposure to phenoxyherbicides are probably not attributable to the TCDD that contaminates 2,4,5-T herbicide*** [32].

CONCLUSIONS

The contaminant TCDD found in the dry residues within Post-Vietnam UC-123Ks was not water soluble. The only method for extracting and measuring TCDD within the aircraft interior surfaces was through the use of wipe samples "wetted" with the organic solvent hexane. Although there were measurable levels of TCDD within these dried residues, studies of dermal contact with TCDD have found that any exposures that occurred were "negligible" because the skin is a major barrier to TCDD uptake, contributing less than 1% over the long term to the body burden. Vapor exposures to TCDD at near ambient temperatures were extremely unlikely to result in any significant dose because TCDD is not volatile below 420° C (~ 780 °F).

Four epidemiological or analytical studies of Vietnam veterans or professional sprayers of 2,4,5-T herbicide provided supporting evidence that "primary" or "secondary" exposure to TCDD associated with the spraying of Agent Orange would not have resulted in diseases caused by the herbicides or its associated TCDD. However, it is important to note that all the analytical and scientific studies cannot prove that the Air Force Reserve aircrews and maintenance personnel assigned to the UC-123K <u>were not exposed</u> to Agent Orange and its associated dioxin contaminant. ***However, all the analytical and scientific studies suggested that if they were exposed, that exposure was negligible.***

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APPENDIX 1*

Evaluation of the Vapor Pressure of TCDD over a range of temperatures

Vapor pressure is an important physicochemical parameter for predicting the atmospheric concentrations of given compounds. Practically, it can be used to determine the transport and fate of contaminants in the environment and to characterize exposure in the context of a risk assessment. However, the precise measurement of the vapor pressure of low-volatility substances is an experimental challenge. This is the case of dioxins and more specifically 2,3,7,8-TCDD, for which a the range of values of vapor pressure found in the literature spread over several orders of magnitude.

Below is a summary of various values of vapor pressure reported in peer reviewed literature for 2,3,7,8-TCDD. In order to give these values a concrete meaning they were compared to the vapor pressure of water at different temperature. The data was synthesized in a graphic format and the numerical values are compiled in Table 1.

Vapor Pressure of TCDD at Different Temperatures

Generally, the reported vapor pressure of 2,3,7,8-TCDD ranges between 7.4×10^{-10} to 3.4×10^{-5} mm Hg (9.9×10^{-8} and 4.5×10^{-3} Pa) (ATSDR, 1998).

In 1984, Schroy and co-workers identified some data gaps in the physical and chemical properties of 2,3,7,8-TCDD. At the time, the vapor pressure of solids was seldom studied and no data was available for TCDD. Therefore, they undertook a research program to define the physical properties of 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (TCDD), including its vapor pressure. They provided estimates for a wide range of temperatures between 25 and 421°C. The vapor pressure spanned over about 11 orders of magnitude, between 1.5×10^{-9} and 7.6×10^{2} Pa (Schroy et al., 1984). One should take caution with the reliability of these results since they differ from values published in later years by several orders of magnitude.

In a subsequent study, the same team reported all the physical and chemical data available for TCDD at the time, including the vapor pressure between 30 and 71°C

(Schroy et al., 1985). For some undetermined reasons, these results were about two orders of magnitude higher than those published in 1984.

In 1986, Podoll et al. studied the rates of volatilization and photolysis of TCDD. They measured the average vapor pressure in air at 25°C to be 7.4 +/- 0.4 x 10^{-10} Torr which corresponds to about 0.987 x 10^{-7} Pa (Podoll et al. 1986). This value is comparable to those published by Schroy et al., Rordorf et al. as well as Delle Site[1] in the same temperature range (Delle Site; 1996, Rordorf 1989; Schroy et al., 1985). Shroy et al. also reported the boiling point of dioxin to be 421.2°C (Schroy et al., 1985).

More recently, Li et al. predicted the vapor pressure of 59 PCDDs and 131 PCDFs. Overall their results were higher than those published by Rordorf et al. even though the calculation methods were the same. In particular, the vapor pressure of 2,3,7,8-tetrachlorinated dibenzo-*p*-dioxin, at 25°C was estimated to be 6.2x10^{-6} Pa, which was 31-fold higher than the values provided by Rordorf (2.0x10^{-7} Pa). The results of these studies are plotted in Figure 1.

*From: Investigations into the Allegations of Agent Orange/Dioxin Exposure from Former RANCH HAND Aircraft. Agent Orange Investigative Report Series, No. 2, November 2012

[1] Delle Site reported vapor pressure values measured for different temperatures using 6 different methods.

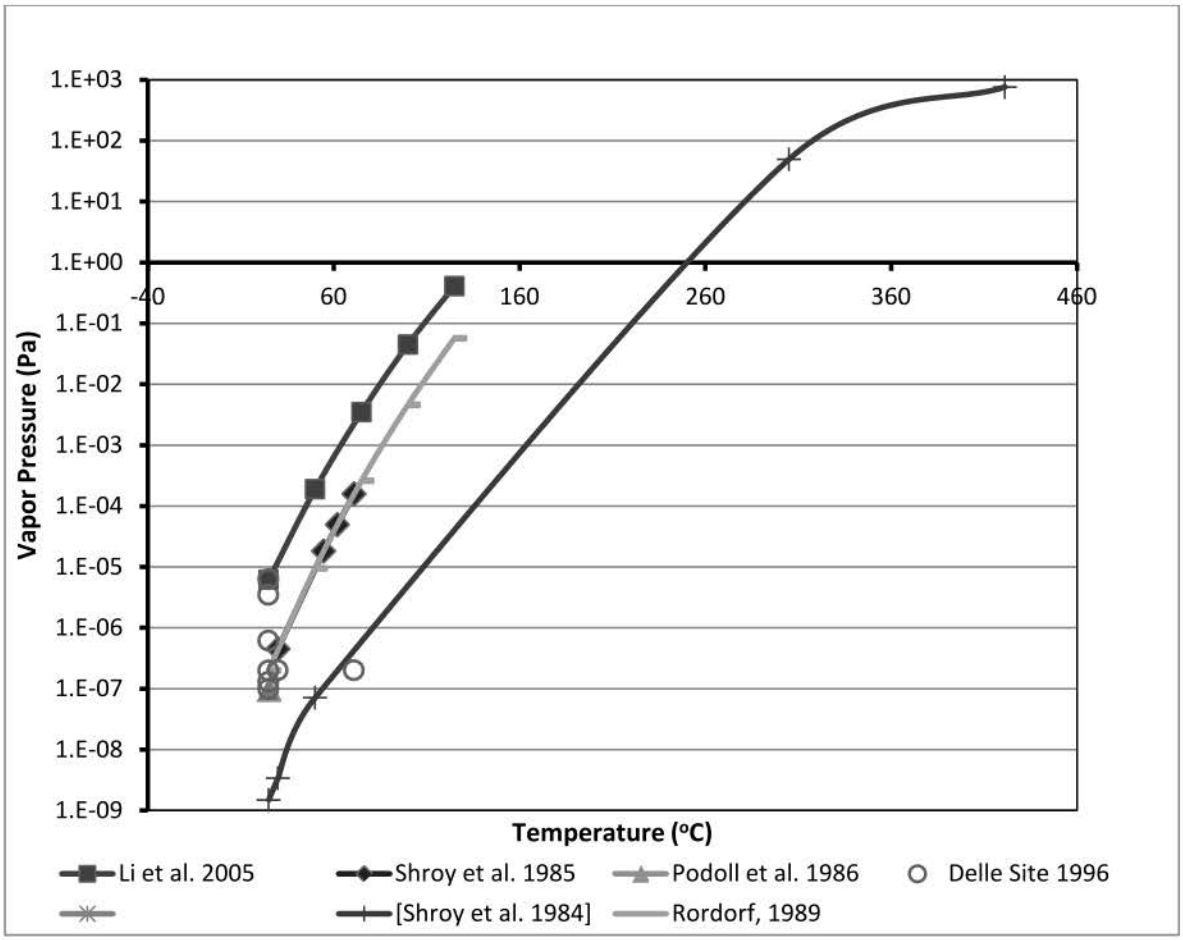

Figure 1. Reported values of vapor pressure for 2,3,7,8-TCDD at different temperatures.

Table 1. Published values of TCDD vapor pressure as a function of temperature.

Reference	Temperature (oC)	Pressure (Pa)
[Shroy et al. 1984]	25	1.49E-09
	30	3.40E-09
	50	7.15E-08
	305	4.95E+01
	421.2	7.60E+02
Shroy et al. 1985	30.1	4.53E-07
	54.6	1.83E-05
	62	4.97E-05
	71	1.59E-04
Podoll et al. 1986	25	9.87E-08
Rordorf 1989	25	2.00E-07
	50	9.50E-06
	75	2.60E-04
	100	4.60E-03
	125	5.70E-02
Delle Site 1996	24.85	9.90E-08
	29.85	2.02E-07[a]
	70.85	2.02E-07[a]
	24.85	1.30E-07
	24.85	3.50E-06[b]
	24.85	6.30E-06[b]
	24.85	2.00E-07
	24.85	6.20E-07
Li et al. 2005	25	6.20E-06
	50	1.90E-04
	75	3.50E-03
	100	4.50E-02
	125	4.10E-01

[a] Reported as a pressure of 2.02×10^{-7} measured for a temperature ranging from 303 K to 344 K

[b] Reported that a temperature of 298 K corresponding to a pressure measurement between 3.5×10^{-6} and 6.3×10^{-6} Pa

Comparison with the vapor pressure of water

The values of vapor pressure reported above were compared to the vapor pressure of water at different temperature. These values were calculated using the Antoine equation expressed as follows:

$$\log_{10}(P) = A - (B / (T + C))$$

where P is the vapor pressure (bar), T is the temperature (K) and A, B and C are parameters depending to the temperature and determined in various studies.. The values of these parameters were found on the website of the National Institute of Standards and Technology (NIST)[2] and are summarized in Table 2.

Table 2[a]. Parameters used in the Antoine equation to determine the vapor pressure of water as a function of temperature.

Temperature (K)	A	B	C	Reference	Comment
379. - 573.	3.55959	643.748	-198.043	Liu and Lindsay, 1970	Coefficients calculated by NIST from author's data.
273. - 303.	5.40221	1838.675	-31.737	Bridgeman and Aldrich, 1964	Coefficients calculated by NIST from author's data.
304. - 333.	5.20389	1733.926	-39.485	Bridgeman and Aldrich, 1964	Coefficients calculated by NIST from author's data.
334. - 363.	5.0768	1659.793	-45.854	Bridgeman and Aldrich, 1964	Coefficients calculated by NIST from author's data.
344. - 373.	5.08354	1663.125	-45.622	Bridgeman and	Coefficients

[2] NIST website. Physical properties of water available at: http://webbook.nist.gov/cgi/cbook.cgi?Name=water&Units=SI&cTG=on&cTP=on

				Aldrich, 1964	calculated by NIST from author's data.
293. - 343.	6.20963	2354.731	7.559	Gubkov, Fermor, et al., 1964	Coefficients calculated by NIST from author's data.
255.9 - 373.	4.6543	1435.264	-64.848	Stull, 1947	Coefficients calculated by NIST from author's data.

[a] Table available on the NIST website: **http://webbook.nist.gov/cgi/cbook.cgi?Name=water&Units=SI&cTG=on&cTP=on**

Table 3. Vapor pressure of water as a function of temperature

Temperature (^{o}C)	Pressure (Pa)
-17.25	1,386.354
-0.15	6,041.849
19.85	23,720.56
29.85	42,073.58
30.85	44,542.64
59.85	197,896.1
60.85	207,276.5
69.85	310,853.1
70.85	323,335.8
89.85	697,060.3
99.85	1,007,867
99.85	992,317.2
105.85	1,004,907
299.85	69,619,644

The calculated values of water vapor pressure are reported in Table 3. They are also compared with the values reported for 2,3,7,8-TCDD in Figure 2.

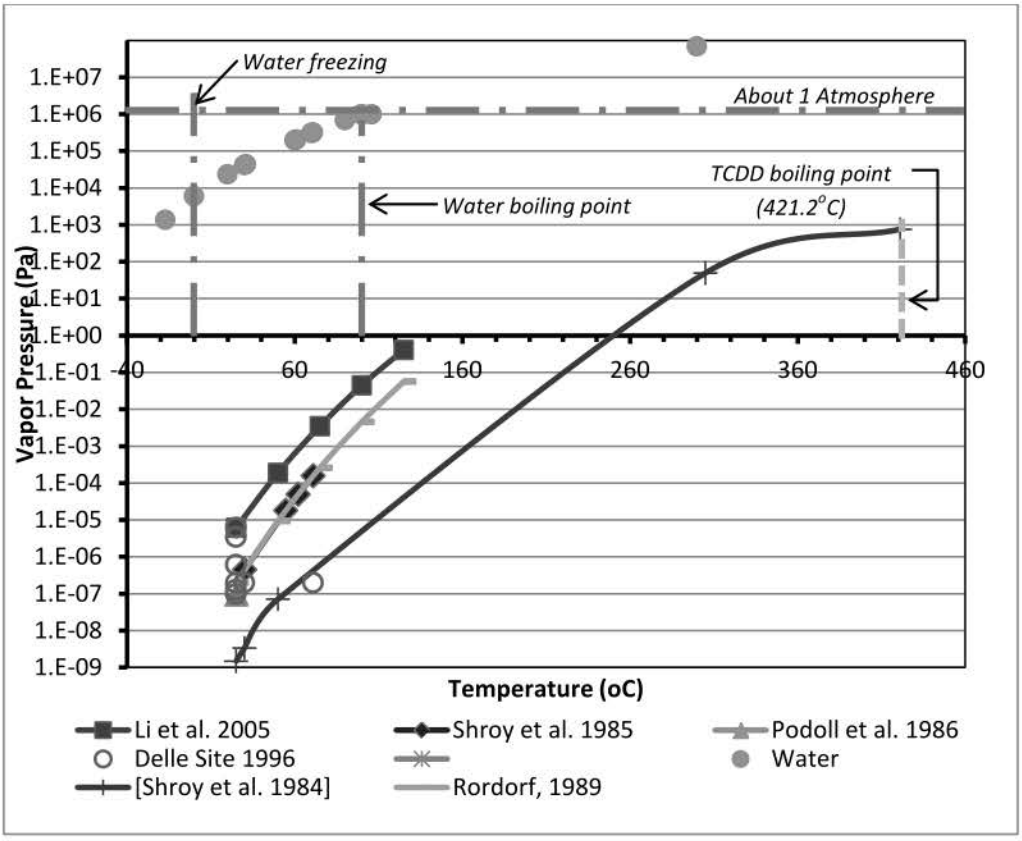

Figure 2. Comparison of the vapor pressure for 2,3,7,8-TCDD with that of water at different temperature

Conclusion

Figure 2 clearly shows that the vapor pressure of 2,3,7,8-TCDD is extremely low, including at elevated temperatures. At ambient temperature (around 25°C) TCDD is essentially in a solid state and its vapor pressure is about 9 to 11 orders of magnitude lower than that of liquid water. 2,3,7,8-TCDD will only melt around 420°C. At 100°C, the boiling temperature of water, the vapor pressure of 2,3,7,8-TCDD is 7 to 8 orders of magnitude lower than that of water. As a consequence, vapor exposures to TCDD vapors at or near ambient temperatures is extremely unlikely to result in a significant dose.

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Agent Orange Investigative Report Series, No. 14

Contract: VA-101-12-C-0006

INVESTIGATION INTO THE ENVIRONMENTAL FATE OF TCDD/DIOXIN

Compensation Service

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March 4, 2014
Mr. Michael D. Pharr
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Dear Mr. Pharr,

Please find attached to this letter the Final Report: **Investigation into the Environmental Fate of TCDD/Dioxin.** This report is the fourteenth of many reports that will be prepared in fulfillment of Contract VA-101-12-C-0006, *Development of an Archival Directory of Agent Orange Documents.* The investigative reports are supported by the archival research. The goal of developing the directory is to search and identify the thousands of documents, reports, and correspondence located within our National Archives and Records Administration and other document repositories that relate to the use of "Tactical Herbicides", including Agent Orange outside of Vietnam. Using documents from the repositories, reports are prepared on topics requested by the Compensation Service.

In the case of this report, the Compensation Service has not prepared an extensive response to questions and claims related to the potential exposure to TCDD, the dioxin contaminant in Agent Orange, by veterans who served within the Continental United States (CONUS) at military installations where the tactical herbicide was tested and evaluated. The focuses of many of these claims are related to the bioavailability of the contaminant 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD) in soils of the test sites. Over a span of four decades thousand of articles have been published on TCDD, making it, not only a chemical of regulatory interest, but one of the most researched molecules worldwide. Unfortunately, some science published about TCDD has been ignored in favor of provocative interpretations and conclusions. This is especially true of the discussions of it environmental fate, which by necessity has been the most difficult to acquire and frequently the most difficult to interpret.

There are three major sources for human exposure related to environmental studies of TCDD: 1) It entered the environment from the improper handling of industrial wastes from the manufacture of chlorophenolic products; 2) It entered the atmosphere as a consequence of an industrial accident or combustion sources; or, 3) It entered the environment as a result of the spraying or spillage of herbicides contaminated with TCDD. From a review of the available data, it was concluded that when 2,3,7,8-TCDD entered the environment, it was rapidly bound to soil and organic particles. Its low water solubility and low vapor pressure resulted in its failure to move in the soil profile, while at the same time these properties enhanced its long-term persistence. In humans, handling contaminated soil resulted in negligible contamination since the skin acted as an effective barrier to the uptake of the TCDD.

Sincerely,

Alvin L. Young

Alvin L. Young, PhD,
Prof. of Environmental Toxicology
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This report is part of the Agent Orange Investigative Report Series, and should be considered as an amendable or living document. If additional authenticated documents or records are found that address the topic of this report, a re-evaluation of the conclusions may be necessary.

INVESTIGATION INTO THE ENVIRONMENTAL FATE OF TCDD/DIOXIN

EXECUTIVE SUMMARY

There are three major sources for human exposure related to environmental studies of TCDD: 1) It entered the environment from the improper handling of industrial wastes from the manufacturer of chlorophenolic products; 2) It entered the atmosphere as a consequence of an industrial accident or combustion sources; or, 3) It entered the environment as a result of the spraying or spillage of herbicides contaminated with TCDD. The review of the available data essentially involved examining three case studies: the Missouri Dioxin Episode, the Seveso, Italy Dioxin Episode, and the USAF Environmental Studies of Agent Orange. It was concluded that when 2,3,7,8-TCDD entered the environment, it was rapidly bound to soil and organic particles. Its low water solubility and low vapor pressure resulted in its failure to move in the soil profile, while at the same time these properties enhanced its long-term persistence.

In water sources contaminated with TCDD, the residue was found to be bound to the soil particles that comprised the soil sediment; certain aquatic species were contaminated from ingesting the sediment. Animals that came into direct contact with a liquid matrix containing the TCDD were likely poisoned. However, animals that came into contact with "aged" contaminated soil could become contaminated, but the level of contamination was generally insufficient to have adverse effects upon the animals. In humans, handling contaminated soil resulted in negligible contamination since the skin acted as an effective barrier to the uptake of the TCDD.

INTRODUCTION

The concern over the widespread military use of tactical herbicides in the Vietnam War, especially the use of Agent Orange, stemmed primarily from the dioxin (2,3,7,8-tetrachlorodibenzo-*p*-dioxin, TCDD) contaminant in the 2,4,5-T herbicide. Our awareness of its chemistry, toxicity, persistence in biological tissue, and environmental fate now spans almost 40 years. During this span of four decades thousands of articles have been published on TCDD, making it not only a chemical of regulatory interest but one of the

most researched molecules worldwide. Unfortunately, some science published about TCDD has been ignored in favor of provocative interpretations and conclusions. This is especially true of the discussions of its environmental fate, which by necessity has been the most difficult to acquire and frequently the most difficult to interpret.

The IOM VIEWS ON VIETNAM VETERAN EXPOSURES

The results of the Institute of Medicine's comprehensive reviews of occupational, environmental, and veterans' studies conducted over the past 18 years have been provided periodically to the Secretary of Veterans Affairs, together with an extensive list of IOM's findings "regarding the association between specific health problems (illnesses) and exposure to herbicides" [1]. However, the IOM has not provided evidence or findings of the veterans likely levels of exposure to or absorption of herbicides or 2,3,7,8-TCDD. Indeed, the IOM viewed the determination of exposure of US military personnel who served in Vietnam as "perhaps the greatest challenge in the study of health effects associated with herbicides and TCDD." The IOM added the following explanation:

> *Some military personnel stationed in cities or on large bases may have received little or no herbicide exposure, whereas troops who moved through defoliated areas soon after treatment may have been exposed through soil contact, drinking water, or bathing. Reliable estimates of the magnitude and duration of such exposures are not possible in most cases, given the lack of contemporaneous chemical measurements, the lack of a full understanding of the movement and behavior of the defoliants in the environment, and the lack of records of individual behaviors and locations* [1].

The IOM additionally recognized that a focus on aerial spraying as the primary exposure may be misplaced and what is needed is a total exposure assessment that accounts for all sources and routes of exposure [1]. Recognizing the difficulty for Vietnam veterans to document their exposures to Agent Orange and other tactical herbicides, the Congress passed and the government enacted the Agent Orange Act of 1991. For Vietnam veterans an assessment of exposure became a moot issue since the policy of the Department of Veteran Affairs assumed exposure occurred for all Vietnam veterans who had "boots on the ground" or served in the inland waterways in Vietnam. A similar presumption was given for US veterans who served in Korea along the demilitarized zone (DMZ) between 1 April 1968 and 31

August 1971. However, Vietnam-era veterans who have filed claims but did not qualify for the presumption of exposure must provide Compensation Service with documentation of exposure to Agent Orange or the other tactical herbicides while serving in military service. The role of environmental fate should be key to any determination of claims.

A previous report in the Agent Orange Investigative Series has described the significance of environmental fate on the exposure to the four component herbicides found in the tactical herbicides tested and evaluated within the Continental United States (CONUS) for use in Vietnam [2]. This report focuses on the significance of environmental fate on exposure to the contaminant 2,3,7,8-TCDD (dioxin) found in the herbicide 2,4,5-T.

UNDERSTANDING THE TOXICITY OF TCDD

Dioxins can be released into the environment through forest fires, backyard burning of trash, certain industrial activities, residues from past commercial burning of waste, and from certain chlorinated pesticides [3]. The levels of TCDD and other dioxins present in the environment as a result of industrial and municipal activities, and under conditions representing possible misuse, are also known [3]. The health effects associated with dioxins depend on a variety of factors. They include the level of exposure and duration and number exposure, i.e., a situation in which there is an opportunity of accumulating an actual toxic dose of the chemical within the body [3]. The toxicity of TCDD when administered as a dose is known with reasonable accuracy for dozens of laboratory animals under a variety of conditions. Also, much has been learned about the effects of TCDD on humans from industrial accidents [1]. However, exposure to TCDD correctly means a situation of proximity and potential for intake, it does not mean the actual intake or absorption of a dose (in other words, exposure and dose are not equal). These are important concepts to understand as Compensation Serve evaluates claims from Vietnam-era veterans *outside of Vietnam.*

An example: If a veteran claimed exposure to Agent Orange while in service in a location where Agent Orange had been evaluated, but was not involved at the time in the actual loading or spraying of the tactical herbicide, or not in the test area at the time of spraying, he might claim that he was subsequently "exposed" to residues of Agent Orange and TCDD in the area. The likelihood of actually acquiring a "dose" may be negligible because of the environmental fates of both the herbicides and the TCDD.

In order to realistically assess the human risks inherent in the presence of TCDD in the environment, the information from toxicological studies must be coupled with the likelihood and degree of human exposure, and to that end, environmental fate plays a key role in the assessment.

PHYSICAL AND CHEMICAL PROPERTIES OF TCDD

Knowledge of the physical and chemical properties of 2,3,7,8-TCDD is essential to understanding its environmental behavior. The EPA accepted water solubility value for 2,3,7,8-TCDD is 19.3 ± 3.7 parts per trillion (nanograms per liter, ng/L) at 22° C [4]. The accepted vapor pressure value for 2,3,7,8-TCDD is 1.50×10^{-9} mm Hg at 25° C [5]. The organic carbon partition coefficient (K_{oc}) describes the partitioning of contaminants between suspended sediment and the water column. The accepted K_{oc} value for 2,3,7,8-TCDD is 6.6 [6]. These physical and chemical properties of 2,3,7,8-TCDD suggest that the compound is essentially insoluble in water, tightly bound to particulates and the organic matter in soil and sediments, and would be extremely stable under most environmental conditions. Burial in-place or erosion of soil to water bodies would likely be the predominant fate of 2,3,7,8-TCDD adsorbed to soil [7]. However, the low solubility and vapor pressure (1.62×10^{-5} @25°C) of TCDD predicted that its volatilization half-life in the water of lakes and ponds would be ~ 32 days, while the half-life for rivers would be ~16 days [8].

FIELD STUDIES OF 2,3,7,8-TCDD RESIDUES AND HUMAN EXPOSURE

There are three major sources for human exposure related to environmental studies of TCDD: 1) It entered the environment from the improper handling of industrial wastes from the manufacturer of chlorophenolic products; 2) It entered the atmosphere as a consequence of an industrial accident or combustion sources; or, 3) It entered the environment as a result of the spraying or spillage of herbicides contaminated with TCDD.

Soil Contamination from Industrial Wastes

During 1971-1972, the Northeast Pharmaceutical and Chemical Corporation (NEPACCO) near St. Louis, Missouri arranged for the periodic disposal of still-bottom residues from the production of hexachlorophene. One of the final steps in the process of purifying the hexachlorophene was distillation, and the dioxins (especially 2,3,7,8-TCDD) were concentrated in the residues

remaining in the still [9].The majority of the still-bottom residues were subsequently mixed with waste oils and were used as sprays for the control of dust on roads, parking lots, and horse arenas [9]. One of the horse arenas in east central Missouri was saturated with the waste oil and in the next few weeks, cats, dogs, hundreds of bird and more than 60 horses died. Analyses of the soil found that an estimated 2.8 kg (6.2 lb) of dioxins had been sprayed within the arena [9]. Because the soil of the arena was saturated with the highly contaminated oily and caustic still-bottoms, the animals were directly in contact with the liquid matrix and the exposures were lethal because a toxic dose was received. Removal of the contaminated soil and subsequent incineration were required in the cleanup operations [9].

During the same period, i.e., 1972, similar mixed waste oils and still-bottom residues were sprayed on dirt roads to control dusts in the community of Times Beach, Missouri. During the 1980s, EPA conducted a sampling program of sites throughout Missouri, including the town of Times Beach, where the waste oils and still-bottom residues had been sprayed. EPA reported levels of 4.4-317 ppb in samples taken from the roads [8]. Subsequent studies with Times Beach soils indicated that the 2,3,7,8-TCDD residue that was located a few millimeters below the soil surface was so strongly absorbed by the high organic carbon soil that little upward or downward migration occurred over a 16-month period [10]. The movement of water through the soil profile had little or no effect on the movement of the TCDD. However, it was noted that because of its high lipophilicity, TCDD moved downward in soil profiles in the presence of a dispersing medium such as organic solvents or gasoline [11].

Studies published by the University of Missouri in 1992 concluded that the binding of TCDD to soil approaches irreversibility over time due to the encapsulation of the compound in soil and mineral matter [11]. This and similar observations have led to the conclusion that 2,3,7,8-TCDD probably has a half-life of 25-100 years in subsurface soil, and 9-15 years at the soil surface (i.e., the top 0.1 cm) [7, 12].

The horse arena (noted earlier) and Times Beach were two of 14 confirmed sites in Missouri contaminated by the waste oils and still-bottoms from NEPACCO during 1971-1972 [9]. The cleanup of all sites involved the incineration of almost 2.5 million pounds of dioxin-contaminated materials and was not completed until 1987 [9]. Nine of the sites had soil contamination of 1 ppb or greater, a level at which public health officials concluded that it was reasonable to consider limiting human exposure. This

conclusion was based on the proximity of contaminated soil to humans and concern over potential daily exposure to TCDD by ingestion, skin absorption, or inhalation of contaminated soil [13, 14]. A comprehensive examination in 1986 of 154 exposed and 155 unexposed persons found no excess of clinical illness in the exposed group [13]. A subsequent human reproductive outcomes study in 1988 of residents in the nine sites did not provide evidence that TCDD exposure had a substantial impact on the reproductive outcomes investigated [14]. Yanders concluded:

> *The harm suffered by the majority of Missouri dioxin victims has not been physical illness; there is no increase in clinical illness in the group of exposed people studies, even though the average level of dioxin found in the adipose tissue of residentially-exposed persons is somewhat higher than controls. Their injuries are psychological, social, economic, and the persistent, wrenching belief that their government, which they expected somehow to make things right, has let them down* [9].

Discussion and Conclusion: The Missouri dioxin episode provided an example where improper disposal of industrial wastes resulted in widespread TCDD contamination in the local communities. Direct contact to the TCDD-contaminated waste oils immediately after application resulted in deaths of numerous species of animals. Once the waste oil and TCDD became bound within the soil matrix, its bioavailability decreased significantly. Despite the extent and magnitude of contamination, the impact on the clinical health of the people in the affected community was minimal.

Soil Contamination from Emission Sources

Most studies involving 2,3,7,8-TCDD are studies of sources from industrialized and urbanized areas. These studies involve a number of atmospheric phenomena, including the wet and dry deposition of dioxin-contaminated anthropogenic airborne particulate matter onto soils and vegetation, and the wet and dry deposition of vapor-phase dioxins onto soils and vegetation. Atmospheric deposition is the major pathway for contamination of the terrestrial/agricultural food chain. However, because of wind dispersion and the binding of the dioxin to particulate matter, the concentration of the TCDD on plant and soil surfaces is very low, as is its bioavailability [3, 8, 15]. However, the Seveso, Italy dioxin episode provided a case study where individuals came in to direct contact with liquid droplets containing high concentrations of TCDD [16].

Almost 40 years have elapsed since the Seveso, Italy industrial accident involving a small factory producing trichlorophenol that resulted in the discharge directly into the atmosphere of the contents of a chemical synthesis reactor containing sodium trichlorophenol, sodium hydroxide and approximately 250 g of TCDD. These materials were discharged as a dense white cloud of gases and vapors, liquid droplets, and solid particulates that settled over a residential area on 10 July 1976 [16].

At the time of the accident, children were playing downwind from the factory and were directly in the path of the white cloud of gases and vapors. Within a few days after the accident, the first signs of contamination in the population were skin rashes which affected mainly those children downwind from the chemical release. These skin lesions were burns of the first and second degree caused by contact with the caustic chemicals, primarily concentrated sodium hydroxide, from the cloud and were the early visible indication that the population had been contaminated by the reactor discharge [16]. On 26 July 1976, the Italian authorities evacuated 179 people from a 12-hectare (30 acres) area immediately southeast of the factory (the direction of the cloud) and extending a distance of 730 meters (2,400 feet) from it. A few days later, further findings prompted the evacuation of 557 more people living in the area extending about 2.1 kilometers (1.3 miles) from the plant and covering approximately 73 hectares (180 acres) [16].

Monitoring of the skin complainants was an urgent priority. Over 600 people with skin lesions were referred to a Dermatology Clinic between the end of July and the end of August 1976 [16]. Of the 600 referred, 477 had lesion symptoms primarily associated with the caustic sodium hydroxide, and in which regression and healing occurred within 15-20 days. However, 34 of the 477 were subsequently found to be suffering from chloracne, the hallmark of TCDD exposure, and the majority of these were children [16]. Eventually 42 cases of chloracne were attributed to the Seveso accident with most healing occurring within two years. There were only two or three cases where scarring occurred. There were no deaths attributed to the episode [16].

Following the evacuation of the 73 hectares, the area was fenced off, and access was prevented. This area was designated Zone A where the TCDD levels averaged 235.5 $\mu g/m^2$ (240 ppt in the top 7 cm). Zone B was an area of 220 hectares (544 acres) and was located along the TCDD main distribution pathway, and had TCDD levels that averaged 3.0 $\mu g/m^2$ (or 30 ppt). Zone R (Respect zone or zone of caution) covered an area of 1,200 hectare (~3,000 acres) and had a population of 31,000 and a TCDD level

that averaged 0.5 $\mu g/m^2$ [16]. Immediately after the accident, grass samples in Zone A exceeded 15 ppm TCDD, but after 1 month the levels were < 0.001 ppm. Thus, it was not surprising that domestic animals and some wildlife, particularly rabbits, domestic poultry, and other birds started dying spontaneously within 3 days of the accident. The Italian authorities quickly banned the consumption of vegetables, dairy products and meat from Zones A and B. Final death count of spontaneous deaths exceeded 3,300 animals, but as a prophylactic measure, the authorities slaughtered an additional 78,000 animals [16].

Soil concentrations of TCDD in the top 7 cm of soil dropped rapidly (73%) between August 1976 and December 1976, but decreased very slowing between December 1976 and December 1980 (an additional 8%) [16]. Thus confirming the initial volatility and photodegradation of the TCDD, and the binding of the remaining TCDD to the soil particulate and organic matter.

The burial of the contaminated soil and other materials in a secure landfill was the method selected for the rehabilitation program. The highly contaminated soil (> 1ppb) and waste materials were placed in two basins having a total capacity of 285,000 cubic meters (373,000 cubic yards) of soil. Once filled, the basins were covered with a 1 meter (3.3 feet) layer of soil. Nine years after the Seveso episode began, the work of restoring the community was complete [16].

For more than 25 years, studies of mortality and morbidity have been conducted on the population of Seveso and surrounding communities. No excess of deaths or any particular cause of deaths was noted at five years beyond the accident [16]. At ten years, a mortality study found that incident-related stressors, e.g., cardiovascular causes, were more relevant to increased mortality than TCDD exposure [17]. Long-term studies of resulting health effects confirmed that the main health effect to have been chloracne. Studies also have drawn possible links to neuropathy, liver function, cardiovascular and respiratory diseases, and cancer, but the study results have been conflicting and in some cases and aside from the chloracne have generally been considered to be inconclusive [18, 19].

Discussion and Conclusion: The Seveso, Italy dioxin episode represented the extreme situation where a reactor mixture of sodium trichlorophenol and sodium hydroxide, massively contaminated with TCDD, was aerially discharged as a dense white cloud of gases and vapors, liquid droplets, and solid particulates into a residential community. Those individuals who came

in direct contact with the droplets of sodium hydroxide containing TCDD initially had caustic acid lesions and within weeks were also diagnosed with chloracne, the hallmark of dioxin poisioning. Animals that came into direct and immediate contact with the liquid drops that had dried on the soil surface or on the vegetation that they consumed were also poisoned. However, within weeks researchers determined that the TCDD contained in the soil was not considered the main source of risk. They concluded that as long as it remained in the soil, it could be absorbed virtually only by contact with the skin. The decision, however, was to bury the contaminated soil, thus preventing any future human or animal contact with the dioxin.

Soil Studies Following the Spraying of Agent Orange

The soil residue studies in Missouri and Italy involved soil contamination with TCDD that differed in three major ways from the soil contamination associated with spraying Agent Orange or 2,4,5-T herbicide: 1. The TCDD was present in an alkaline environment, i.e., it was present in a liquid matrix containing caustic sodium hydroxide, and other materials that significantly hindered the photodegradation of the TCDD; 2. The intent of spraying herbicide to impact the vegetation, minimized the amount of soil contamination; and, 3: TCDD photodegration in sunlight was enhanced by the hydrogen donor (as a proton) in the Agent Orange/2,4,5-T matrix, thus reducing the concentration that was bound by the soil [20]. These critical differences were important since testing and subsequent missions involving Agent Orange were conducted in daylight [21].

The primary soil studies of the herbicidal components and the 2,3,7,8-TCDD associated with Agent Orange were the studies conducted at Eglin Air Force Base (AFB), Florida; the former Herbicide Storage Sites at the Naval Construction Battalion Center (NCBC), Gulfport, Mississippi, and Johnston Island, Central Pacific Ocean; and in Vietnam. The studies conducted in Vietnam were those conducted by the National Research Council of the National Academy of Sciences in 1971 and 1972, and the studies conducted decades after the conflict ceased. Those studies conducted in the late 1990s and early 2000s provided evidence of TCDD presence primarily in soils associated with RANCH HAND or US Army Chemical Corps military operations at former storage and loading sites.

Soil Studies Conducted in Vietnam

The last mission involving Agent Orange was conducted in Operation RANCH HAND in April 1970 [21]. Teams of scientists selected by and representing the National Research Council of the National Academy of Sciences visited Bien Hoa Province in South Vietnam between September 1971 – August 1972, and collected soil samples in the mangrove areas of Vung-Tau and Rung Sat, and in forestry areas near Ban-Me-Thuot [22, 23]. Sites were selected at locations where a history of spraying Agent Orange was available. Only the herbicides 2,4,5-T and picloram (from Agent White) were detected in most samples and then primarily in the top layer of the soils at concentrations ranging from 3 ppb to 3 ppm of 2,4,5-T, and less than 0.4 ppm picloram [22]. One of the soil samples collected in October 1971 from a site that had received repeated applications of Agent Orange in the period 1965-1970, had a soil level of 0.01 ppm 2,4,5-T, but no analysis of TCDD were conducted on any of the samples because of the lack to analytical capability to detect it. The soil samples were subsequently treated in the laboratory (uniformly mixed) with sufficient Agent Orange to result in a 2,4,5-T concentration of 15 ppm, and were incubated for 160 days. More than 90% of the 2,4,5-T disappeared within 80 days. The authors concluded that these Vietnamese soils were inherently capable of degrading 2,4,5-T at levels at least as high as15 ppm [23]. The National Research Council concluded from their studies in Vietnam:

> *Claims that the herbicides as they were used during the war have rendered the soil "sterile," permanently or at least for prolonged periods, are without any foundation. It should be noted that these claims were contrary to all existing information for the herbicides in question* [22].

Schecter et al (2001) reported soil levels of 0.6 to 1.2 ppm TCDD at the site of a former Agent Orange spill of 5,000 gallons in 1970 at Bien Hoa Airbase in Southern Vietnam [24]. However, no protocol information was provided on date, how the sample was collected, or to what depth. Sediment samples collected (again without describing the sampling protocol) from Lake Bien Hung (described as "close" to the former airbase) and from sites in and around Bien Hoa City had levels of TCDD from non-detected to 177 parts per trillion. Including 2,3,7,8-TCDD, all of the samples contained detectable levels of 17 different dioxin and furan congeners. This subsequent observation led Mae to challenge these data noting that waste waters and emissions from the Bien Hoa industrial zones have been routinely

discharged directing toward and into waters feeding Lake Bien Hung [25]. The waste waters contained wastes from paper, plastic, electric, and chemical industries, all sources of dioxins and furans [25]. These observations of such sources were similar to those for sediment studies in the United States from the Saginaw River and Bay and from Lake Huron [26], or in China for the lower reaches of the Yangtze River [27].

Dwernychuk et al (2002) detected 2,3,7,8-TCDD in soils collected from a former Special Forces base in the Aluoi Valley of central Vietnam where Agent Purple and Agent Orange were stored and sprayed on the exterior of the base perimeter prior to December 1965 [28]. Levels of TCDD detected in the top 10 cm (collected from 1996 – 1999) of soils or sediments ranged from 1.8 to approximately 900 ppt (0.9 ppb). The highest levels were attributed to "hot spots" where the herbicide had been spilled. Additional studies of "hot spots" have been conducted on sites where tactical herbicides were stored and loaded on RANCH HAND aircraft or helicopters of the US Army Chemical Corps [29].

Studies Conducted at Eglin AFB, Florida

From 1961 – 1971, the Air Development Test Center, Eglin AFB, Florida developed, tested, and calibrated the aerial spray systems used in support of Operation RANCH HAND and the US Army Chemical Corps in Vietnam. Twenty major test and evaluation projects of aerial spray equipment were conducted on four fully instrumented test grids, each uniquely arrayed to match the needs of fixed-wing, helicopter, or jet aircraft. Each of the grids was established with the boundary of Test Area C-52A of the Eglin AFB Reservation [30]. The tests, conducted under climatic and environmental conditions similar to those in Vietnam, included the use of the herbicides Agent Orange and Agent Purple. Approximately 165,400 lb of 2,4,5-T and 167,600 lb of 2,4-D were aerially disseminated on an area of less than 1 square mile. Data from the analysis of archived samples suggested that an estimated 6.8 lb of 2,3,7,8-TCDD, present as a contaminant, were aerially released in the test area [30].

In 1974, studies were initiated on the soil persistence and movement of 2,3,7,8-TCDD. The oldest grid on the Test Area, Grid 1, was used from 1962 – 1964, and received 71,440 lb of 2,4,5-T from Agent Purple. It was estimated that on an area of less than 91 acres approximately 6.4 lb TCDD was aerially disseminated with the herbicide. The aerial distribution of herbicides on the test grid was neither uniform nor random, but rather along

discrete sampling arrays to measure particle size and deposition. Thus, by considering the flight paths, water sources, and terracing effects, 22 soil samples were collected from the top 15 cm of soil from 1974 through 1978 and analyzed for 2,3,7,8-TCDD. The levels of TCDD varied from less than 10 ppt to 1,500 ppt (1.5 ppb) with a median of 110 ppt and a mean of 325 ppt [30, 31].

The selection of a 15-cm (6-inch) soil core profile was based on studies that indicated that TCDD concentrations in the 0-2.5 cm ranged from 150 to 460 ppt; 2.5-5.0 cm level ranged from 160 to 815 ppt; 5.0-10.0 cm level ranged from 700 to 2,400 ppt; and the 10.0-15.0 cm level range from 44 to 1,100 ppt. Essentially, no TCDD was detected below 15 cm. Although the levels of TCDD were greatest in the 5.0-10.0 cm zone of the soil profile, it was concluded that it was unlikely that these data represented leaching of TCDD though the soil profile [31]. Rather, a more likely explanation was that the TCDD was deposited in layers, during and in subsequent years after herbicide application, as a consequence of wind and water movement of the contaminated soil particles. Examination of the soil horizons in excavated profiles of Grid 1 clearly showed that within the top 15 cm discrete layers could be discerned that differed from the parent soil [31]. In reviewing climatic data including wind speed and direction, it was noted that the winds that occurred in the evenings after the herbicide was aerially disseminated resulted in contaminated soil particles being moved back and forth across Grid 1, and eventually being deposited in low areas of Grid 1. It was likely that water also moved the contaminated particles into the low-lying areas of Grid 1 [31]. Similar observations of the soils and TCDD contamination of Zone A, Seveso, Italy were made [32]. In both studies, it was apparent that TCDD was very persistent once it was bound within the soil profile.

It was calculated that 87% of the TCDD in the herbicide applied to the Test Area impacted the 91-acre Grid 1. Approximately 6.4 lbs of TCDD needed to be accounted for on Grid 1. If the mean value of 325 ppt was used as the level of TCDD in 1978 for the top 15 cm of soil and the density of the Lakeland Sand was 1.4 g/cm^2, then approximately 1 percent of the TCDD remained 14 years after application. Most of the TCDD in Agent Purple (and Orange), when exposed to natural sunlight at each of the times of application, was likely lost to photochemical degradation [30, 31].

Studies Conducted at the NCBC and Johnston Island

At the conclusion of the Vietnam War, the United States Air Force had more than 15,000 55-gallon drums of Agent Orange that was not shipped to Vietnam, but rather put in storage at the Naval Construction Battalion Center (NCBC), at Gulfport, MS [33]. In addition, in Project PACER IVY in March 1972, the US returned more than 25,000 drums of Agent Orange from Vietnam to Johnston Island, Central Pacific Ocean [33]. Both inventories of herbicides were destroyed by at-sea incineration in 1977, and a soil residue monitoring program was initiated at both locations in 1978.

The soil level of herbicides (2,4-D and 2,4,5-T) at spill sites dramatically decreased at both NCBC and Johnston Island from a maximum of 62,000 mg/kg (ppm) (8 samples taken from the top 10 cm (~4 inches) of soils from spill sites from each of the two former storage sites) to less than 2% of the initial concentration remaining at the end of the 4 years (1978 – 1982). In the same sampling period and sample sites, the TCDD concentrations decreased from 180 ng/kg (ppb) to less than 100 ppb (45% loss in 4 years) [34]. During the remediation program for NCBC in 1986, 35 soil cores were collected on the former Agent Orange Storage Site at NCBC. Essentially no herbicide was detected; however, in the soil profile increment of 0-8 cm (~3.1 inches) TCDD levels ranged from <0.01 – 310 parts per billion (ppb) (generally in the same range that was detected in 1982). For the 8-16 cm increment the TCDD levels ranged from <0.01 – 93 ppb; and, for the 16-24 cm increment, the TCDD levels from <0.01 – 12 ppb. No TCDD was detected below 24 cm (~ 10 inches), with a detection limit of <0.01 ppb [35]. The movement of the TCDD in the soil profile was thought to be associated with the mass movement of liquid Agent Orange into the profile. Similar results were obtained for Johnston Island [35].

Discussion and Conclusion: In the aerial spraying of tropical vegetation or dense shrubs with tactical herbicides, the intent was to spray and thus control the vegetation. Studies conducted by USDA in Puerto Rico and Texas indicated that the vegetation intercepted 94% of herbicide while only 6% landed on the soil beneath the vegetation [33]. Thus, soil bound TCDD levels from a area that had been repeatedly aerially sprayed with Agent Orange in Vietnam ranged from 1 to 41 ppt (average 8.8 ppt) [36]. However, TCDD concentrations in soils where the Agent Orange was spilled contained concentrations from 0.6 to 1.2 ppm (orders of magnitude greater than from aerial applications). However, in either case, once the TCDD came into contact with the soil, it was rapidly and tightly bound. In the Eglin Studies,

99% of the TCDD was photodegraded within hours of its aerial deposition on to the bare sands of the test area. Remaining 1% was bound within the top 6 inches of soil due to wind and water movement, where it persistent for at least two decades. In the studies of NCBC and Johnson Island Agent Orange storage sites, the herbicides rapidly degraded primarily by microbes, but TCDD was much more persistent requiring incineration of the soils 20 years later [35].

UPTAKE OF TCDD FROM SOILS AND SEDIMENTS

Test Area C-52 at Eglin AFB offered a unique opportunity to study the impact of soil-bound TCDD in a terrestrial ecosystem. Most of the vegetation had been removed in 1961 before establishing the four fully instrumented test grids used in support of the aerial calibration tests and evaluations of aerial spray equipment subsequently used in Operation RANCH HAND and by the US Army Chemical Corps in Vietnam [30, 31, 33]. Because of the importance of the calibration, the decision was made to use the actual tactical herbicides that would be used in Vietnam, namely, Agents Purple, Orange, White and Blue. The removal of the vegetation, and hence high solar exposures, provided an opportunity to follow ground-based residues independent of canopy interception [30].

Studies of the soils, fauna, flora, and aquatic ecosystems of the test grids and associated perimeters were initiated in 1969 and concluded in 1984 [31, 30]. More than 340 species of organisms were observed and identified within a 1.5 square mile area encompassing the four test grids and their perimeters. More than 300 biological samples were analyzed for TCDD and detectable residues were found in 16 of 45 species that had been collected and carefully examined for any anomalies [30]. An examination of the ecological niches of the species contaminated with TCDD residues confirmed that each was in close contact with contaminated soil. Anatomical, histological, and ultrastructural examinations, spanning more than 50 generations of the Beachmouse, *Peromyscus polionotus*, the dominant rodent on the test area, demonstrated that continual exposure to soil concentrations of 0.1 to 1.5 parts-per-billion of TCDD had minimal effects upon the health and reproduction of this species [30].

The aquatic studies at Eglin were consistent with the literature review of polychlorinated dibenzo-p-dioxin and dibenzofurans in the aquatic environment conducted by AEA Technology in England [37]. They concluded that the dominant transport mechanism for removal of 2,3,7,8-

TCDD from water is by sedimentation of soil and organic particles, although some volatilization will occur. Sediment re-suspension and remobilization of the TCDD will vary on a site-by-site basis depending on the nature and extent of physical processes (e.g., winds/ waves/currents) and biological processes (disturbance by benthic organisms) [37]. Aquatic organisms can bioaccumulate the TCDD by ingesting contaminated soil particles, although it was concluded that the total quantity (mass) of TCDD in the biota in a given water body will account for only a small fraction of the total quantity of TCDD in that water body [37].

The University of Missouri-Columbia initiated a study of the terrestrial ecosystem associated with the abandoned town of Times Beach, an area similar to the test grids at Eglin AFB [38]. The Deer Mouse, White-footed Mouse, and the Prairie Vole, all rodents nesting in contaminated soil had concentrations similar to those found in the Beachmouse at Eglin AFB, 47 – 1,736 ppt, whole bodies and livers, respectively [30, 38]. The Missouri scientists made additional comparisons with Seveso animal studies and found similar soil and tissue results. Having an understanding of the levels of TCDD in the body fat of animals, the authors then made a comparison to available monitoring studies (as of 1987) of the adipose tissue of man [38]. Their observations were as follows:

> *The concentrations in over 500 human adipose samples containing TCDD, which range from <1 to 1,840 ppt and with a mean of 79.6 ppt, can be divided into four groups. In the first group, the means of approximately 277 samples of low-exposure individuals from a variety of locations in the US, Canada, Sweden, Germany, Japan and Vietnam was 6.7 ppt (range 1.4-12.7 ppt). In the second group of moderate exposure, the means was 16.9 ppt (range 3.7-41.1 ppt) in 84 individuals exposed to TCDD in Southern Vietnam (Vietnamese and US Army personnel), the Binghamton, New York Post Office fire, and personnel in the non-production area of a facility manufacturing TCDD contaminated chemicals. A third group of 206 individuals subjected to high occupational and recreational exposure had TCDD levels of 3.5 to 978 ppt and a means of 193 ppt. The fourth and last group of the highest exposure was the woman from Seveso who had a level of 1,840 ppt* [38].

It is likely that most of the 500 human samples did not represent TCDD obtained through working with contaminated soils, but rather through ingestion of contaminated food, e.g., meat, fowl, and fish [24, 25, 29].

The IOM in describing how Vietnam veterans might have been contaminated with TCDD suggested: "*troops who moved through defoliated areas soon after treatment may have been exposed through soil contact, drinking water, or bathing* [1]". However, the physical properties of TCDD (essentially insoluble in water) likely made drinking water or bathing a negligible route of contamination, but could contact with the soil be a viable route of contamination? Numerous studies of dermal contact with TCDD have found that any exposures to contaminated soil that would have occurred were "negligible" because the skin is a major barrier to TCDD uptake, contributing less than 1% over the long-term to the body burden [39]. A validation of this observation occurred with some of the field researchers who were involved in the ecological studies at Eglin AFB, Florida [40].

Beginning in 1970 (before any analytical results of TCDD on the Eglin AFB Test Range C-52A in 1974), three men collected thousands of soil samples bare-handed and in direct contact with the soil [40]. These individuals were also involved in conducting soil bioassays and in the capture of contaminated animals with contaminated pelts. Two of three also participated in the cleaning of the ship, the *MS Vulcanus*, after the incineration of Agent Orange in 1977, where metal scrapings were contaminated with TCDD. In April 1979, all three individuals volunteered for abdominal fat biopsies; these samples were analyzed for TCDD. The results of those analyses varied from 5 to 7 parts-per-trillion (ppt); the normal background level at that time being 3-4 ppt [40].

CONCLUSIONS

From a review of the available data it was concluded that when 2,3,7,8-TCDD entered the environment, it was rapidly bound to soil and organic particles. Its low water solubility and low vapor pressure resulted in its failure to move in the soil profile, while at the same time these properties enhanced its long-term persistence. In water sources contaminated with TCDD, the residue was found to be bound to the soil particles that comprised the soil sediment; certain aquatic species were contaminated from ingesting the sediment. Animals that came into contact with a liquid matrix

containing the TCDD were likely poisoned. However, animals that came into contact with "aged" contaminated soil could become contaminated, but the level of contamination was generally insufficient to have adverse effects upon the animals. In humans, handling contaminated soil resulted in negligible contamination since the skin acted as an effective barrier to the uptake of the TCDD.

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