Description of document: National Nuclear Security Administration (NNSA) Technical Bulletins, 2005-2007

Requested date: 24-February-2017

Released date: 07-March-2017

Posted date: 16-October-2017

Source of document: FOIA/PA Officer
NNSA/Office of the General Counsel
P. O. Box 5400
Albuquerque, NM 87185-5400
Fax: (505) 284-7512
Email: FOIOfficer@nnsa.doe.gov

Department of Energy
National Nuclear Security Administration
Office of the General Counsel
P. O. Box 5400
Albuquerque, NM 87185

MAR 07 2017

SENT VIA EMAIL

This letter is the final response to your February 24, 2017 Freedom of Information Act (FOIA) request. Your request was received in this office on March 3, 2017. You requested:

> A digital/electronic copy of the NNSA Technical Bulletins for the years 2005, 2006 and 2007.

We Contacted the National Nuclear Security Administration's Office of Safety, Infrastructure and Operations, NA-50 about your request. NA-50 searched and located the enclosed 9 (nine) NNSA Technical Bulletins for the years 2005 (4 bulletins), 2006 (2 bulletins), and 2007 (3 bulletins), which are releasable and provided to you in their entirety.

There are no fees chargeable to you for processing this request. If you have questions concerning the processing of this request, please email Ms. Delilah Perez at Delilah.Perez@nnsa.doe.gov or write to the address above. Please reference Control Number FOIA 17-00073-M.

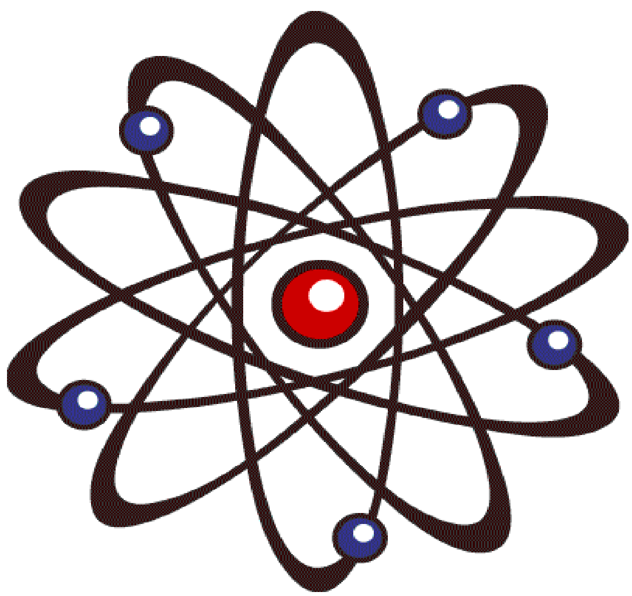
Sincerely,

Jane Summerson
Authorizing & Denying Official

Enclosures

National Nuclear Security Administration

TECHNICAL BULLETIN
5-01



MARCH 2005

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In This Edition…

SECTION I. <u>FOCUS AREA</u>

Lessons to be learned
Columbia Accident

Much has been written about the Columbia accident including the NNSA review done under the leadership of BGEN Haeckel in 2004. Since most attention has been placed on the actions as a result of the NNSA review, this focus area will look back at the lessons learned from that accident. In this way, it is possible to reflect on the underlying lessons learned themes.

The NNSA team developed the following ten lessons learned themes:

- Oversimplification of technical information could mislead decision making.
- Proving operations are safe instead of unsafe.
- Management must guard against being conditioned by success.
- Willingness to accept criticism and diversity of views is essential.
- Effective centralized and decentralized operations require an independent, robust safety and technical requirements management capability.
- Assuring safety requires a careful balance of organizational efficiency, redundancy and oversight.
- Effective communications along with clear roles and responsibilities are essential to a successful organization.
- Workforce reductions, outsourcing, and loss of organizational prestige for safety professionals can cause an erosion of technical capability.
- Technical capability to track known problems and manage them to resolution is essential.
- Technical training program attributes must support potential high consequence operations.

Each of these themes is discussed below using statements from the NASA CAIB Report.

Oversimplification of technical information could mislead decision making

The CAIB Report described "oversimplification of technical information" as one lesson learned. Three specific attributes were identified in the report that contributed to oversimplification of technical information. Those attributes were:

- Oversimplification of highly complex information in decision making.
- Making decisions on subjective experience instead of solid data.
- Use of briefings instead of technical papers as the primary method for communication.

Proving operations are safe instead of unsafe

Organizations that deal with high-risk operations must always have a healthy fear of failure—operations must be proved safe, rather than the other way around. NASA inverted this burden of proof.

When managers in the Shuttle Program denied the team's request for imagery, the Debris Assessment Team was put in the untenable position of having to prove that a safety-of-flight issue existed without the very images that would permit such a determination. This is precisely the opposite of how an effective safety culture would act.

Organizations with strong safety cultures generally acknowledge that a leader's best response to unanimous consent is to play devil's advocate and encourage an exhaustive debate. Mission Management Team leaders failed to seek out such minority opinions. Imagine the difference if any Shuttle manager had simply asked, "Prove to me that Columbia has not been harmed."

Management must guard against being conditioned by success

Even after it was clear from the launch videos that foam had struck the Orbiter in a manner never before seen, Space Shuttle Program Managers were not unduly alarmed. They could not imagine why anyone would want a photo of something that could be fixed after landing. More importantly, learned attitudes about foam strikes diminished the management's wariness of their danger. The Shuttle Program turned 'the experience of failure into the memory of success.' Managers also failed to develop simple contingency plans for a re-entry emergency. They were convinced that without a study nothing could be done about such an emergency. The intellectual curiosity and skepticism that a solid safety culture requires was almost entirely absent.

Willingness to accept criticism and diversity of views is essential

The NASA Columbia Accident Investigation Board Report identified problems in the areas of acceptance to new information; willingness to listen to outside expertise; intellectual curiosity and skepticism; lack of openness in communication and trust; and lack of encouragement in debate and diverse opinions. The Board found that: "External criticism and doubt, rather than spurring NASA to change for the better, instead reinforced the will to 'impose the party line vision on the environment, not to reconsider it,' ... This in turn led to 'flawed decision making, self deception, introversion and a diminished curiosity about the world outside ... '" NASA personnel believed that they possessed a unique knowledge on how to perform their job safely but that belief eventually became a fundamental impediment to effective organizational performance.

Effective centralized and decentralized operations require an independent, robust safety and technical requirements management capability

NASA's Columbia Accident Investigation Board (CAIB) found that the loss of a truly independent, robust capability to protect the system's fundamental requirements and specifications inevitably compromised those requirements and therefore increased risk. In particular, the CAIB found that the organization responsible for program accomplishment decided on its own how much safety and engineering oversight was needed. The Board concluded that the separation of authority of Program Managers—who, by nature, must be sensitive to cost and schedule—and "owners" of technical requirements and waiver capabilities—who, by nature, are more sensitive to safety and technical rigor—is crucial.

Additionally, the CAIB concluded that the ability to operate in a centralized manner when appropriate, and to operate in a decentralized manner when appropriate, is the hallmark of a high-reliability organization. However, complex organizational structures such as NASA's that mix centralized and decentralized functions or split functions into centralized and decentralized pieces can hinder effective operations and result in disasters. The Board determined that NASA failed to operate effectively in both centralized and decentralized modes based on the roles, responsibilities, authorities and relationships that developed over time. As a result, organizational complexity created artificial barriers to effective communications throughout the organization. Assigning individuals to multiple, and in some instances, competing places in the organization, complicated the problem.

Assuring safety requires a careful balance of organizational efficiency, redundancy and oversight

The Columbia Accident Investigation Board (CAIB) found that efforts to improve efficiency of NASA's organizational structure undermined the redundancy essential to successfully operating a high-risk enterprise.

The CAIB also concluded that NASA's contractual arrangements, organizational structure and downsizing undermined the adequacy of Federal oversight of the contractor and resulted in the transfer of too much authority for safety to the contractor. The oversight previously in place was essential to operating a potential high consequence enterprise successfully.

Effective communications along with clear roles and responsibilities are essential to a successful organization

The Columbia Accident Investigation Board (CAIB) concluded that NASA's complex and often hierarchal organizational structure diffused and confused responsibility, essentially leaving no one person accountable. Coupled with NASA's culture that lent greater technical credence to communications originated from higher in the organization, the organizational structure itself often stifled or blocked communications. Additionally, within NASA's strong, hierarchal organizational structure, as decision-making information worked its way up to senior management, it tended to get watered down, primarily by reducing the technical detail, for brevity's sake. This resulted in those who should be held accountable for operational performance not having the information necessary to make good decisions. For all effective purposes accountability was delegated down to the supporting staff, or even the contractor, who was developing the decision briefing for upper management.

Workforce reductions, outsourcing, and loss of organizational prestige for safety professionals can cause an erosion of technical capability

NASA grew dependent on contractors for technical support, contract monitoring requirements increased, and positions were subsequently staffed by less experienced engineers who were placed in management roles.

Years of workforce reductions and outsourcing culled from NASA's workforce the layers of experience and hands-on systems knowledge that once provided a capacity for safety oversight. Safety and Mission Assurance personnel were eliminated, careers in safety lost organization prestige, and the Program decided on its own how much safety and engineering oversight it needed.

Technical capability to track known problems and manage them to resolution is essential

NASA had a broad Lessons Learned Information System that was strictly voluntary for program/project managers and management teams. Design engineers and mission assurance personnel used it only on an ad hoc basis, thereby limiting its utility.

Integrated hazard reports and risk analyses were rarely communicated effectively, nor were the many databases used by Shuttle Program engineers and managers capable of translating operational experiences into effective risk management practices.

Known problems were not tracked and managed to resolution. Information suggesting there may be a problem existed but was not acted upon in a timely manner. For example, it was widely known that pieces of foam routinely separated during launch operations. However, the data was not systematically analyzed and evaluated to determine whether the separation of foam represented a significant hazard, which should be mitigated.

Technical training program attributes must support potential high consequence operations

NASA did not have a recurring training program, was not aggressive in training, and did not institutionalize "lessons learned" approaches to ensure that knowledge gained from both good and bad experiences was retained in the corporate memory.

SECTION II. <u>QUESTIONS AND ANSWERS:</u>

This section is dedicated to answering questions and providing general information related to nuclear safety.

What is the role of the Authorization Authority with respect to startup/restart of nuclear facilities and what is the Authorization Authority's relationship to the ORR team?

In accordance with DOE Order O 425.1C, *Startup and Restart of Nuclear Facilities*, "the authorization authority has the following responsibilities:

- Approves Startup Notification Reports (SNRs)
- Approves both the contractor and DOE Plans of Action (POAs)
- Designates the NNSA ORR or RA team lead
- Directs the NNSA ORR or RA to commence when readiness is achieved
- Directs startup or restart

As delegated by the Secretary, the NNSA Administrator is the Authorization Authority for startup of new hazard category 2 nuclear facilities. Delegation of this authority to the Principal Deputy Administrator and the Deputy Administrator for Defense Programs is being finalized with specific conditions for further delegation.

There has been confusion with respect to the ORR team composition in relation to the Authorization Authority. NNSA ORRs are conducted by teams whose leaders are designated by the Authorization Authority. There is no such thing as a "Headquarters ORR" or "Field ORR." In reality, the site office will perform the majority of the NNSA line management effort including development of SNRs, POAs, and preparation for readiness. Readiness review team leadership and team composition can come from anywhere in NNSA, DOE, or from support service contractors as long as the required independence is achieved.

During readiness reviews and assessments, occasionally issues will be discovered with the documented safety analysis (DSA). For example, a hazard may have not been fully analyzed, or the controls proposed may not apply to all of the bounded accidents in a family of accidents. As a prerequisite to the readiness review, an NNSA Safety Basis Review Team (SBRT) would have already reviewed the DSA, and it would have already been approved by NNSA. So, shouldn't such issues be treated as being outside of the scope of the readiness review?

The short answer is "No." Although it is not the function of the readiness review to duplicate recent independent reviews, any issue that is discovered during a readiness review that affects the readiness of the facility to operate is automatically within scope of the review. Minimum Core Requirement #7 in DOE Order 425.1C treats both the implementation and the adequacy of the DSA. In general, the recent review of the DSA by the SBRT establishes its adequacy for the purposes of the review, and only implementation of the DSA and pre-start conditions of approval need to be explicitly included in the scope of the review. However, if, while reviewing the implementation of the DSA, deficiencies are identified in the approved analysis or the adequacy of approved controls, such deficiencies or inadequacies should be reported as pre-start or post-start findings of the review.

What is the new Defense Nuclear Facilities Safety Board (Board) Recommendation, 2005-1, Nuclear Material Packaging, all about?

Recommendation 2005-1 was published in the Federal Register on March 21, 2005. In this recommendation, the Board noted progress in stabilization and improved storage of excess nuclear materials, but expressed concerns about other categories of nuclear materials. The Board noted that hazards posed by nuclear materials covered by Recommendation 94-1 (relating to long-term storage of excess materials) are the same as those for nuclear materials not considered excess. Therefore, according to the Recommendation, the Department should establish a technical basis for nuclear materials packaging, including designation of the time period for which a particular container is confirmed to perform its containment function adequately. The Board recommended that the Department issue a requirement that nuclear material packaging meet technically justified criteria for safe storage and handling; implementation of packaging requirements should be consistent with the hazards of the different material types and the risk posed by existing packaging configurations and conditions. The Department's response to Board recommendations is due 45 days after publication in the Federal Register.

Recently, a potentially nonconservative error was discovered in one part of a computer code that is used for safety analysis. Only certain applications were affected, and in some cases it only took a few hours to determine whether there was any significant effect on the relevant safety analyses. For situations like that, when is it appropriate to use the Potential Inadequacy in the Documented Safety Analysis (PISA) process, and to perform an Unreviewed Safety Question Determination (USQD)?

When an employee identifies a potentially inadequate safety analyses, the facility management is allowed a reasonable time prior to notifying DOE to confirm the reasonableness of the *potential* for having an inadequate safety analysis. This time should be on the order of hours, up to several days, but not a matter of weeks, or months. However, once it becomes reasonable to think that there may be an inadequacy in the DSA, either because of an as-found condition not consistent with the DSA or because the analysis is "otherwise deficient" as could be in this case, the PISA process should be invoked. Invoking the PISA process, even when an issue can be addressed in a matter of hours, requires that a formal USQD be performed. One output of the USQD is a documented assessment that serves as a record of the findings. If, in the future, the question re-emerges, an adequately completed USQD can serve as a record of what was reviewed, how it was reviewed, and what the outcome was.

In the recent case involving safety-related software, once it was known that the software had a potentially nonconservative error, and that the computer code had been used for safety analysis at a site, it would have been reasonable to conclude that the potential for an inadequate safety analysis had been established. At that point, the PISA process became the appropriate vehicle for addressing the question of whether the inadequacy actually existed for a safety basis that used the computer code.

National Nuclear Security Administration

TECHNICAL BULLETIN
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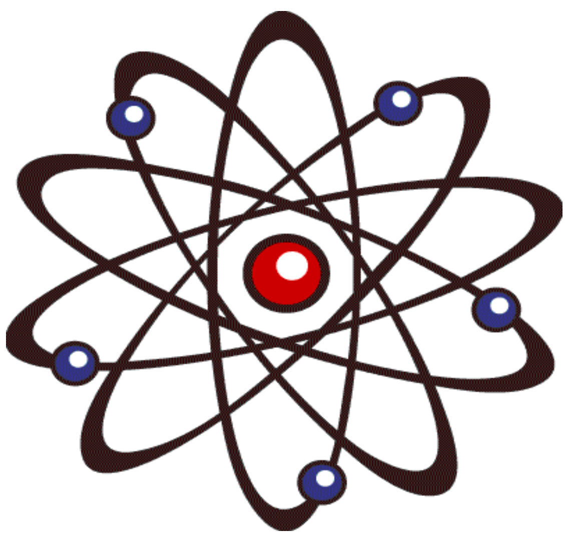

JUNE 2005

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In This Edition…

SECTION I. <u>FOCUS AREA</u>

Safety and Security

The focus area this month is on balancing the sometimes-conflicting need to ensure the safety of our nuclear operations while also ensuring their security. As policy and guidance are being discussed at many levels within NNSA, it's helpful to understand some of the unique aspects of the issue and how the affected sites have chosen to address them. To that end, this issue of the Technical Bulletin contains two articles from site offices that have wrestled with achieving this balance. The Y-12 Site Office contributed the first article. Special thanks go to Teresa Robbins.

Firearms Safety and Safety Basis—
Dual Safety or Safety Duel?

Does the presence of loaded firearms in nuclear facilities present a hazard required to be included in the documented safety analysis (DSA)? 10 CFR 830.204(2) states that a DSA will *provide a systematic identification of both natural and man-made hazards associated with the facility*. The accidental discharge and/or discharge of firearms in nuclear facilities would present a man-made hazard, but is it *associated with the facility*? Due to the inherent security risks of each of the nuclear facilities within NNSA, this paper suggests that the hazard presented by the accidental and/or discharge of firearms is associated with the operation of the facility and thus required to be included in the DSA. If that premise were accepted, then the next step would be how to incorporate this hazard into the safety basis.

At the Y-12 National Security Complex, a site-wide approach was taken that limited consideration to accidental discharge of firearms. The discharge of firearms during an engagement with adversaries was not included because 1) the types of weaponry and the intended targets of the adversary are not firmly defined or controllable; 2) malevolent acts are not analyzed within the authorization basis; 3) most likely controls could not be implemented beyond the standard rules of engagement; 4) offsite exposure data for engagement may not be useful for risk acceptance and is somewhat addressed with analysis of malevolent acts in the emergency management arena; and 5) the risk is inherently accepted.

The types of hand-carried firearms deployed at Y-12 are standard for all nuclear facilities. The hazard evaluation was performed on a facility-by-facility basis and the derived controls were collected into a site-wide safety document as a safety management program identifying specific attributes of the program credited in the evaluation. The worst-case scenario for size of ammunition, type of ammunition, and the number of bullets that could be expelled in automatic mode for a 2–3 second trigger pull were used. The hazard evaluation assumed that the ammunition could travel anywhere and did not look specifically at penetration capability or muzzle velocities. The accident analysis for Y-12 facilities concluded that the accidental discharge of firearms did not create any new accidents. In addition, the accidents analyzed were bound by the existing Documented Safety Analysis (DSA). To identify the controls that would address accidental discharge as an initiator of an accident, each firearm was reviewed individually for specific features that may prevent an accidental discharge. The overall firearms safety program was reviewed for applicability as a safety management program in the DSA. Force-on-force exercise control was also reviewed for determining appropriate controls for inclusion in the DSA. The DSA process resulted in the inclusion of the firearms safety program and specific attributes of that program that were relied on in the accident analysis in the site-wide DSA. At Y-12, the site-wide DSA includes chapter 1 information required by DOE-STD-3009 and a description of the safety management programs (chapters 6-17 of the DSA). This site-wide DSA is applicable to all nuclear facilities and is on the safety basis list.

Prior to implementing the firearms safety program as a safety management program credited in the DSA, the safeguards and security organizations were required to have general safety basis training and Unreviewed Safety Question (USQ) training. Implementing procedures were revised to recognize the need to apply the USQ process to procedure changes. At Y-12, NNSA has a management and operating (M&O) contractor and a separate direct contractor for safeguards and security (S&S). This contracting arrangement had limited the involvement of the S&S contractor in safety basis awareness and training activities. Instead of creating a second USQ process for the S&S contractor, a contractual agreement was reached to provide for use of the M&O contractor process and expertise on a fee for service basis.

Engineered security systems (firearms or other weapons that have the potential for accidental discharge) are analyzed in the facility-specific DSA. As such, credited controls associated with engineered systems would be incorporated into the facility specific DSA and TSR. Controls for prevention of accidental discharge of firearms and weapons systems could be in the form of limiting conditions of operation (LCO), specific administrative control, design features for safety, and/or safety management program. As such, the credited controls must be included in the configuration management program.

With the sharp rise in the number of changes necessitated by the design basis threat and focus on security, the need for ensuring implementation of integrated safety and security management has become prominent. As many of the new weapons systems being considered involve the potential to impact not only nuclear facilities, but also the public, Y-12 is pursuing a more risk-informed decision process. At Y-12 the approach being employed is to identify and agree on the performance requirements, perform an alternatives analysis to identify the recommendations for new weapons system(s) and/or risk acceptance, and allow NNSA and the M&O contractor to make a risk-informed decision. The alternatives analysis evaluates different types of weapons systems to address the performance requirements. Consideration is being given to safety of the workers and public, impact on emergency response capabilities, capability to conduct and maintain weapons certification training, and the effectiveness of the proposed weapons system in addressing the vulnerability (ies). Consideration should also be given to whether the use of the weapons system(s) during engagement with an adversary could create or exceed the damage that the adversary was seeking to inflict.

Supporting the NNSA missions is not without risk and a reasonable approach should be taken to ensure that safety is appropriately integrated with security. This may include the decision by the risk acceptance official to accept the security risk due to the unacceptable safety risk and/or vice versa. Some may question these decisions, however, with a documented sound technical basis that has appropriately considered safety and security implications, the decisions should not be as easily challenged.

While not traditionally addressed in safety basis documents, the accidental discharge of firearms is a man-made hazard that is associated with facility operations. The approach taken at Y-12 as demonstrated in this paper has shown that the hazard evaluation, accident analysis, and control selection for prevention of accidental discharge does belong in the safety basis process. As security requirements continue to change and the potential for deployment of more destructive weaponry is considered, controls on the prevention of accidental discharge may require treatment as administrative controls, LCOs or Design Features for Safety in the TSR.

This second article on safety and security was contributed by the Livermore Site Office. Special thanks to Carol Sohn.

When Nuclear Safety and Security Intersect

As the Design Basis Threat requirements evolve, many of us are entering new territory on how we integrate nuclear safety and security. For the Nuclear Safety Team at the Livermore Site Office, this intersection occurred in February 2004. A security training exercise was scheduled that introduced new hazards and potential events for a Hazard Category 2 and two Hazard Category 3 nuclear facilities[1]. In the past we had been heavily focused on the "conventional hazards" that could result in radiological releases. However, the exercise helped us realize that day-to-day security activities and exercises could result in radiological releases for non-malevolent events. So how do we go forward to better integrate two worlds that have worked independently for much of the past?

10 CFR 830.202[2] specifically discusses the requirement to identify and analyze the hazards associated with the work. 10 CFR 830.204 requires the Documented Safety Analysis (DSA) to provide a systematic identification of both natural and man-made hazards associated with the facility. The DSA Guide is referenced in 10 CFR 830 and states[3]: "A purpose of hazard and accident analyses of a DSA is to ensure <u>all</u> hazards are considered and a complete set of hazard controls are identified and appropriately classified." The guide also states[4]: "The [Integrated Safety Management System] core functions that are key for developing a safety basis are analyzing <u>all</u> hazards and identifying controls." The expectation that all hazards will be analyzed led the Livermore Site Office to conclude that we could not ignore the hazards and events associated with security, and we had to ensure the identification and analysis of each.

The next question that arose was how closely we should adhere to the DOE STD 3009[5] methodology when analyzing security hazards? Once controls such as training and hardware are identified in the hazards analysis, must those controls flow into the Technical Safety Requirements (TSR) if the analysis warrants the need? Or, can other documents be used in place of the TSRs? Discussions with colleagues at other DOE sites found a variety of methods are being used to capture and flow down security-related nuclear safety controls. In our case, some controls were necessary to reduce the high and

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[1] Facilities categorized as Hazard Category 2 or 3, as described in DOE-STD-1027-92, Change 1, *Hazard Categorization and Accident Analysis Techniques for Compliance With DOE Order 5480.23, Nuclear Safety Analysis Reports.*
[2] 10 CFR 830: is Title 10 of the Code of Federal Regulations, Part 830, the Nuclear Safety Management rule. Section 202 addresses Safety Basis requirements, and Section 204 addresses Documented Safety Analysis requirements.
[3] DOE G 421.1-2, Section 5.3.2, *Selection Process; Use of Hazard Ranking Process in Selecting and Classifying Controls*, pg 33, emphasis added.
[4] DOE G 421.1-2, Section 5.4, *Relationship of Integrated Safety Management to Facility Safety Basis*, pg 33, emphasis added.
[5] DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports.*

moderate risks to lower acceptable levels due to our facility specific hazards. As a result, we decided that TSRs were necessary to preserve assumptions and frequency reductions.

At the Livermore Site, the analysis of security hazards is complicated by the close proximity of facilities because our primary site consists of several hundred buildings within one square mile. A deterrent security system built for a specific Hazard Category 2 nuclear facility could inadvertently impact and result in a radiological release in neighboring facilities. The potential for impacts to adjacent nuclear facilities complicates the development of the hazards analysis and the flow down to the TSRs, particularly if a site-wide Documented Safety Analysis (DSA) and TSRs do not exist. We struggled to find the most effective method to structure the flow down of common controls for implementation because of different facility DSAs and TSRs.

The difficulty in implementing security-related nuclear safety controls is exacerbated because organizations other than operations are responsible for security. How can proper training of protective forces be enforced through facility's TSRs when the training responsibilities are in different organizations? For LSO, the solution was to help the NNSA security representatives understand nuclear safety and, similarly, to assist nuclear safety analysts to better understand aspects of deterrent security systems like frequencies for inadvertent discharges and their potential consequences.

The integration of security and safety is paramount to strong security and nuclear safety programs. Neither security nor safety is "more important", but both are critical to ensure accomplishment of the mission of our nuclear facilities. If we performed "only safety" or "only security" with a no risk strategy, the mission of our facilities would be jeopardized. Achieving the balance between safety and security to accomplish the work has to be our primary objective. Only through joint cooperation between the safety analysts and security representatives can we be effective in implementation of security deterrents and ensure risks and controls are identified and understood.

For more on this subject, see the Questions and Answer section of the September 2004 edition of the Technical Bulletin. The discussion in that edition included five essential elements that should be considered by the site office. Those are reiterated here for completeness:

- *Some level of site Authorization Basis (AB) analysis should be conducted to identify and analyze accident scenarios that could be initiated by the security force (i.e. accidental discharges) and included in the DSAs.*
- *Where appropriate, controls to eliminate the hazard (i.e. prohibit a round in the chamber), or mitigate (specify limits on type of ammunition) should be established so as to reduce the risk of release of radiological materials.*
- *The site AB should require an Unreviewed Safety Question process be applied, or safety basis modified, when specific thresholds are exceeded (i.e. introduction of a new weapon that has not been previously analyzed.)*

- *Maintain an appropriate separation between security and AB systems. Site ABs need not analyze individual post orders or every potential security force response. Be careful not to compromise security with unnecessary involvement in the site AB. Classified security performance requirements often contained in Site Security & Safeguards Plans (SSSP) should not be indiscriminately contained in multiple documents having different audiences.*
- *The Site Manager must be aware of the type of weapons and ammunition being employed by the security forces; the planned security responses to proposed threats; and any controls that are being credited to minimize adverse consequences. The Site Manager formally accepts this "Security posture" via his/her approval of the SSSP. This should be treated as a Site AB-level document and identified as such in appropriate site Authorization Agreements, or other contractual documents.*

SECTION II. QUESTIONS AND ANSWERS:

This section is dedicated to answering questions and providing general information related to nuclear safety.

1. Is it appropriate to routinely enter into a Limiting Condition of Operations (LCO) in order to perform preventative maintenance?

An LCO represents the lowest functional capability or performance level of safety systems, structures or components required to perform an activity safely.[6] The action statements provided in LCOs provide a set of predefined actions that can maintain the facility in a safe condition, and in some case permit limited operations under temporary controls. These actions are intended to provide safe recovery, not to establish a limited mode of operations. Although it is not explicitly prohibited, using the action statements in an LCO to provide operational flexibility to perform maintenance is at the very least a bad practice.

The expected approach is to establish normal operating conditions under which the maintenance can be performed safely. For situations such as the conduct of preventative maintenance, which can be planned in advance, two safety basis mechanisms are available. The first is to provide allowable outage time (AOT) for the affected equipment[7]. An AOT may be defined in the relevant Technical Safety Requirements (TSRs) to define a period of time during which a piece of equipment may be unavailable without requiring entry into an LCO.

The second mechanism is the establishment of a facility mode that does not rely upon the affected safety equipment. Entry into an appropriate facility mode obviates the need to enter the LCO, and ensures that related hazards have been analyzed and appropriately controlled.

2. If a situation arises in which changes to a procedure relied upon in the Documented Safety Analysis (DSA) are made over a period of years, but were not reviewed for Unreviewed Safety Questions (USQs), what actions should be taken to ensure that the safety basis is adequate?

From a nuclear safety perspective, the key considerations are whether the reliance that the DSA currently places upon the procedure is consistent with the procedure, and whether there may be changes to other procedures that may not have been properly reviewed.

At the very least, the fact that changes were not reviewed for potential USQs indicates a weakness in the process that is designed to keep procedures consistent with the DSA. As a result, the consistency of the procedure with the DSA should be investigated. If

[6] DOE G 423.1-1, *Implementation Guide For Use In Developing Technical Safety Requirements,* Section 4.10.1.3
[7] DOE G 423.1-1, section 4.10.4

discrepancies are discovered between the procedure and the DSA, then a Potential Inadequacy in the Documented Safety Analysis (PISA) should be declared and the steps required by 10 CFR 830 followed. The USQ determination associated with such a PISA would evaluate any specific inconsistencies that had been discovered.

The review of the procedure consistency could take several forms, and which is most appropriate would depend upon the details of the situation. One approach would be to simply review the procedure to verify that the flow down of DSA requirements into the procedure is currently adequate. Typically, this would involve identifying the parts of the DSA that relied upon the procedure and examining the procedure to ensure it meets expectations.

Alternatively, particularly if the scope of the changes to the procedure were known and relatively limited, one could perform a USQ evaluation of each change that had been made since the time at which it was last known that the procedure was consistent with the DSA.

Regardless of the approach taken, immediate action should be taken to ensure that all future changes to the procedure receive proper review under the USQ process. In addition, a review should be conducted to determine whether there are other procedures that had escaped proper review.

3. Regarding qualitative hazards analysis as part of a DSA to meet DOE-STD-3009 at an NNSA site, can a healthy and effective general administrative program (or a collection of such programs) be credited by itself to reduce the unmitigated frequency by one bin when deciding which hazard scenarios should be forwarded into the accident analysis?

The simple answer is "No." The methodology in the DOE standard only allows for a qualitative frequency analysis, used solely for the basis of helping to decide which scenarios should be carried forward to the accident analysis. DOE-STD-3009 encourages a very simple approach to frequency estimation, suggesting as an example that "a simple methodology for frequency binning would be to assign a probability of 1 to non-independent events, 0.1 to human errors, and 0.01 to genuinely independent failures."[8] Effort spent adjusting the frequencies to account for subtleties such as the effects of administrative programs puts far more emphasis on the quantitative nature of the frequency estimates than is permitted by the standard. Furthermore, if an unmitigated hazard and its initiators warrant consideration in an accident analysis, the analysis must be performed in order to determine the specific characteristics that the administrative control must have if it is to effectively control the hazard.

[8] DOE STD 3009-94 change 2, *Preparation Guide For U.S. Department Of Energy Nonreactor Nuclear Facility Safety Analysis Reports,* Section 3.3.2.3.5, pg 51.

4. Under what circumstances should the potential for criticality in a facility result in a facility being categorized as a Hazard Category 2 nuclear facility? In particular, how should the provision in DOE-STD-1027[9] to consider segmentation and the nature of the process be used when determining the potential for criticality at an NNSA site?

This question has been a topic of conversation at several NNSA facilities, and considerable confusion exists over determining the thresholds for facility categorization when the potential for criticality is the driving factor.

The short answer is that, by definition, Hazard Category 3 and radiological facilities have no criticality hazard. Thus, they do not depend upon procedural controls or process-specific criticality safety evaluations, limits, or controls in order to reduce risk of an inadvertent criticality. Only high-level DSA/TSR controls at the facility level (e.g. Material at Risk limits, Transportation Index limits, etc.) are needed to preclude a criticality hazard. If the hazard of criticality must be otherwise controlled within a facility, then the facility is, by definition, a Hazard Category 2 facility.

A thorough discussion of how to apply segmentation and nature of process considerations is outside the scope of the Technical Bulletin, and will be addressed in upcoming directives revisions. However, consideration of segmentation and the nature of the process must be applied in a way that is consistent with the treatment of criticality in the definition of hazard categories. In brief, segmentation may only be applied (from a criticality perspective) for situations where the material and activities in segmented portions of facilities are incapable of affecting the potential for criticality in other segments. Geographically separated storage bunkers are a good example of a situation where segmentation may be appropriate; that is, where it may be possible to evaluate the fissile material in each bunker independently to determine final facility classification.

An evaluation of the nature of process generally should consider whether planned activities, operational upsets, and derivative design basis abnormal environments could alter the characteristics of the facility, packaging, or fissile material such that controls are needed to address the potential for criticality. For example, controls may not be needed to address criticality hazards in normal environments because material is in a solid form and environment that renders it geometrically safe, and because normal processes would not alter that form. However, nature of process must also consider whether derivative design basis accident environments would alter the physical form or environment of the material such that criticality controls are required. The need for the criticality controls would indicate that Hazard Category 2 facility classification is warranted.

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[9] DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports,*

SECTION III. <u>PERSPECTIVES:</u>

This section is dedicated towards communicating issues that are authored by site offices and help in promoting nuclear safety within our workforce. If you have a topic that you believe should be presented in a future NNSA Technical Bulletin, please provide a copy to the Chief of Defense Nuclear Safety.

The following was contributed by the NNSA Service Center. Special thanks go to Al MacDougall.

Resolution of Structure, Systems, or Components (SSC) Degraded/Non-Conforming Conditions

Introduction

This article discusses the general steps related to the identification, evaluation, and resolution of an SSC degraded/non-conforming condition. DOE guidance regarding this topic is discussed in DOE G 424.1, *Implementation Guide for use in Addressing Unreviewed Safety Question (USQ) Requirements*, DOE G 423.1-1, *Implementation Guide for use in Developing Technical Safety Requirements (TSRs),* DOE STD 1104, *Review and Approval of Nuclear Facility Safety Basis Documents*, and DOE M 231.1A, *Occurrence Reporting and Processing of Operations Information.*

Identification

A degraded/non-conforming condition may be identified during an operational event (e.g. equipment failure), following a system evaluation or assessment, or as a result of new information/lessons learned. Examples of SSC degraded and non-conforming conditions include failure of SSCs to: 1) meet Documented Safety Analysis (DSA) requirements 2) conform to applicable codes and standards, or 3) satisfy design basis requirements.

Following the identification of an SSC degraded/non-conforming condition, the contractor should take prompt action to assure public health and safety by placing the facility in a safe condition if there is an immediate hazard and by promptly making an initial determination of whether the SSC is operable with the degraded/non-conforming condition (this is typically referred to as an initial operability determination). The initial operability determination is normally based on an evaluation of whether the SSC Limiting Condition for Operation and Surveillance Requirements in the TSRs could be satisfied with the degraded/non-conforming condition.

The timeliness of the contractor's immediate actions should be commensurate with the potential safety significant of the issue. The identification of an SSC degraded/non-conforming condition should also be promptly reported per the occurrence reporting requirements.

Evaluation

Following the initial operability determination, the contractor should evaluate whether the degraded/non-conforming SSC would be able to perform all its intended safety functions as assumed in the DSA for all expected normal, abnormal, and accident conditions (typically referred to as the final operability determination)

The following information is provided from DOE G 423.1 to assist with the initial and final operability determinations:

A system or component can be degraded but still OPERABLE if it remains capable of performing its required safety function at the level assumed in the accident analysis. If systems, components, or equipment are observed to be functioning but under stress (e.g., with elevated temperature, vibration, or physical damage), then judgment must be used concerning a declaration of inoperability.

The following general principles should be followed when evaluating operability:

GENERAL PRINCIPLE 1: A system is considered OPERABLE as long as there exists assurance that it is capable of performing its specified safety function(s).

GENERAL PRINCIPLE 2: A system can perform its specified safety function(s) only when all of its necessary support systems are capable of performing their related support functions.

GENERAL PRINCIPLE 3: When all systems designed to perform a certain safety function are not capable of performing that safety function, a loss of function condition exists.

GENERAL PRINCIPLE 4: When a system is determined to be incapable of performing its intended safety function(s), the declaration of inoperability should be immediate.

The USQ process is used to support the final operability determination by evaluating the existing condition as a proposed change (normally called a backward looking USQ) and determining whether the change is bounded by the current DSA. If the USQ determination is positive, then NNSA must approve continued operation with the SSC degraded/nonconforming condition.

The contractor's submittal to NNSA should provide the technical basis for requesting authorization to continue to operate with an SSC degraded/non-conforming condition. This submittal is sometimes called a Justification for Continued Operation (JCO). Regardless of the terminology, the contractor's submittal should present a clear evaluation of the risk NNSA is to accept.

During the evaluation of the impact of a degraded/nonconforming condition on plant operation and operability of SSCs, a contractor may decide to implement a compensatory measure as an interim step to restore operability or to otherwise enhance the capability of the SSC until final corrective action is complete. The use of compensatory measures to support operability determinations should be included in the contractor's submittal for approval by NNSA as either a temporary or permanent modification to the safety basis.

The contractor's submittal should also consider the following items as appropriate to the specific condition:

- Availability of redundant or backup equipment
- Compensatory measures including to use of any administrative controls
- Conservatism and margins in design/calculations
- Identified corrective actions and schedules for removing compensatory measures
- Results of any completed USQ evaluations including a discussion of increase in probability or consequences of design basis accidents

The results of the USQ determination, operability determinations, and initial and final corrective actions should be formally reported per the occurrence reporting requirements.

Final Resolution

Following the initial actions discussed above, the contractor should identify and implement corrective actions to resolve the condition adverse to safety, identify the root cause, and develop and implement corrective actions to preclude repetition of the condition adverse to quality. The contractor typically can take the following three approaches to completely resolve an SSC degraded/non-conforming condition:

Restore to Original DSA Condition

The contractor develops a corrective action plan to correct the degraded/nonconforming condition. If compensatory measures are required to support operability while corrective actions are completed, the justification for these compensatory measures should be reviewed and approved by NNSA as discussed above.

Modification of the SSC and/or changes to the DSA other than Full Restoration to the Original DSA Condition

The contractor develops a corrective action plan that includes changes to the facility and or procedures in order to partially correct the degraded/non-conforming condition. In this case, the contractor decides to restore the SSC functionality or margin of safety without fully restoring the SSC to the original DSA condition. The contractor needs to evaluate the change from the DSA described condition to final proposed condition. The contractor's evaluation would include a USQ evaluation for any proposed changes to the facility and/or procedures and the submittal of a DSA change package to NNSA for any proposed changes to the DSA that resulted from a positive USQ determination.

Acceptance of Discrepant/Non-Conforming Condition (Accept As Is)

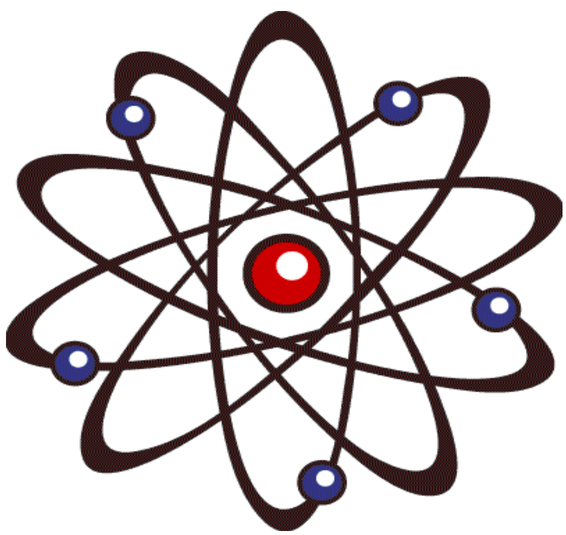
In this case the contractor submits a change to the DSA to reflect acceptance of the as found condition. The contractor will provide an evaluation of the change from the DSA described condition to the existing condition in which the contractor plans to remain. In this situation, the contractor is exiting the corrective action process by revising the DSA to document acceptance of the as found condition. The contractor would submit the justification for accepting the SSC degraded/non-conforming condition to NNSA for approval as discussed above.

NNSA Review and Approval Processes

In summary, the NNSA should review and approve the contractor's initial operability determination as part of the occurrence reporting process and/or during the approval of any proposed changes to the DSA such as interim compensatory measures. Any proposed changes to the DSA resulting from the contractor's final resolution of the condition, such as permanent changes to the facility or procedures, should be submitted and approved by the NNSA via a Safety Evaluation Report (SER).

National Nuclear Security Administration

TECHNICAL BULLETIN
5-03



SEPTEMBER 2005

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In This Edition…

NNSA Technical Bulletin 05-03

Memorandum from The Administrator

This issue of the NNSA Technical Bulletin has some lessons from the first site review conducted under the direction of the Chief of Defense Nuclear Safety. It is important that we all understand the purpose of these new reviews. In December 2002 we established a new organization for NNSA. This organization placed great emphasis on Site Offices and especially on the Site Managers. I have come to refer to it as the strong Site Manager model. I believe that the Site Manager is responsible for oversight of the contractor and should not be excessively burdened with people from Washington looking over his or her shoulder. Thus, for example, we ended the external reviews being done by the Environmental Safety and Health Advisor. Our theory was that we could depend on the Office of Safety and Security Performance Assurance (OA) and their biannual reviews to provide me the confidence that the site mangers were carrying out their responsibilities.

As we gained experience with this model we concluded that two areas—the safety of high hazard nuclear operations and security—were so important that we needed additional mechanisms both to support the Site Manager and to give me confidence that we were carrying out our responsibilities effectively. One result of this realization was the establishment of the Office of the Chief, Defense Nuclear Safety. We established this office to serve two purposes: be a source of assistance to the Site Manager and be a source of confidence to me that we are meeting our safety responsibilities. There is, I acknowledge, an inherent tension between those two objectives, but there is extensive experience in the military of the same individual performing both.

We determined that we would conduct reviews of nuclear safety operations at each site in alternate years from scheduled OA inspections. To emphasize that these reviews perform a dual function, I have asked that the Site Manager and Chief of Defense Nuclear Safety agree on their scope. That allows us to emphasize areas in which either party has a concern and to de-emphasize (though not completely ignore) those areas in which neither believes there are issues.

Because one function of these reviews is to ensure consistency and to raise standards across NNSA, we are drawing people from across the complex to help with the reviews. In addition, we plan to use the NNSA Technical Bulletin and other mechanisms to disseminate both best practices and other forms of lessons learned. To allow identification of trends, we decided we would assign grades. Finally, to emphasize the continued importance of the strong Site Manager model, unless a review identifies a significant weakness, the follow up to these reviews are conducted entirely by the Site Manager with no requirement for reports to the Central Technical Authority, the Chief of Defense Nuclear Safety, or me.

We are evolving the effort and will doubtless refine it as we gain more experience. From the Site Office perspective, despite the intention that these reviews are conducted primarily to support the Site Manager, they feel a lot like inspections. I've concluded *that's probably inevitable. We still have work to do on getting the timing right with the Office of Safety and Security Performance Assurance so that the two outside groups are separated by about a year. Finally, we are still groping with how much tailoring we should do in response to site manager concerns. While our efforts will doubtlessly evolve, I remain convinced that these reviews are an important tool in meeting our nuclear safety responsibilities.*

…Linton Brooks

SECTION I. <u>FOCUS AREA</u>

Site Office Management Systems

The focus this month is on management systems used by site office managers to carry out their nuclear safety oversight responsibilities. The focus article, from the Y-12 Site Office (YSO), discusses the basic principles considered in establishing the YSO management system. A related article in the Perspectives section at the end of this bulletin discusses a specific management tool being piloted by the Pantex Site Office.

Editorial Note: In early 2006, William Brumley will be retiring from NNSA after a long and distinguished career that culminated in his management of the Y-12 Site Office. Under his leadership, the Y-12 site has made tremendous progress in its implementation of integrated safety management. NA-2 asked Bill to put together his thoughts on what has factored in his success at Y-12, so that we could share them through the technical bulletin. Bill forwarded this focus article for publication, along with the following note:

> *I would like to think I had some grand plan for the improvements in YSO. I didn't. When Jerry Paul asked me to write a paper on what we did to drive the improvements that have been made, there were two points that I continually came back to:*
>
> 1. *Work on the important but not urgent tasks (Quadrant 2 for the Covey fans). Specifically we did spend time on the processes and procedures that are rarely a high priority.*
>
> 2. *Draw circles around arrows on the wall. First write down what you do, and then continue to do what you said. Make your improvements to a documented system.*
>
> *Since that was about all I could come up with, I asked several of the YSO staff to write a paper on why they thought we had been relatively successful. As a result the attached paper reflects much more of what the staff heard, rather than what I said or directed. In the end it is more important what people hear, not what you say or mean. – Bill Brumley*

The CDNS office extends a special thank you to Bill and the YSO staff for the insight provided in this article and wishes him the best in his retirement.

THOUGHTS ON AN EFFECTIVE SITE OFFICE MANAGEMENT SYSTEM

By Jeff Cravens, Diane McCarten, and Travis Howerton
Y-12 Site Office, NNSA

The purpose of this paper is to demonstrate and explain some of the basic principles involved in establishing an effective site office management system. Though missions, staffing and resources will always vary from site to site, there are some underlying principles and concepts that are common to all of us. These include the following elements: mission, processes, management, systems, and people.

Understanding and defining the mission is the first step in the process of establishing an effective management system. The next step is formalizing and documenting the processes that help achieve the mission. The third step consists of developing a management system that helps enforce and strengthen organizational processes. The fourth step is developing and/or using systems that support the management structure. The last step focuses on the most important aspect of all—the human element—encouraging and strengthening employee performance. Employees are always the most important part of any site office. However, in order for employees to succeed, the other four steps must be in place and properly implemented. Having said that, starting with a few people up front with the necessary skills and abilities is a prerequisite for success.

Mission

Mission is the foundation of any government organization, regardless of its size. Identifying and understanding the mission, the products, and the customers are the foundation for building a successful management system. The mission should be specific and motivational, and it should clearly establish the office's identity to external parties and customers. The mission definition should define success for the office. Generic attributes, such "great quality, service, and customer focus," apply to all organizations. While important attributes to organizational success, when identifying the mission of an organization, these statements should be avoided.

In defining the mission, clarify completely the "products" and primary customer(s) of the organization. This exercise crystallizes the areas that are most important to the success of the organization. It focuses on the required, versus the non-essential, processes.

At the Y-12 Site Office (YSO), we quickly discovered that defining mission and customers was not an easy task. It is all too tempting to slip into an "identity crisis" and assume that the site office mission is the same as the contractor's mission. While it is true that the Y-12 plant's mission is the end goal, the site office and the contractor have separate roles (or missions) to fulfill if the plant is to be successful. After much soul searching, we came to the realization that our site office mission, and the primary reason we are here, is to administer and oversee a contract. Our product, therefore, is risk acceptance and oversight.

Similarly, identifying our customer (or customers) was difficult to answer. With all the entities vying for our attention (Headquarters, the Defense Nuclear Facilities Safety Board, Members of Congress, and the public), it was tempting to refer to all of them as "customers." However, once the missions and products were determined, we identified "Headquarters" as our customer. To most observers, this answer would appear to be obvious, but that was simply not the case. The YSO "customer" is more specific than just Headquarters. YSO's customers are the Program sponsors—weapons NA-10, nuclear nonproliferation NA-20, FIRP NA-50 and security NA-70. All other interested parties, as listed above, were identified as stakeholders. This did not diminish the importance of these various groups and individuals, as they are important to our continued success. However, despite some discomfort we felt in making the customer vs. stakeholder distinction, it helped us to achieve an improved clarity of vision for the future of the office. There is no question that the right choice was made in the path chosen.

Processes

If mission definition results in the "what, for whom, and why," then process development provides the "who and how." A well-defined set of documented processes is essential to cohesive and consistent operations, effective employee turnover, and successful bids to drive operational improvements. Processes should be documented in a consistent manner (e.g., templated procedures or flowcharts) and should adhere to a formal review, change and approval mechanism to ensure control of, and drive improvements in, accuracy and applicability. An effective documented process generally goes through three stages:

> <u>Define</u> – The first step is to define the current process, avoiding any sort of embellishment. "Wishful thinking" is a process killer that immediately generates noncompliance with existing procedures. Think of this step as a game of darts. If you put up a dartboard and aim for the bull's-eye, you are bound to hit it on occasion but will likely miss quite often. However, if you stick a dart in the wall and then draw a bull's-eye around it, you will never miss. If you start by writing down exactly what you do, you are bound to hit the mark every time. For YSO, the issuance of our Management System Description in 2001 was a defining moment that documented for the first time how our processes and procedures were all part of an integrated management system.
>
> <u>Streamline</u> – Once a defined set of processes has been developed, it is time to start streamlining. There are several obvious things in this phase such as eliminating redundant or unnecessary steps, reducing the amount of paper generated, or lowering costs where applicable. However, the hardest part involves taking an objective view and looking at which processes should be corporate versus organizational. In many cases, especially with vertical management structures, processes tend to become stove-piped with each organization playing in their own

sandbox. Many processes such as issues management, human resources, and project management can and should be handled the same way across organizations. Ideally, each organization would be a matrix organization servicing line or mission essential organizations (management egos and tradition are not valid reasons for avoiding this step). By matrixing these functions, key processes become standardized thereby improving control of nonconforming product for your customers. At YSO, there are no Assistant Manager level procedures. If a procedure is required, even though it may apply primarily to one Assistant Manager, it is issued as a site office procedure and applies to all.

Improve – A mature set of processes is always in the improvement phase. If a manager thinks that his or her processes are perfect, then they have already failed as a manager. Processes can and will continue to improve as long as there is a continued focus and emphasis on them. There are several areas that currently provide huge process improvements for today's businesses. First, technology continues to increase efficiency across all areas of business. Many processes can be automated or streamlined by simply using the latest technology. The second major area for improvement involves maximum utilization of people. Every successful organization will express the fact that their people are their most important asset. Managers should take this to heart by looking for ways to create synergy in new areas. Use job rotation to bring new and fresh ideas into troubled areas, bring different people into stagnant meetings, and always encourage employees to be creative problem solvers. There is no end to the improvements that can be made with the proper management encouragement.

ISO 9001:2000

After the initial issue of the management system description, and substantial process improvement for two years, YSO was beginning to lose focus on improving processes and procedures. At about the same time, NNSA started looking into ISO 9001:2000 registration as a way to improve. YSO embraced ISO 9001:2000 as a tool to cause us to look at what and how we were doing things. As an added bonus, this effort also offered the opportunity to have our processes and systems independently evaluated to a private industry standard. At the beginning of the bid for ISO 9001:2000 registration, a small group of employees was tasked with producing a flow chart of all YSO processes, after becoming familiar with ISO standard clauses. This was done person-to-person—it was not a paperwork exercise. The ISO "disciple" would sit down with a YSO employee and ask them what they do. Then, as the employee described his/her work, the ISO "disciple" would flowchart the processes being described. If there were other things the employee did, there were other flowcharts generated. This was, effectively, drawing the bull's eye around the dart.

Not until *after* all the processes were mapped did we pull out our procedures to see if there were gaps. When gaps were identified, a rational decision was made regarding how to do the process (i.e., the way the procedure said or the way it was actually being done), and a change was made either to the procedure or the employee's methods. Once all the many "microprocesses" were mapped, they were tied together, as far as it made sense to do, to create eight "macroprocesses." These were called the "critical few" and included things such as Contractor Oversight, Continuous Improvement, and Resource Management that make up the YSO management system. While this turned out to be a very smart thing to do, it was driven by a more primal instinct… survival. The employee team was simply unable to get their minds around the 40+ processes that had been mapped. During this phase, unnecessary process overlaps and conflicts were discovered and resolved. Then, with the work clearly mapped, YSO was able to automate, measure, and improve many of the processes.

It was during the automation phase when streamlining of YSO processes was achieved. As better ways to automate were developed, the team was led to find better ways to do business, which in turn led us to more ideas for automation, and so on—in a word, improvement. This has subsequently become a living and evolving process as YSO employees continue to develop suggestions for improvements since the automated processes get wider use than their predecessors.

Before automation, when the processes existed only as paper procedures, there were varying degrees of compliance depending on the users' preferences. As discovered during the initial process mapping activities, some processes were routinely "worked around" because they were onerous, duplicative, or just plain cumbersome. Early on, YSO Management made it very clear that the automated processes were the *only* processes to be used at YSO. The truly significant aspect of this decision stems from the fact that the automated processes *do not allow deviation.* That single management decision, therefore, resulted in instant compliance with our processes: there simply was no other way available to do the work. There is a school of thought that the automated system has become our process, and there is no longer a need for specific documented procedures as long as we maintain process maps and exceptionally well-documented software. This would allow a significant reduction in the maintenance of the paper procedures and allow more focus on the process. YSO is not quite ready to take this next leap of faith, but is indeed standing on the edge.

Management

Management structure and staffing can make or break any organization. Managers are expected to provide leadership, set the corporate vision, and enforce existing policies and procedures. With such responsibility, an organization's management ranks should be filled with the best and brightest. Promotions based on seniority or "who you know" will guarantee mediocrity by discouraging top performers and elevating people above their capabilities. Management staffing efforts should be focused on the following areas:

> <u>Core Values</u> – Top management must define, continuously communicate, and most importantly, model the core values of the organization. It is an absolute necessity that every employee shares the company's core values. Allowing

continual and active differentiation or dissent in this area is a morale and trust killer. This should not be confused as discouraging differing professional opinions (DPOs). A DPO process and the willingness of the staff to raise and management to hear differing opinions are healthy and absolutely critical to long-term success. However, once the management decision has been made, the debate is over, and the mission goes forward. In addition, great managers not only enforce the core values, they also act as role models for the organization. They serve as living proof that their ideas work.

Organizational Structure – There is no such thing as a "correct" organizational structure. The structure will always vary based on mission and staffing. In addition, a great looking organizational chart will not guarantee success though it can often lead to failure. In general, there is one fundamental principle that applies to all organizational structures, flatter is better. Excessive levels of management will increase delays in decision making, reduce management accessibility by staff, and, most importantly, significantly reduce the amount and accuracy of information that is disseminated from staff to top-level management. By increasing their distance from the field, managers will have only succeeded in reducing their effectiveness. Managers should strive for a structure that promotes a "learning organization" where ideas flow seamlessly from top to bottom and every employee feels like an important part of the team.

The YSO organizational structure consists of three layers: the Site Manager/Deputy Manager, the Assistant Managers, and the staff. There is never more that one person between the Manager and any one employee in the office. This not only facilitates communication of "the vision," but it also enables high levels of management and staff commitment. In YSO's most successful ventures, the Site Manager communicates (and, in some cases, forcefully defends and reiterates) the vision, and then gets out of the way. Informal teams are constantly forming, performing, and disbanding in a very fluid and transparent (to management) manner, and without regard to pay grade, seniority, or any other artificial and irrelevant factor. YSO's ISO 9001:2000 registration bid was completed by a number of teams, most of which were never formally chartered. People were asked to participate and did so without fanfare. When asked by the Site Manager why they did all this, one staff member responded, "Because you said we could."

Vision – As important as it is that managers form and understand the vision for the organization, it is much more important is that the vision is effectively communicated to the staff. If everyone is not on the same page, performance will never be optimal, and the mission may fail completely. Everyone from the top manager down to the file clerk should understand his or her part in the mission and vision. In addition, the vision should plan for the present, short term, and long term. It should also evolve based on changing strengths, weaknesses, opportunities, and threats (SWOT analysis). And, naturally, the staff must be kept apprised of and, ideally, participate in the changes. All-hands meetings every 6–8 weeks are very useful in keeping a focus on the vision as well as recent changes.

Commitment – All management must demonstrate consistent and constant commitment to the organization's vision. While lack of commitment from staff can be frustrating, lack of commitment from management is disastrous. Management must serve as the role model by clearly demonstrating on a daily basis their commitment to the organization's mission. In addition, it is the manager's job to ensure that the staff shares the same level of commitment that s/he does. There should be no place in the organization for people who do not share the company's values or who intentionally bypass policies and procedures for the sake of convenience.

Contractor Relationship – The organization's relationship with the contractor must always be maintained at a courteous and professional level. Disrespect or abusive behavior cannot be tolerated from either side. If such behavior is found to exist, appropriate management intervention is required immediately. The key to this relationship is ensuring that an adversarial relationship is not allowed to develop (and if already developed it must be quickly remedied). The site office should never engage in a game of "gotcha" and abuse their oversight authority. In addition, the contractor should never engage in hiding problems or factual manipulation in order to deceive the site office. Instead, both sides should engage in an atmosphere of trust and cooperation, working together to achieve a common mission. The site office and contractor should always fail or succeed together as a team.

The key to the YSO-Contractor relationship has been formality and management ownership. Most of the feedback provided to the Y-12 Contractor is in the form of assessment results. YSO has established a formal process for scheduling, tracking, and documenting assessments. Results of these assessments are provided informally to the Contractor for factual accuracy checks, and then forwarded to the YSO Management Team for prioritization and approval. *All assessment results transmitted formally to the Contractor are endorsed by YSO Management.* This process ensures that the Contractor is focused on accurate, relevant, and significant issues and not nit-picked or misdirected by alternate agendas.

Systems

Systems exist solely to support management and the processes that help achieve the mission. Good systems increase efficiency, productivity, and employee morale. However, a bad system can hinder performance and undermine morale. Therefore, it is important that all systems decisions be made with due consideration and forethought as to consequences and rewards. Below are three systems that are likely to be common to all sites:

Network – As business has moved into the 21st century, the network has become the standard way to share and disseminate information. Whether it is from file shares, the intranet, or the internet, the network is the backbone of any organization. As such, it deserves the proper amount of attention to be successful. Consideration should be given to network availability, data storage and backup, and customer service. Lost data, network downtime, and buggy software can all lead to significant productivity loss. An effective site office will recognize all of these risks and have controls in place to mitigate them.

Software – Procuring the best software will allow employees to reach their maximum productivity level. In addition, management should attempt to standardize as much as possible so that interaction between employees is seamless (e.g., using Microsoft Office for all documents and spreadsheets). Finally, the site office should try to buy in bulk to reduce costs whenever possible.

Assessment Schedule – Since each site office is essentially an oversight organization, having a robust and comprehensive assessment schedule is vitally important. The schedule should cover all requirements, involve all staff, and be of sufficient depth to ensure that work is being performed safely, securely, and in a cost effective manner. The schedule ensures that everyone knows their oversight role, that each staff member is meeting management expectations, and that all the bases are covered. Progress against the schedule should be tracked as close to real time as possible with results being reported to management in a timely manner. But more than just scheduling and tracking assessments, it is vital to understand the requirements that drive the assessment. The site office should strive for requirements-driven, performance-based oversight of the contractor. All findings against the contractor should be clearly tied back to a requirement. Any other feedback from the site office should be given as professional advice or an opportunity for improvement. By judging contractor performance from a requirements basis, rather than an arbitrary individual standard, the site office can ensure that the contractor is always on the same page and that direction is always clearly given.

YSO uses a shared network drive, Microsoft Office Suite, and Pegasus to accomplish virtually all its work. Information is tied together by the YSO Home Page. By far, the most effective tool is Pegasus.

Pegasus is an open code source information management system that not only stores YSO documents, but is also the process by which most of those documents are created. Pegasus houses the YSO Assessment Schedule and tracks those assessments to closure. It is also the software used to write, approve and transmit to the contractor all YSO assessment reports and issues. In addition, Pegasus houses and tracks all incoming and outgoing YSO correspondence, actions, corrective action plans, suggestions for management system improvements, Lessons Learned, and many of the YSO performance indicators. This “one stop shop” enables YSO employees and managers to keep track of all commitments and deliverables. Further, Pegasus enables YSO Management to hold individuals accountable for performance. In short: there's no place to hide.

People

As stated earlier, the most important part of the organization is its people. With the implementation of the other elements mentioned in this paper, employees can and should be positioned for success. The next step is to ensure that the workforce is staffed with high performers. The following areas must be monitored to ensure the highest levels of performance:

> Hiring – Hiring is arguably the most important part of dealing with people. Job descriptions should be as accurate and thorough as possible. This helps ensure that applicants are truly interested in the job and limits surprises after they hire on. In addition, all job descriptions should support identified and documented processes. Though it is common sense to hire the most capable candidates, many managers get hung up on experience. In most cases, managers should strive to hire the brightest and most enthusiastic candidates. Often, better results are achieved by teaching a talented, though inexperienced, new employee as compared to hiring an average, albeit experienced, candidate.
>
> Performance – All site offices should ensure that outstanding performance is recognized and rewarded. This is one instance where it does not pay to treat everyone the same. In fact, doing so actually promotes mediocre performance. To achieve the very best results, you must pay for performance. An effective site office will have a grading system that controls pay raises, bonuses, and promotions. A good general approach is GE's "20-70-10" rule. The top 20% of performers should get large bonuses, large raises, and the first opportunity for promotions. The middle 70% should get standard bonuses and raises that are significantly smaller. The bottom 10% should get neither a bonus nor a raise (at GE they get fired). This sort of system promotes higher achievement and clearly differentiates the top performers.
>
> High Standards – Management should always push to set the bar a little bit higher (both internally and with the contractor). If a 5% improvement is reasonable, then set the goal to 10%. Though you will probably end up reaching fewer of your goals, you should still end up seeing a marked difference in overall performance. For this to be realistic, you must also ensure that employees are not punished for falling short of miracles. On the same note, significant achievements should be celebrated. You can never be too proud of or pour too much praise on the overachievers.

Conclusion

During the past few years, YSO has undergone a tremendous transformation. The genesis of this dramatic turnaround was a landmark event—the October 2000 ISM review of YSO. Such a review was not unique to Y-12; however, in the case of YSO, a decision was made in December 2000 not to develop an ISM specific corrective action plan. At that time many questioned the wisdom of not taking this action. Instead, YSO decided to take a giant step back, to take the time and effort to build an Integrated Site Office Management System that focused on the principle elements of mission, process, management, systems, and people.

This was time and effort well spent, and these actions laid the foundation for the success that has been achieved at YSO in the years that followed.

SECTION II. QUESTIONS AND ANSWERS

This section is dedicated to answering questions and providing general information related to nuclear safety.

1. What are the requirements for Startup Notification Reports?

DOE Order 425.1C, *Startup and Restart of Nuclear Facilities,* requires a Startup Notification Report (SNR) for every startup or restart of a nuclear operation other than routine resumption of operations after a short, planned interruption.

Startups requiring review should be started or restarted using an Operational Readiness Review or properly scoped Readiness Assessment. Routine resumptions of operations can be conducted without a readiness review using normal contractor operating procedures for the facility or activity. Contractor routine procedures should not be developed for the purpose of avoiding a properly scoped Readiness Assessment.

DOE line management procedures must require the contractor to prepare SNRs. SNRs must be submitted at a periodicity specified by DOE (recommended to be quarterly). Each SNR must project ahead at least one year and update information from previous periods for startups that have not yet occurred and add information for each startup or restart that has been identified since the last report. The SNR is to be approved by DOE. The procedures should require the following elements:

a. Minimum information in the SNR for each startup or restart should include the following:

    1) A brief description of the facility or program work

    2) Reason for non-operation (e.g., maintenance or modification, outage, no program work, new facility, shutdown for safety concerns, etc.)

    3) The approximate date operations were last conducted (for restarts) and the projected date for the startup

    4) Proposed type of readiness review

    5) Basis or justification for proposed type of readiness review

    6) Proposed authorization authority

b. Each SNR should be reviewed and approved by DOE field office management. If the startup authority resides with the Program Secretarial Officer (PSO), the field office management should comment and make a recommendation regarding approval.

c. Each SNR, including the field office comments and actions, must be forwarded to the PSO, the Office of Corporate Safety Assurance, and the site Lead Program Secretarial Officer and/or cognizant Secretarial Officer, as appropriate.

d. Contractor readiness review action to start or restart operations should not commence until the DOE authorization authority has approved the proposed readiness review process.

The purpose of these reports is to establish early the appropriate authorization authority and appropriate review methodology for the startup/restart. Quarterly reports add new startup/restarts and update previously reported startups and restarts.

Not all NNSA sites are meeting the requirements for SNR development and submittal. SNRs should be submitted at least quarterly to NA-10 and the CDNS (Dick Crowe). The CDNS office will provide a copy to EH to fulfill that requirement. Many discussions take place concerning the appropriate review methodology (ORR or RA). The SNR is the vehicle for the contractor to justify, in detail, the recommended readiness review. Some cases have occurred where past practice was the justification for a review recommendation. That past practice needs to be clearly documented with appropriate approvals to be defensible. Early submittal of SNRs will allow resolution of questions prior to planned startups and restarts.

Any questions in this area should be addressed to the Technical Lead for Operations and Readiness (Dick Crowe 301-903-6214, richard.crowe@nnsa.doe.gov).

2. How does NNSA intend to interface with EH in the area of startups and restarts?

DOE Order 425.1C lists several responsibilities for EH including the following:

a. In coordination with the PSO, perform independent reviews of startup and restart activities as appropriate and provide results of these reviews to DOE Operational Readiness Review team leaders, cognizant operations office managers, and cognizant Secretarial Officers for resolution.

b. Review and comment on the PSO, operations office, and contractor procedures for startup or restart of nuclear facilities and provide results of these reviews to cognizant operations office managers, and cognizant Secretarial Officers for resolution.

c. In coordination with the PSO and the field office, perform independent review of contractor SNRs and provide results of these reviews to cognizant operations office managers and cognizant Secretarial Officers for resolution.

d. Review and comment on contractor and DOE plans of action and implementation plans for startup or restart of nuclear facilities for both readiness assessment and

Operational Readiness Reviews, including specification of involvement in startup or restart activities proposed by the Office of Corporate Safety Assurance.

e. Review and comment on the Operational Readiness Review final report recommendations regarding startup or restart to the DOE authorization authority.

f. Provide any dissenting opinion on the readiness of a facility to startup or restart to DOE line management or the Secretary if a significant safety concern is not being properly corrected.

g. If requested by the Secretary, concur in the final decision to startup or restart a nuclear facility.

The Technical Lead for Operations and Readiness (Dick Crowe) in the office of the CDNS is the NNSA corporate interface with EH in fulfilling these responsibilities. The office of the CDNS will provide copies of the site readiness documents to EH and provide any feedback from EH to the sites. This will relieve the sites from the necessity of providing these documents directly to EH. Feedback from EH should be reconciled as appropriate.

Any questions in this area should be addressed to the Technical Lead for Operations and Readiness (Dick Crowe 301-903-6214, richard.crowe@nnsa.doe.gov).

3. What was the outcome of the Savannah River Site Office Biennial Review of Site Nuclear Safety Performance?

The Biennial Review of the Savannah River Site Office was completed on July 28, 2005. Copies of the final report will be distributed to the sites after the results are briefed to the Administrator, Principal Deputy Administrator and Deputy Administrator for Defense Programs. Noteworthy site office and contractor practices identified in the report will be disseminated in the December 2005 NATB. In the interim, here are the lessons learned from the review process itself.

LESSONS LEARNED

Scope/Focus of Review

- SRSO is a small site, and the team was small in number. Multiple CRADs were assigned to each reviewer. This led to resources being stretched thin. It is recommended that no more than two similar CRADs be assigned to an individual reviewer and at large sites, a single CRAD per reviewer be assigned.

Pre-Visit

- During the pre-visit, the site office should identify any independent review/assessment(s) that might be germane to the CDNS review (e.g., OA review) and provide any documentation related to the site's programs (e.g., corrective action plan deliverables affecting site programs).

- By the end of the site pre-visit, team members should have identified the procedures, work products, and operations that will be requested or observed during the main review. In addition, as much documentation as possible should be made available during the pre-visit or immediately thereafter.

- To maximize the use of time and resources during the pre-visit, the agenda should include an initial session involving general topics. Following this session team members can split into groups to collect detailed information relative to their CRADS in a more parallel fashion.

- During the pre-visit, site offices should make a case where they consider existing site office and contractor assessment programs to have provided an adequate, recent assessment of specific criteria. This case should be supported with documented evidence of the assessments, corrective action plans, and the status of corrective action plans. The site office and the review team can then rescope the criteria to avoid duplicative assessments as discussed in the biennial review protocol.

Conduct of Review

- Ideally, there should be at least three weeks between the pre-visit and the actual review to allow sufficient time for team members to review documents made available during the pre-visit and then develop lines of inquiry based on that review.

- Good intra-team communication facilitated integration of crosscutting issues; for reviews at larger sites (with larger CDNS review teams), communicating issues at the 4 pm meetings is critical.

- CDNS Team members should familiarize themselves with the criteria of functional areas from other CRADs to keep alert for potential crosscutting issues and to be able to alert other team members if a weakness is noted that would be applicable in another functional area.

Computer/Logistics

- Noteworthy Practice: Access to the contractor's intranet site (SHRINE) greatly facilitated review of contractor documents.

- In providing computer support to the CDNS team, shared memory capabilities would improve efficiency (i.e., no need to transfer products via disks or email).

- Arrangements to store UCNI, OUO, or classified material at the end of the day should be arranged in advance of arriving for the review.

- More desk surface area should be provided to CDNS team members to allow for review of multiple documents.

4. If a facility performs initial hazard categorization using the tables in DOE-STD-1027-92 and the caveats included in the standard (like the provision to exclude certain sealed sources and material in approved shipping containers), is there ever a situation in which the final facility hazard category would be increased? For example, if the hazard analysis identifies credible accident scenarios in the facility, and the sealed sources clearly would not survive those scenarios, would the analysis have to consider the release of the material in those sources for final facility hazard categorization?

The tables and caveats in DOE-STD-1027-92 are provided for convenience, and with the assumption that their use leads to a conservative hazard categorization of facilities such that they are categorized consistently with the definitions in the standard. Normally, the use of the tables and caveats is sufficient. Often, hazard and accident analyses can show that a lower facility hazard category is reasonable, and final facility hazard category is sometimes more appropriate at a lower level than the values in the tables would indicate. Lowering the hazard category is permitted by the standard in those cases.

On the other hand, there can be certain circumstances for which the tables and caveats in the standard were not designed. For example, a facility could have accident conditions that shipping containers or sealed sources clearly could not survive, or environmental conditions and material form could lead to much greater release fractions than were assumed in the isotope table. For such situations, it is appropriate to increase the facility hazard category, if necessary, to be consistent with the definitions of the hazard category. This is consistent with the final statements found in Section 3.1.2 of the standard: "All assumptions which are used to reduce the inventory at risk should be supported in the Hazards Analysis. This also applies to ground rules identified in Attachment 1, to demonstrate that the ground rule conditions exist."

This is ***not*** to say that site contractors must re-analyze each situation with each isotope, source, or container to determine whether the consequences are consistent with the facility definitions in the standard. However, when hazard analyses or inspections reveal that the unique conditions at a facility call into question the validity of the assumptions embedded within DOE-STD-1027, final facility hazard category should take those unique conditions into account.

Important Note: Sometimes accident analyses, particularly for low hazard facilities, are performed very simply using gross approximations that are intended to conservatively bound the actual hazard. In some cases, such analyses can exceed by orders of magnitude what a more detailed, reasonably conservative analysis would indicate to be the appropriate degree of hazard. When considering whether a higher facility hazard category is appropriate, the degree of conservatism in the analysis should be examined. In some cases, a more rigorous, reasonably conservative analysis should be performed to determine whether the facility can categorized appropriately at a lower level. It is not useful to categorize facilities at a higher level simply because of an artifact in the analysis.

5. Who is responsible, NNSA or the Contractor, for determining the proper facility hazard category in situations where questions have been raised as to how to apply the ground rules discussed in DOE-STD-1027?

Consistent with 10 CFR 830, the contractor responsible for a facility must categorize the facility consistent with DOE-STD-1027-92, Change Notice 1. DOE is responsible for approving the facility safety basis, which includes the proper determination of facility hazard category. The NNSA Functions, Responsibilities and Authorities Manual (FRAM) delegates this authority to the NNSA Site Office Managers, stating that they "Approve final nuclear facility/activity hazard categorization level based on input from NNSA line managers and contractors regarding the types and amounts of hazards, and the requirements of 10 CFR 830." Thus, for NNSA facilities, the final approval of appropriate facility hazard category is the NNSA Site Office Manager.

If an interpretation is required to determine the appropriate application of DOE-STD-1027-92 to a unique situation, a directed revision to the DOE FRAM, issued by the Secretary on April 26, 2005, assigns the NNSA Central Technical Authority the authority to provide "expectations and guidance for implementing nuclear safety requirements as necessary for use by NNSA employees and contractors." The NNSA FRAM contains a similar provision, stating that the CTA provides "interpretations of nuclear safety requirements and guidance … as necessary for use by NNSA employees and contractors." Should an NNSA employee or contractor desire a formal interpretation from the CTA, the request should be made through the responsible Site Office Manager. CTA interpretations will only be issued to contractors through their Site Office Managers.

SECTION III. PERSPECTIVES

This section is dedicated towards information from site offices that promote nuclear safety within the NNSA workforce. If you have a topic that you believe should be presented in a future NNSA Technical Bulletin, please provide a copy to the Chief of Defense Nuclear Safety.

The following article was contributed by the Pantex Site Office. This article presents an approach being piloted by the Pantex Site Office for focusing site office oversight of the contractor's performance in the area of nuclear safety. Thanks to Steve Erhart, the Pantex Site Office Senior Science and Technical Advisor, for this input.

The Heinrich Pyramid at Pantex

Defining Pinnacle and Tracking Precursor Events

OBJECTIVES

1. To identify a set of Pantex specific Pinnacle Events (accidents that must be avoided) and a related set of first and second order precursor event definitions that can be used to mark operational events for tracking/trending or other action.

2. To establish a more focused trending/tracking system at Pantex.

3. Make recommendations on how best to utilize this new tool to provide a feedback mechanism to better focus NNSA oversight of and direction to the contractor

BACKGROUND

H. W. Heinrich published a text on accident prevention, *Industrial Accident Prevention—A Scientific Approach*. His specialty was industrial safety, and his definition of an accident was essentially an event resulting in personal injury or an event that suggested the probability of personal injury. In evaluating injuries, he identified that for every major injury accident there were about 30 minor injury accidents and 300 non-injury accidents. He represented that information on a pyramid (commonly referred to as a Heinrich Pyramid) with the major injury as the "pinnacle" event and the non-injury accidents as the base of the triangle. A derivative of his work is that for a major accident there was likely a larger group of similar events that each resulted in a less severe accident and an even larger group of events that had a probability of an adverse consequence even if one did not actually occur. Heinrich summed up his philosophy by simply stating that if the accident is prevented, the injury is prevented with emphasis on preventing the opportunity for accidents in the first place. In other words, the opportunity for an accident is a precursor for an actual accident. Identifying and correcting situations where those opportunities exist can prevent serious accidents.

At Pantex, like most industrial operations, accidents are prevented by a series of barriers that include both engineered and administrative controls. Typically the barriers exist to prevent specific consequences like worker injury or the dispersal of radioactive material. Each individual barrier is usually sufficient to prevent the accident, and since multiple barriers are in place, it is unlikely all will fail at the same time. However, it is important to monitor the performance and operation of these barriers to identify when either actual failure occurs or the opportunity for failure occurs since these events are precursors to the possible failure of all barriers.

The ideas discussed above may be combined and summarized to create an oversight methodology where opportunities for barrier failures and actual barrier failures are monitored and evaluated using a graded approach. Under this approach, the most significant barrier failures are those that could immediately result in a "pinnacle" event and are referred to as "incidents". Less significant barrier failures are referred to as a "near miss" and the least significant barrier failures are described as "deficiencies". A "Heinrich Pyramid" type representation of this approach is shown in Figure 1. At Pantex, the contractor would, for the most part, be relied upon to monitor "deficiencies". The site office would review the results of the contractor's activities regarding "deficiencies" and closely monitor "near misses" and "incidents".

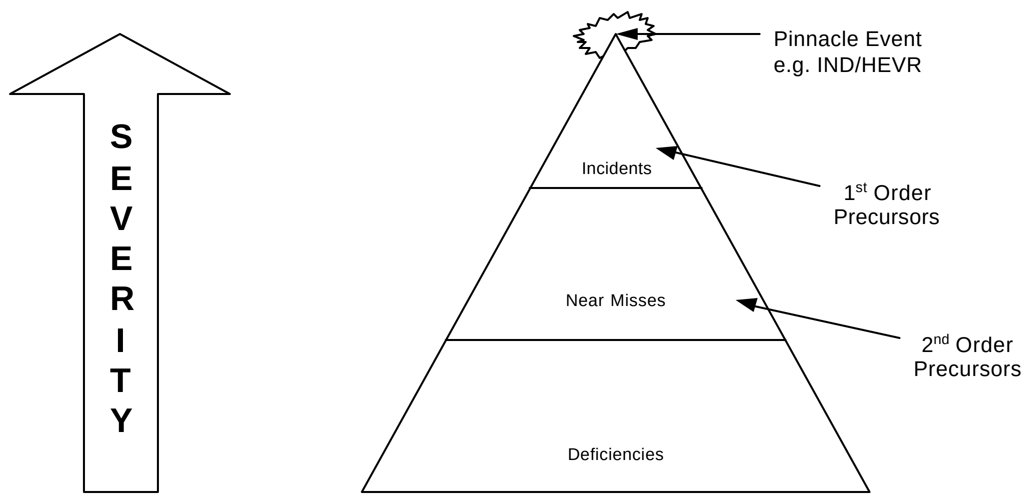


Figure 1: Pantex Generic Occurrence Pyramid

This concept (defining pinnacle events, precursors and related deficiencies) helps focus attention on fixing small problems so that they do not lead to big problems. As an example, consider a reactor accident as a pinnacle event. It could be prevented by a combination of reactor protection design features (engineered controls) with the underlying control structure of highly trained operator's strict adherence to rigorously verified and approved procedures. A basic precept in nuclear reactor operations is not to exercise the reactor protection systems (since doing so would exercise the last line of defense to the pinnacle event). Put another way, you are not to test the interlocks through plant operation. Rather, you are to avoid situations where the interlocks would be necessary.

In order to instill the importance of strict procedural compliance and the need for continued vigilance and attention to detail, we should make "big deals" out of some seemingly "small things" that have very little, if any, short or long-term consequences if they are viewed as precursors to larger events. The rationale is to sensitize the personnel on the smallest of details and to take sufficient corrective action on those to prevent them from becoming bigger problems. These lower level events (which in our application of the Heinrich Pyramid are monitored primarily by the contractor who could make their own pyramids with those occurrences as "pinnacle" events) also require specific reporting and corrective actions.

The DOE Event Investigation and Occurrence Reporting System reporting criteria are general and are not tailored to an individual site's specific pinnacle events. Further, some deficiencies identified in the system may not be indicative of breakdowns that left unaddressed could lead to events further up the pyramid (toward the pinnacle event). The generic nature of the definition of each reporting criterion and the vast assortment of activities that take place at NNSA sites limit the utility of this system as a tool for site managers to quickly determine the significance of an event and identify trends that truly indicate movement up the pyramid toward a predetermined, unacceptable event.

The system described in this paper has several advantages not otherwise provided by existing reporting and data collection processes:

1. Defines the particular accidents that are of the most significance to the site manager. Not all things that can go wrong at Pantex have (or should be presumed to have) the same level of impact on the continued operation of this facility. Therefore, not all occurrences should necessarily receive the same response.

2. Focuses on "preventative" versus "mitigative" controls consistent with the Pantex safety basis approach.

3. Defines specific occurrence types that are clearly precursors to the pinnacle events. This will help to focus on deficiencies that can have a significant effect on plant safety. This is not to say other deficiencies are not also important to address, just not of utmost importance.

4. Provides a better basis for and consistency to contractor direction. Continual tracking and periodic reporting of first and second order precursor events and linking deficiencies to these events will form a defensible basis for focused federal oversight and should provide for more consistency with how we respond to occurrences.

5. Provides a more focused, meaningful set of reporting metrics and aids in discussion of the significance of Pantex occurrences with other external entities.

DEFINITIONS

Pinnacle Event – Accident that must be avoided. The Site Office Manager has identified three pinnacle events at Pantex (others may be developed at a later date): 1) IND/High Explosive Violent Reaction (HEVR), 2) Worker Fatality, and 3) Offsite release of SNM.

Note: A single event may be a precursor to more than one pinnacle event, e.g., an event that could have lead to an HEVR is also a precursor to a worker fatality.

Incident – A first order precursor event where an accident sequence is initiated that could lead to (enable) the pinnacle event.

Examples:

1. Contractor personnel receive electrical shock while cutting what was thought to be de-energized cables.
2. Inadvertent discharge of firearm while cleaning.

Near Miss – A second order precursor event where an accident sequence was not initiated but one or more controls (administrative or engineered) were found to be missing, deficient or improperly implemented and therefore would not be available to prevent the pinnacle event. Operating outside the safety basis is also considered a near miss.

Examples:

1. Electrical line that should be de-energized for work activity is left energized.
2. Violation of firing range, cleaning house or armory safety procedures.

Deficiency – Any problem or issue that if left uncorrected could lead to a precursor event or a breakdown in systems/processes underlying several barriers (e.g. procedural violation issues, systemic training issues, etc.).

IMPLEMENTATION

1. Adopt (or modify as appropriate) the above pinnacle events and corresponding precursor event definitions.

2. Assign a responsibility within the site office and provide training to “mine” existing data sources, and apply the adopted definitions. It may be a useful exercise to go through the available reporting system databases for the past year to see how these events fall out.

3. Prepare a quarterly report of precursor events to the Manager and Assistant Managers (AM) and provide copy to the office of the CDNS.

4. Require the AMs to update the Manager periodically with adjustments (if any) that have been or are to be made to the site office Line Oversight Assessment Plan as a result of the information in the quarterly reports as well as any other direction to the contractor that may be warranted.

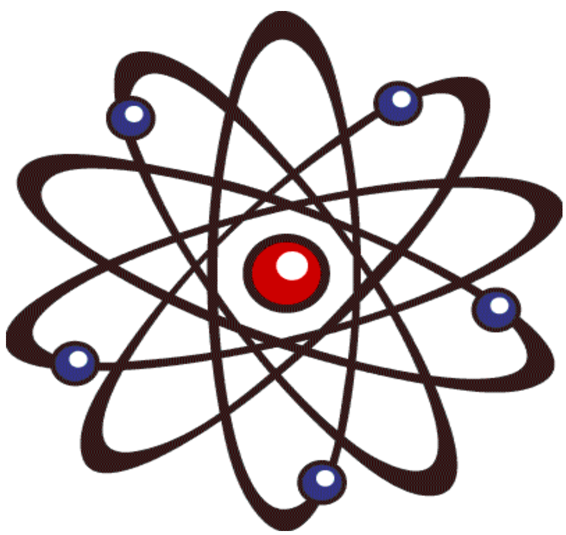
5. Provide the precursor event definitions to the contractor and notify the contractor of the site office intention to track this information.

6. Provide the contractor with the expectation that they track and trend deficiencies that could reasonably be expected to lead to precursor events and take appropriate action.

For more details on how this concept is being implemented at Pantex, please contact Steve Erhart, (806) 477-6150 or serhart@pantex.doe.gov.

National Nuclear Security Administration

TECHNICAL BULLETIN
5-04



DECEMBER 2005

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In This Edition…

SECTION I: FOCUS AREA

Site Office Chemical Safety Systems

The focus this month is on chemical safety systems that may be used by Site Office managers to carry out their chemical safety oversight responsibilities. The focus article is a consolidation from a full-length paper being published in the Chemical Health and Safety (CH&S) Journal, a publication of the American Chemical Society. The full-length article is available on the CH&S and DOE EH web sites. It was written by members of the DOE and EFCOG Chemical Safety Topical Committee (CSTC).*

Site Office Chemical Safety Management System

by Don Brunell, Jim Todd, and Rob Vrooman, Sandia Site Office, NNSA

Under the United States (U.S.) Department of Energy (DOE) Integrated Safety Management System (ISMS), DOE sites must ensure that hazards are identified and analyzed, engineering and administrative controls are implemented to protect the workers and public, and operations are properly authorized in an appropriately hazard classified facility. In essence, the ISMS provides the overarching authorization basis requirements to both nuclear and non-nuclear facilities as ISMS applies to all DOE facilities in accordance with DOE-P-450.4, *Safety Management System Policy*, and DOE Acquisition Regulations (DEAR) clause 48 CFR 970.5223-1, *Integration of Environment, Safety, and Health into Work Planning and Execution*.

For nuclear facilities, 10 CFR 830, *Nuclear Safety Management*, Subpart B, adopted in January 2001, replaces earlier DOE Orders 5480.21, *Unreviewed Safety Questions*, 5480.22, *Technical Safety Requirements*, and 5480.23, *Nuclear Safety Analysis Report*.

For non-nuclear facilities, DOE Order 5481.1B, *Safety Analysis and Review System*, was cancelled in September 1995, and DOE-EM-STD-5502-94, *Hazard Baseline Documentation*, was cancelled in October 2001. As a result, there has been minimal guidance on safety basis (SB) for chemical, non-nuclear facilities. Various DOE sites over the years have adopted site-specific chemical safety-basis processes and documentation that have resulted in wide variations across the DOE complex (Phase 1 report, CSTC 2003-C).[1]

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[1] CSTC-2003C. *Phase 1 Report: Current Hazard Characterization Practices in the DOE Complex*, J.C. Laul, LA-UR-03-1242 (Los Alamos National Laboratory), October 2003.

The text below is a summary from the Chemical Safety Topical Committee (CSTC)* Report CSTC 2004-C [2]. This report is also in publication in the Chemical Health and Safety Journal (2006)[2], which can be seen on the Science Direct web site (http://www.sciencedirect.com/science/journal/10749098) and click on "Article in Press". This article is also on the DOE-EH Chemistry Safety web site (http://www.eh.doe.gov/chem_safety/CHS-article-final9-7-05.pdf).

In compliance with the guiding principles of the DEAR clause and ISMS, there are seven main steps in developing SB documentation for chemical, non-nuclear facilities that include the essential features of the five core functions of ISMS. The SB documentation development is an iterative process and can be developed using a graded approach. The key steps are:

- Facility and work description
- Hazard Identification
- Facility Chemical Hazard Classification (CHC)
- Hazard Analysis (HA)
- Identification of Controls
- Commitments to Safety Management Program
- Document and Approval process

Four of these steps are similar to development of nuclear facility SB documentation and, for the sake of brevity, are not discussed in this summary paper. Details for the Hazard Identification, Facility Chemical Hazard Classification, and Hazard Analysis steps are provided in the following sections because the approach for these items is somewhat different for chemical hazards as opposed to nuclear hazards. All seven steps are discussed in detail in the original paper (CSTC 2004-C)[2].

Hazard Identification

A hazards-based approach begins with a comprehensive identification of all types of hazards. This step identifies hazards to define the scope and structure of the safety

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[2] CSTC-2004C. *Perspectives on Chemical Hazard Characterization and Analysis Process at DOE*, J.C. Laul, Fred Simmons, James E. Goss, Lydia M. Boada-Clista, Robert D. Vrooman, Rodger L. Dickey. Shawn W. Spivey, Tim Stirrup, Wayne Davis, LA-UR-04-8335 (Los Alamos National Laboratory), March 2005; also in Publication in Chemical Health and Safety Journal, a Publication of the American Chemical Society, 2006.

* CSTC is a joint Committee of the Department of Energy (DOE) and the Energy Facility Contractor Group (EFCOG).

document. Typically, general types of hazards (e.g., chemical, physical, electrical, kinetic energy) are first identified, and then process-specific and activity-specific hazards are identified in subsequent hazard analysis. Hazard identification may include the use of a checklist, inventory, and preliminary risk binning and other screening criteria to help determine the extent of the HA.

At a minimum, information adequate for proper hazard identification and categorization should be documented. The hazards of expected operations using the maximum planned quantities and types of hazardous material should be considered and listed. Non-specific hazards, including natural phenomenon hazard (NPH) driven, should be identified as potential initiators of events involving specific hazards present.

Generally, the hazard identification processes involve the use of various tables that list chemicals and their threshold planning quantities (TPQs), threshold quantities (TQs) or some other inventory-based indicator of the hazards associated with the chemicals present in the facility being evaluated. Many variations of hazard identification methodology are practiced, but the details vary depending on the complexity of their chemical safety analysis process. Typical hazards identification steps are:

- Identify chemicals and their hazards and processes that use them within the facility.
- Identify additional hazards such as mixing hazards, chemical combustion hazards, and chemical incompatibility.
- Screen the chemical hazards against regulatory criteria
- Screen the chemical hazards against other criteria such as National Fire Protection Association (NFPA) Hazardous Materials Identification System (HMIS) ratings.
- Screen chemicals for common characteristics such as toxic, corrosive, reactive, unstable, shock-sensitive, time-sensitive, moisture-sensitive, light-sensitive, or ignitable chemicals.

The use of regulations with lists (both specific and generic) are useful in identifying chemicals that may require in-depth analysis of the process (e.g., PrHA) to ensure the safety of workers. Specific lists that may be considered include:

- 29 CFR 1910.119 and 29 CFR 1926.64. These are OSHA Process Safety Management (PSM) regulations listing 137 chemicals and their threshold quantities.
- 40 CFR 68. This EPA regulation on Chemical Accident Prevention Provisions establishes a list of 140 regulated substances and their TQs for stationary sources concerning the prevention of accidental releases to protect the public.
- 40 CFR 355. This EPA regulation establishes the list of extremely hazardous substances, TPQ, and facility notification responsibilities necessary for the development and implementation of State and local emergency response plans.
- 40 CFR 302.4. This EPA regulation identifies reportable quantities for a list of hazardous substances and sets notification requirements for releases of these substances.

Additional hazard evaluation should be considered due to the possibility of mixing chemicals or incompatible chemicals that could cause violent exothermic reactions such as a detonation (explosion) or deflagration. A method for determining whether chemicals are compatible should be developed as a tool to assist in reducing the possibility of inadvertent mixing of incompatible chemicals.

Characteristic properties of hazardous chemicals commonly available are usually NFPA ratings (health, fire, reactivity) and information available on material safety data sheets. Additional research is often required to find information on incompatible chemicals. Reportable quantities, threshold quantities, and threshold planning quantities can be used to screen chemicals for hazard and accident analysis and selection of controls. There are other common facility or process/energy hazards such as pressure, thermal, and electrical that can serve as initiators for accidents involving chemicals. Flammable materials, leaking material, and equipment failure are other examples of common hazards that can serve as initiators.

Facility Chemical Hazard Classification (CHC)

There are two viable approaches to CHC in the DOE/NNSA complex: 1) traditional CHC that is based on inventory or consequence; and 2) industry standard – OSHA and EPA regulations that do not require traditional facility hazard classification (CSTC 2004-C)[2] .

For non-nuclear facilities, many DOE sites use high, moderate, and low or high/low or moderate/low categories based on inventory or consequence criteria. There are wide variations in the facility CHC terminology and the screening criteria (inventory or consequence). As indicated above, threshold quantities, threshold planning quantities, and reportable quantities may all be used to establish facility CHC based on inventory. CHC may also be derived from consequences based on exceeding Temporary Emergency Exposure Limits or Emergency Response Planning Guidelines at site boundary or for co-located workers.

The OSHA Process Safety Management (PSM) regulation is a performance-based rule that does not prescribe how specific elements (14 in all) of a safety management system must be implemented; however, it does provide a framework for determining hazard classification and the need for subsequent HA. EPA regulations require analysis of a worst-case scenario at the site boundary

Hazard Analysis

Hazard analysis provides a structured approach for evaluation of those process-related, NPH, and man-made hazards from non-nuclear facility activities that could potentially impact facility workers, co-located workers, and the public.

HA systematically identifies facility hazards and accident potentials through hazard identification and hazard evaluation techniques. The HA addresses the credible range of hazards and accidents anticipated for a facility. Typically, a qualitative approach is used in HA to support non-nuclear facilities SB development, including specifically addressing the protection of workers and the public and providing for defense-in-depth.

There are different approaches to hazard analyses. A graded approach may be useful (see ISMS guiding principles). It is important that all hazards are analyzed one way or another and that the process is systematic and consistent. For hazards that are common in industry (often called standard industry hazards), consensus standards such as OSHA and EPA standards dictate necessary hazard controls. DOE-unique hazards or common hazards resulting in the release of significant quantities of material or unique applications, or hazards that could initiate an event of significant consequence should be the primary focus of hazards analyses. A screening process may be useful to identify hazards needing detailed analyses.

Chemical hazards addressed in hazard analyses may include toxicological, flammability, explosive, reactive, and other hazardous aspects. Each identified hazard is evaluated to characterize relative risk (i.e., in terms of consequences and expected frequency) of unmitigated hazard scenarios. These analyses can also include a preliminary identification of control options that would prevent or mitigate a malfunction or an upset condition that leads to an accident.

Methods used to perform hazard analysis across the DOE complex usually fall into one of two categories: a) a chemical industry approach, and b) an approach based on DOE-STD-3009 for nuclear facilities, as discussed in CSTC 2004-C[2] Report. The primary references of the chemical industry for hazard evaluation are the PSM approach and the Center for Chemical Process Safety (CCPS), *Guidelines for Hazard Evaluation Procedures,* Second Edition with Worked Examples (AIChE, 1992)[3]. The PSM standard is often used by the chemical industry as a good practice, even for facilities that fall below the TQs of highly hazardous chemicals. The PSM standard lists six hazard evaluation techniques, although it allows other equivalent methodologies. The CCPS guide describes in detail the six listed PSM methods, as well as six additional methods. It points out that some of the methods are "broad-brush" techniques most useful early in the design process, whereas still others are applicable to special situations. A number of the techniques focus on developing a list of recommendations for improvements to the process or facility. Several of the techniques suggest identifying engineered or administrative controls "safeguards" that prevent or mitigate the hazards or accident events.

The DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*, Change Notice 2, April 2002, approach uses the

[3] Center for Chemical Process Safety (CCPS). *Guidelines for Hazard Evaluation Procedures*, Second Edition with Worked Problems, AIChE; New York, 1992

basic methods for hazard evaluation that starts the same as the chemical industry approach – by selecting a hazard evaluation method from the chemical industry. Then accidents that can cause release of hazardous materials or energy are analyzed. This analysis includes a qualitative estimation of the frequency and consequences of each event and a listing of engineered systems and administrative controls that would prevent or mitigate the scenario. Typically, the frequency and consequences are both estimated as *unmitigated*, which is before controls are applied. A best practice is to also estimate *mitigated* frequency and consequences, which is after application of controls, to show the effectiveness of the controls for potential accidents that affect workers and the public.

Engineered systems and administrative controls that significantly contribute to preventing or reducing accident frequency or consequence may be identified for special treatment to ensure they will perform their safety functions when needed. A further extension of this method used by some sites includes binning hazard scenarios that require more analysis.

DOE-STD-3009 does not specify which hazard evaluation methodology to use. Instead, it refers the reader to the American Institute of Chemical Engineers CCPS[3]. This reference is cited by DOE-STD-3009 Change Notice 2 and is considered appropriate for use for hazard analysis at non-nuclear facilities. An appropriate hazard analysis technique can be selected from several available standard methods that are widely used by government and industry, as described in the CCPS[3] guidelines and summarized in CSTC 2004-C[2].

Conclusion

This paper presents methods for developing a safety document for chemical, non-nuclear facilities. The seven key steps listed at the beginning of this paper (CSTC 2004-C) provide an outline of a non-nuclear hazards analysis document. The outline follows the essential steps of the ISMS as well as incorporates those ideas from DOE nuclear facilities safety document and industry based analyses.

Facilities should discuss the concepts, methods, and strategies with the respective DOE field or site offices to develop the necessary process(es) that ensure protection of the worker, public, and environment from hazardous material releases from high/moderate hazard facilities.

SECTION II: QUESTIONS AND ANSWERS

This section is dedicated to answering questions and providing general information related to nuclear safety.

The following paragraph appeared on page 20 of the September 2005 edition of the Technical Bulletin:

> If an interpretation is required to determine the appropriate application of DOE-STD-1027-92 to a unique situation, a directed revision to the DOE FRAM, issued by the Secretary on April 26, 2005, assigns the NNSA Central Technical Authority the authority to provide "expectations and guidance for implementing nuclear safety requirements as necessary for use by NNSA employees and contractors." The NNSA FRAM contains a similar provision, stating that the CTA provides "interpretations of nuclear safety requirements and guidance … as necessary for use by NNSA employees and contractors." Should an NNSA employee or contractor desire a formal interpretation from the CTA, the request should be made through the responsible Site Office Manager. CTA interpretations will only be issued to contractors through their Site Office Managers.

1. ***Isn't this statement and the language in the NNSA FRAM at odds with 10 C.F.R. § 820.51, which states that the General Counsel of DOE is "responsible for formulating and issuing any interpretations concerning . . . a DOE Nuclear Safety Requirement?"***

As codified in 10 CFR 820.51, the DOE General Council is responsible for interpreting the Atomic Energy Act of 1954, as amended, Nuclear Safety Statutes, and DOE Nuclear Safety Requirements. The DOE FRAM revision issued by the Secretary on April 26, 2005, establishes that the NNSA CTA's responsibility is to provide "expectations and guidance for implementing nuclear safety requirements as necessary for use by NNSA employees and contractors." The NNSA FRAM (dated February 28, 2005) used the word "interpretations" when describing the CTA functions, but the NNSA FRAM will be changed soon to be consistent with the language in the DOE FRAM.

Bottom line: the DOE General Council issues interpretations of nuclear safety requirements, and the CTA issues expectations and guidance for implementing requirements.

NNSA contractors must submit any request for interpretations, expectations or guidance regarding nuclear safety requirements through their site manager. When the CTA issues expectations and guidance, or the DOE General Counsel issues interpretations, they will be provided to the site manager, not directly to the contractor.

2. ***What is the status of NNSA and Site Office Safety Management Functions, Responsibilities and Authorities Manuals (FRAMs)? What are the lessons learned***

from Site Office FRAM reviews? What is the path forward for next FRAM updates and implementation?

<u>NNSA FRAM</u>: The NNSA FRAM, Revision 1 was approved by the Administrator on February 28, 2005. The revision incorporated NNSA organizational changes to include Central Technical Authority, Chief of Defense Nuclear Safety and Associate Administrator for Defense Nuclear Security. Also, the functional areas of quality assurance including safety software quality assurance, nuclear explosive safety and transportation and packaging safety were added in this revision. The NNSA FRAM, Revision 1 was provided to the DNFSB to close out commitments in the Quality Assurance Improvement Plan and Safety Software Quality Assurance Implementation Plan (DNFSB Recommendation 2002-1).

<u>Site Office FRAMs</u>: As required, all Site Offices submitted their revised FRAMs, within 90 days of the issuance of NNSA FRAM, Revision 1 for approval by the Deputy Administrator for Defense Programs. All Site Office FRAMs, except for the Los Alamos Site Office (LASO) FRAM, were approved by the Deputy Administrator. The LASO FRAM needed to be revised to reflect the organization in place and to address the assignments and delegations of the NNSA FRAM, Revision 1. The LASO FRAM is expected to be revised by January 2006.

<u>Lessons Learned from Site Office FRAM Reviews</u>: Major improvements were noted in the revisions to all Site Office FRAMs. In almost all cases the FRAMs covered all the elements expected by the NNSA FRAM. Specifically, they clearly addressed all applicable functions assigned to the Site Office Managers. In a few cases, the function involving exemption to nuclear safety requirements needed to be clarified and the affected Site Offices have agreed to do so in the next FRAM revisions.

<u>Path Forward for Next FRAM Update and Implementation</u>: The DOE Implementation Plan for DNFSB Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*, requires an update of the Site Office FRAM by June 2006. It is expected that a revised DOE FRAM (DOE M 411.1) will be issued soon that will require a revision to the NNSA FRAM. The Site Office FRAM revisions should incorporate the elements of the revised NNSA FRAM.

The revised NNSA FRAM will provide additional clarification of interfaces among NNSA Headquarters Offices, with the Office of Environmental Management, and the Office of Environment, Safety and Health. Additional clarifications are expected to include review and approval of safety requirements, the clarification of the CTA function as described in the previous question and answer, and changes resulting from DOE implementation plan for Recommendation 2004-1.

As a part of the NNSA Roadmap for Nuclear Facility Quality Assurance Excellence, a peer review of the Site Office FRAM implementation is planned for the summer of 2006. The review will include a verification of the adequacy of Site Office FRAM implementing processes and procedures. The peer review team will consist of all Site Office and Service Center FRAM points of contact.

Any questions in this area should be addressed to Rabi Singh, 301-903-5864 or e-mail rabindra.singh@nnsa.doe.gov.

3. What actions can Senior managers take in preparation for a Biennial Review that will ensure the most beneficial outcome for their sites?

CDNS has developed a lessons learned document based on feedback from the first three biennial reviews. The complete document is available from Richard Crowe at 301-903-6214 or e-mail richard.crowe@nnsa.doe.gov, and contains feeedback for not only the site office managers, but also team leaders, members and other participants. For site office managers, four of the most significant lessons provided in the document are:

1) If possible, perform a Management Self Assessment (MSA) using the CDNS CRADs in advance of the Biennial Review pre-visit. This is useful to self-identify issues that will not be counted against the Site Office during the actual review. If an MSA is conducted, files (preferably electronic) containing copies of the documents reviewed and conclusions of reviewers based on those documents are helpful for the assessors.

2) During the pre-visit, Site Office personnel should present the results of any existing Site Office and contractor self-assessments, including the MSA if conducted, that provide an adequate, recent assessment of specific criteria. The presentation should be supported with documented evidence of the assessments, corrective action plans (if ready), and the status of corrective action plans. They should feel free to discuss independent reviews or assessment(s) (e.g., OA review) that might be germane to the CDNS review and provide related documentation that offers perspective of the site's programs (e.g., corrective action plan deliverables affecting site programs).

3) If possible, establish a Point of Contact (POC) for each functional area, maintain the list, and minimize any changes during the review. The Site Office should ensure that POCs understand and are able to execute their responsibilities. Since the POC provides a critical function during the review, it is helpful if the POCs is a Federal employee, has no more than two functional areas, is familiar with assigned functional areas, is available during the pre-visit and for the duration of the review, and is available for telephone discussions during the period between the pre-visit and the review.

4) As a Senior Office manager, it is important to meet with the POCs and discuss the arrangements that have been made to facilitate the review. You should verify that each POC has developed, in coordination with the assessor, interviews, documents and requested observations. If a POC has not received a request from

the assessor to set up walkthroughs and meetings, he/she should contact the assessor and/or the CDNS Team Leader. DON'T WAIT UNTIL THE ASSESSMENT BEGINS.

Any questions in this area should be addressed to Richard Crowe, 301-903-6214 or e-mail richard.crowe@nnsa.doe.gov.

4. What insights or trends have developed from the Biennial Reviews conducted to date?

We have completed three of the biennial reviews conducted by the office of Chief, Defense Nuclear Safety. Two site offices demonstrated satisfactory performance and received the grade of **Meets Expectations.** The other site office received a grade of **Needs Improvement.**

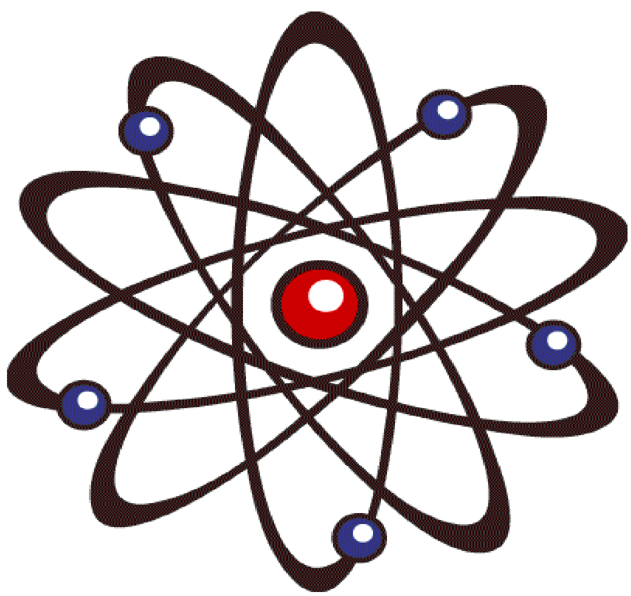
No major complex wide deficiencies have been noted. Several generic issues have been identified including: dispositioning of federal requirements in light of resource constraints, management of contract nuclear safety requirements, planning and execution of formal oversight programs, and support for federal training. Strengths were noted in the areas of Facility Representatives, operational awareness, and Safety System Oversight (SSO) Programs.

PXSO demonstrated an exemplary Safety System Oversight (SSO) program. They also exhibited noteworthy practices in their ALARA program and verification of implementation of safety basis controls. SRSO has a noteworthy management walkthrough program and a vital safety system assessment program.

Any questions in this area should be addressed to Richard Crowe, 301-903-6214 or e-mail richard.crowe@nnsa.doe.gov.

National Nuclear Security Administration

TECHNICAL BULLETIN
6-02



JUNE 2006

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In This Edition…

SECTION I. <u>FOCUS AREA</u>

<u>A Lesson on Lessons Learned from Wildland Fires at the Nevada Test Site</u>
Submitted by Steven J. Lawrence and Robert M. Bangerter
Nevada Site Office

Background

In 2002, the Nevada Test Site (NTS) experienced a wildland fire. While only 350 acres burned, the "Egg Point" Fire caused more than $1.2 million in damages, mostly to replace a destroyed 1.7-mile stretch of critical communication and power lines in a remote area of the site. The resulting lessons learned and corrective actions from this fire would change how the NTS managed wildland fires but would not be put to the test for three more years.

Record spring rains in 2005 created unprecedented vegetation growth across the deserts of the Southwest. For example, a spectacular wild flower bloom in nearby Death Valley generated worldwide attention for the "100-year" phenomena. The rain stopped, the vegetation set seed and dried out, setting the stage for perfect wildland fire conditions.

On Thursday evening, June 2, 2005, a series of thunderstorms moved across Southern Nevada. This marked the beginning of the 2005 wildland fire season for the area, causing the first of 31 lightning-induced wildland fires to plague the NTS over a 10-week period.

Over the course of the season, a total of 13,000 acres burned yet without damage to any site asset within the path of the fire—including power lines, communications sites, cultural areas, and key facilities—or impact to any of the legacy radiological areas that dot the site. The protection of these areas can be attributed to paying attention to the earlier lessons learned, hard work and a touch of ingenuity on the part of the NTS Fire and Rescue (F&R) department, prudent use of technology, and a well-trained and equipped Emergency Response Organization.

Lesson Learned—Focus on Early Detection and Suppression and Asset Protection

The Egg Point fire occurred in rugged terrain, inaccessible to most of the NTS F&R vehicles. While F&R did have two All Terrain Vehicles (ATV), they were used only for scouting and extraction of injured firefighters. Initially, the ATV carried only a fire extinguisher or two. By 2005, the number of ATVs was increased to six, each equipped with a "homemade" wildland fire suppression system. Created by the firefighters themselves, the system consists of parts and pieces from the compressed air foam system contained within a standard wildland firefighter backpack. Combined with a 14-gallon plastic tank with a fan tip spray nozzle, each unit has the capability to produce 25 gallons of foam per gallon of water. The ATV provide the capability to get to a fire quickly in remote areas for early suppression; to lay down foam around power poles, communication tower sites, etc.; and, to perform and patrol back-burns between areas at risk and a fire line. The success of the ATV Wildland Fire Suppression System has attracted interest not only among area fire departments but also commercially. The vendor that supplies the wildland firefighter backpacks used in the ATV system is now marketing a device similar in concept. The number of ATVs has been increased by two in preparation for the 2006 wildland fire season.

In recognition that resources other than firefighters may be needed on the fire line, a cadre of heavy equipment operators now annually receive the eight-hour Incident Command and Wildland Fire Safety Training and are issued appropriate personal protective equipment. Operating under the direction of the Incident Commander, these drivers and their bulldozers, backhoes, water masters, etc., become part of incident response, available to plow out access roads and fire breaks, and supply water critical to the suppression effort. Another lesson learned from Egg Point was to fit the water masters with connectors compatible with fire apparatus, providing instant connect capability. The water masters are also equipped with side spray nozzles, providing additional capabilities to wet down an area at risk, such as around facilities, and along roads and power line cuts.

Another early suppression asset will also be in place before this year’s fire season. A contract already exists with a local commercial helicopter service to provide flights from Las Vegas to the NTS for VIP tours and the like. The pilots have gone through the security clearance process and received access badges for this purpose. This same company is also under contract to the Bureau of Land Management (BLM) with the pilots trained and helicopters equipped to provide fire reconnaissance and suppression services. The contract for the NTS was expanded to include early detection and fire suppression activities on an as-needed call out basis. This will allow use of the service regardless of BLM involvement.

Lesson Learned—Research Local Sources and Identify Available Technology

Of the 31wildland fires in 2005, only one required extensive external assistance. The “Air Force Fire” as it was named by the BLM, started on BLM-managed property offsite as the result of a lightning strike associated with the June 2 storms. Without early detection and suppression, the fire gained strength, eventually burning approximately 21,000 acres—92 acres of BLM-managed land, 14,181 acres of U.S. Department of Defense (DoD) land, and 6,059 acres of U.S. Department of Energy (DOE) land. At its peak, more than 500 firefighters and 8 aircraft were involved in suppression activities.

It was during the Air Force Fire that technology played a major role. Cameras with zoom capabilities are positioned across the site, used to monitor missions in progress. These were now turned towards the fire, streaming real time imagery back to the NTS Emergency Management Center (EMC) in Mercury and the NNSA Nevada Site Office (NNSA/NSO) Emergency Operations Center (EOC) in North Las Vegas. The cameras provided visual indications of smoke trails and incident scene wind shifts, allowing F&R command staff in the EMC to provide visual input to the Incident Commander regarding scene conditions he could not see. The installation of three additional cameras at key high-elevation/high-visibility locations is in progress, in time for the 2006 fire season, with an additional four planned. The Duty Manager and/or Fire Dispatcher, located in the Operations Coordination Center (OCC) adjacent to the EMC, will be able to remotely control these cameras. The cameras are useful not only during wildland fires but will also be monitored during and after thunderstorms for early detection of lightning-caused fires.

Other technological help during the Air Force Fire included the Remote Sensing Lab (RSL)-Nellis staff performing night-time flyovers with thermo-imaging cameras, pinpointing hot spots in burned areas. Similar support came from U. S. Air Force (USAF) in the form of Unmanned Aerial Systems (UAS). This was a rare opportunity since these assets are not normally available for non-USAF mission activity. The technicians established remote monitoring capabilities in the EMC providing eye-in-the-sky real-time imagery, critical to operations planning. The benefit gained from this scarce resource gives way to investigating contract or an "on-call" type UAS capability.

Other issues from the Air Force Fire have been addressed and resolved with technological solutions. For example, maps of the test site were compartmentalized. No one map existed that showed all the hazards emergency responders might face. The Geographic Information Systems (GIS) staff at the RSL-Nellis undertook an extensive effort to update and consolidate maps. An electronic "NTS Known and Potential Hazards Map" is now in a place that provides emergency responders the ability to zoom in and zoom out or to bring up different layers, i.e., to show all surface-laid cables, power lines, known unexploded ordnance areas, bore holes and abandon mine shafts, radiological areas, facilities with hazardous material, and shot locations. Combined with a grid overlay, the map can display with accuracy Global Positioning Satellite (GPS) field data, allowing real-time plotting of key data points, such as an advancing fire line.

The Command, Control, Coordination, and Communication Visualization and Analysis System (C4VAS) is in beta testing and is scheduled to go online in May. Among other functions, C4VAS provides near real-time satellite tracking of anyone or anything equipped with a tracking device. F&R Command Staff located in the EMC in Mercury will be able to track all firefighters and vehicles responding to wildland fires. Combined with the new mapping capability, C4VAS provides the Command Staff the ability to track firefighter deployments and operations status, and also provide the Incident Commander help in promoting firefighter safety by monitoring for mapped hazards that may be invisible in the field.

Lesson Learned—Understand Communication Limitations and Develop Contingencies

The remote areas of the 1,375 square-mile test site have limited radio/cell phone coverage, which hampered communications with ground forces. In addition, the number of radios available for ground-to-air operations to direct water drops and to coordinate water pick-ups for helicopter bucket drops was inadequate. To add to the communication woes was the number of different frequencies used by responders assisting in the Air Force Fire—the same problem faced in any multi-jurisdictional response anywhere in the Nation. Additional communications equipment has been acquired to resolve these problems, including additional radios programmed with the multiple frequencies and radios that connect to "flight deck" type helmets for better hearing protection during air-to-ground operations. Another benefit of the ATVs is that they can tow a trailer that has been equipped with a portable repeater, gasoline generator and other associated equipment to improve communications in the remote areas.

Lesson Learned—Anticipate Public Perceptions

Of primary concern during the Air Force Fire was a legacy radiological area, the result of a nuclear test conducted 40 years ago, known as the "Buggy Shot." It lay directly in the path of the fire. While in itself, and as validated with plume models, burning over the shot site would pose little hazard in terms of radiological exposure, the public perception ramifications could hamper future missions at the site. As a precaution, air samplers were set up and/or activated not only onsite but in surrounding communities to ensure data would be available in the event the wildland fire reached the Buggy Shot site.

An all-out effort using strategically-placed firefighters, aerial water and foam drops, and state-of-the-art technology stopped the fire a mile away from the contaminated area. In preparation for the 2006 season, public affairs staff members have been trained in the eight-hour Incident Command and Wildland Fire Safety Training and issued appropriate personal protective equipment. With this training, they are more knowledgeable of wildland fire characteristics and terminology and can be part of the incident scene response with the ability to do photography and video to share with news media, better respond to media inquiries, or, as circumstances and conditions allow, serve as escorts for the media or others.

Lesson Learned—Address External Responder Issues

Use of external responders posed a unique set of problems. Security issues arose when it was identified that some of the external emergency responders—specifically, two of the aircraft pilots critical to the suppression effort—were foreign nationals. In addition, along with the inherent risks of fighting a wildland fire, the BLM firefighters were understandably concerned about the other hazards posed by the very nature of the test site. In addition to the radiological area, fighting the Air Force Fire potentially placed them in proximity to other legacy hazards, such as unexploded ordnance from military missions. Subject matter experts were deployed to the Incident Command Post to brief the external responders on these hazards and to perform radiological monitoring to alleviate their concerns. While these problems were rather quickly resolved, they did create minor delays at a critical point in the response. In time for this year's fire season, policies exist for quickly resolving issues regarding emergency responders who are foreign nationals and a safety briefing designed specifically for external emergency responders is now in place

In addition, it was determined that while a Memorandum of Understanding (MOU) existed between the NNSA/NSO, BLM and USAF, it was not specific enough to address the unique problems encountered during a wildland fire—everything from funding mechanisms and radiological monitoring to the hazard briefings for external responders. A collaborative effort among these organizations (NNSA/NSO, BLM, USAF and the NTS prime contractor Bechtel Nevada) resulted in a revised MOU, addressing specific wildland fire protection issues. The MOU, approved on March 29, 2006, also has provisions for quickly elevating the national priority in acquiring offsite firefighting resources for test site fires.

The team working on the MOU also determined that another agreement was needed between NNSA/NSO and its NTS neighbor, the 99th Air Base Wing at Creech Air Force Base, which provided the UAS assets during the fire. This agreement covers the whole spectrum of emergency response and readiness including mutual assistance not only with wildland fires but also structural fires, aircraft rescue and firefighting, hazardous materials response, emergency medical services, and station back-filling operations. The agreement also addresses participation in joint training, drills and exercises; and, has a provision that allows NTS F&R to respond offsite to near-boundary fires for purposes of early suppression before the fires can spread.

Lesson Learned—Identify Weather Forecasting Assets

Because weather plays a key role in wildland fire response planning, the partnership between the NTS F&R and the Air Research Laboratory/Special Operations and Research Division (ARL/SORD) has been strengthened. In addition to the twice-daily weekday general NTS forecasts, ARL/SORD meteorologists provide alerts to NTS F&R on weather conditions that may indicate increased fire hazards. Beyond forecasting, ARL/SORD also advises on heavy rainfall events. These events have the potential to wash out access roads, which then need to be assessed for damage. SORD field staff has been trained in wildland fire safety and incident command principles. ARL/SORD's mobile weather station could be deployed near an incident to provide near-scene weather data. This capability includes surface data and the launching of weather balloons to provide upper atmospheric data, which is important in supporting aircraft operations.

Summation

The extensive vegetation growth from last year dropped seed and dried out, creating the promise of even more vegetation growth and a tinderbox situation for this year. The corrective actions from the Egg Point 2002 fire had proved their worth but the Air Force Fire of 2005 also had a few lessons to teach. The advancements made since last year should serve the NTS well in minimizing the consequences of wildland fires while the new MOUs provide a level of assurance that when the call for help goes out, it will be quickly answered.

Identification of Nuclear Safety Requirements

Submitted by Don Nichols, Office of the Chief of Defense Nuclear Safety

Background

As a result from the lessons learned from the Columbia Space Shuttle Accident, one of the actions the Department of Energy committed to was to clearly define the safety requirements and standards applicable to our operations. In September 2005, NNSA sites were asked to provide information regarding applicable DOE orders and manuals (i.e., safety requirements), exemptions to those requirements, if any, and an assessment of compliance. The sites responded late in February 2006.

Establishing a Baseline of Nuclear Safety Requirements and Exemptions

These data were used to develop a clearer picture of NNSA's Nuclear Safety Requirements Managements processes. As a result, on June 1, 2006, NNSA's Central Technical Authority (CTA) published an NA-1 Supplemental Directive entitled CTA Management of Nuclear Safety Requirements. This directive provides procedures and subordinate responsibilities in support of CTA management of nuclear safety requirements. It provides the process for obtaining CTA concurrence on changes to applicable DOE Directives as well as to the incorporation of those Directives in contracts. It also provides the process for obtaining formal guidance and expectations regarding nuclear safety requirements for use by NNSA personnel and their contractors.

The Directive is available online for those with access to the NNSA Intranet. Click on the Supplemental Directives link on the NNSA Intranet Homepage at http://hq.na.gov/ or contact Sue Megary in the office of the Chief, Defense Nuclear Safety, at 202-586-8246 or e-mail sue.megary@nnsa.doe.gov for a copy.

SECTION II. <u>QUESTIONS AND ANSWERS</u>

This section is dedicated to answering questions and providing general information related to nuclear safety.

1. *The DOE and NNSA commit a lot of resources to conducting investigations of major accidents, as per DOE O 225.1A. What is the purpose of these investigations, and what is their relevance to nuclear facility safety?*

While no one wants accidents to happen, they do occur. When the consequences of an accident during a DOE or NNSA activity exceed the thresholds defined in DOE O 225.1A, an Accident Investigation Board is chartered to evaluate the situation. The goal of the investigation is simply to determine what happened, to understand why it happened, and to recommend ways to avoid a similar accident in the future. These investigations are not intended to find fault or place blame, although sometimes that cannot be avoided. The philosophy is simple: we can learn much from our accidents, since the point of failure and its causes can usually be determined with a high degree of confidence.

Accident investigations are intensive and stressful situations for all, but are well worth the effort, given the ultimate goal. There are at least two aspects of accident investigations that are considered unique, and those aspects enable the process to be particularly successful. First, the Board is established with the independence and authority to evaluate all aspects of both the Contractor and DOE programs that the Board believes have relevance to the accident. Therefore, the Board can gain access to all relevant information, such as programmatic guidance, expectations, budgets, resource allocations, accident scene and forensic evidence; can request an interview with any involved party; and can direct independent forensic testing. Second, the investigation is not a criteria- or compliance-based assessment; the Board can equally consider whether compliance with a requirement was a concern, and whether the requirement itself was adequate to provide the level of protection necessary. As a consequence, it is not unusual for a Board to make recommendations to both the Contractor and DOE covering the entire range of activities from floor-level operations to high-level program management, policy making, and oversight.

There are also two aspects that are particularly relevant to nuclear facility safety. First, from the lessons learned perspective, all of our nuclear facilities are heavily dependent on the Contractor and DOE institutional programs. Therefore, regardless of where the accident occurred, there are likely to be lessons that can be applied to the nuclear facilities. Second, the concepts and tools used in investigating an accident are complementary to those used for determining the safety bases of our nuclear facilities. When evaluating the safety basis, analysts postulate what accidents could happen, and determine controls to prevent their occurrence or mitigate their consequences. When the accident investigation is done, one can work backwards from the actual accident, therefore allowing more understanding as to the effectiveness and adequacy of controls and mitigative actions.

The tools used by the accident investigators were designed for this application, but they could be used in other areas as well. All Facility Representatives and nuclear safety SMEs are encouraged to at least take the accident investigation training, or better yet, volunteer to participate in an accident investigation when the opportunity arises. The experience would be of exceptional value to both the participant and his or her parent organization.
[Doug Minnema, NNSA Accident Investigation Coordinator, NA-3.6. 301-903-7098]

2. *At the recent Energy Facility Contractors Group (EFCOG) meeting in Atlanta, CDNS staff talked about the risk informed decision-making project. What sites will be used in the pilot studies, and how can [my site] get involved?*

First, for those who did not attend the EFCOG meeting, some background on the NNSA Risk-Informed Decision-Making (NRID) project is in order.

The technical breadth of the facilities and activities under NNSA responsibility, the nature of their inherent risks, and the increasing need to balance the ideal of risk minimization with the goals of cost minimization and efficiency, contribute to the challenge of managing the NNSA mission. It is challenging to weigh all these considerations against competing objectives and alternatives; thus, NNSA initiated the NRID project to advance management decision-making capabilities. The objective is to develop a methodology or tool to help managers:

- Become informed of the health and safety risks associated with their decisions;
- Allocate resources, support budget requests, prioritize future resources; and
- Make complex decisions involving multiple (and potentially conflicting) objectives, criteria and attributes.

The method will consist of a structured approach that will lead to documented, consistent, transparent and defensible decisions. NRID envisions that the method could be used when considering:

- Revisions to DOE rules, regulations, and orders
- Recommendations from oversight entities
- Physical security countermeasures and mitigation systems
- Processing exemption requests
- NNSA program element priorities and actions
- Multiple decision criteria or objectives

The Chief, Defense Nuclear Safety (CDNS) will lead the project. CDNS finalized the project plan, which includes a scoping analysis of decision-making techniques used at DOE and other federal agencies, such as NASA, that evaluate risk and prioritize activities. The project plan also calls for pilot exercises and the development of risk-informed decision-making process guidance.

CDNS reviewed existing methods and selected *Expert Choice*, commercial-off-the-shelf software, to be used as the basis for the pilot NRID method. *Expert Choice* evaluates alternatives in terms of an additive preference function. That is, a function that requires subject matter experts and managers to respond to a series of comparative questions that lead to an implied numerical ranking of the alternatives as a function of each criterion or objective.

Since the initial presentation at the EFCOG meeting in Atlanta, CDNS learned that *Expert Choice* has been used successfully at some DOE sites. If your site provides examples of successful applications of decision-making techniques, CDNS may capture the processes and results of your applications in the NRID process guide. Please contact us to share your insights, or if you are interested in participating in the pilot studies or in the development of the guidance document.

For more details, please contact Sharon Steele at Sharon.Steele@nnsa.doe.gov or call 202-586-9554.

3. *What is the status of NNSA's efforts to improve the integration of nuclear safety with security?*

Implementation of security and nuclear safety requirements do not have to be exclusive of each other. BWXT Y-12 has developed a process to facilitate integration of the two disciplines, satisfying both the Design Basis Threat (DBT) expectations as well as safety basis objectives meeting 10 CFR 830, subpart B. In conjunction with and under sponsorship by the EFCOG, BWXT has taken the lead in the development of a cost effective, comprehensive approach using a multidisciplined team to enhance project integration, develop design selection, and maintain configuration control. Included in the initiative were DOE, NNSA and other contractor personnel representing security and safety programs.

A key aspect of the process is the development of a "toolbox" of key information designed to be transportable among and accessible by multiple DOE sites. Pertinent information includes safety basis and security data for various security designs, including system evaluation and approval documentation. This shared information can reduce costs associated with duplicative efforts and expedite the approval process for deployment of similar systems.

Fundamental to the successful execution of this integrated process is effective communication between security and safety basis professionals. To avoid misunderstanding, important terms and concepts used by both disciplines have been identified in a crosswalk matrix. Additionally, attention has been given to strengthening training on the project approach, selection of tools (e.g., alternate analysis methodologies), and regulatory requirements. Recognizing that the final results of facility modifications are frequently manifested in DOE-approved documentation (both from safety basis and security standpoints), attention is given to implications of both venues, including application of the Major Modification concept.

With full recognition of the need for configuration control, a model was developed for the safety basis and security processes to proceed on separate paths, but interface at opportune points. The USQ process remains valid for determining approval authority for security changes affecting safety basis documents while another process was developed to ascertain approval authority for changes affecting security plans. Completion of both processes is a requisite for proposed changes to proceed.

The Y-12 process is being presented in a topical report on security and safety integration to be issued by EFCOG. For more details, please contact Patrick Cahalane at 301-903-2609 or Kevin Carroll at 865-576-2289, or email patrick.cahalane@nnsa.doe.gov

4. *If criticality isn't supposed to be a credible event in a facility designated as Hazard* Category *(HC) 3 per DOE-STD-1027-92, does that mean that a HC 3 facility would never have a criticality safety program, or need to do criticality safety evaluations? If a facility needs a criticality safety program, doesn't that mean by default it should be designated as HC 2?*

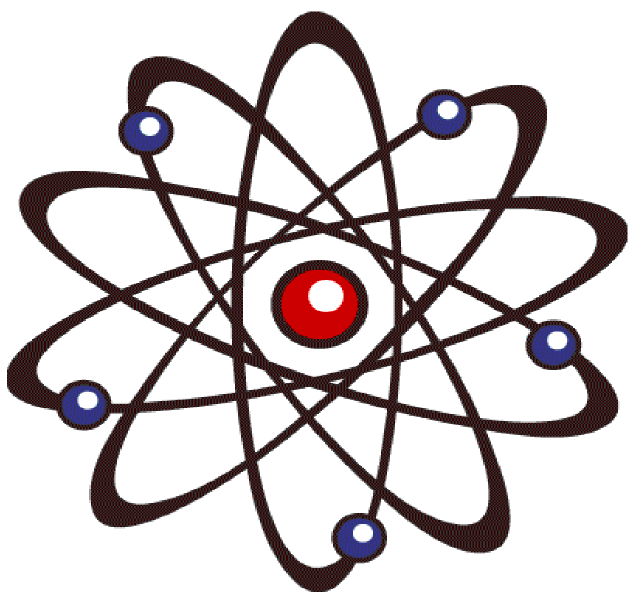
If a facility has less fissionable material than the single parameter sub-critical limits listed in ANSI/ANS-8.1 and 8.15 and the fissionable material quantities are less than the threshold values listed in DOE-STD-1027, then it may prove to be a HC 3 facility and no criticality safety program (CSP) is needed.

However, if the facility contains more fissionable material than the single parameter sub-critical limits, then a CSP is required. Nonetheless, the facility may still be shown to be HC 3 by virtue of nature of process or segmentation provided that no operational criticality safety controls or limits are needed. Appropriate elements of the CSP would be used in this case to (1) develop the analysis supporting the nature of process argument, (2) establish the criticality safety technical basis of the facility leading to bounding DSA and/or TSR controls, (3) perform annual reviews to ensure analytical and process assumptions remain valid, and (4) provide criticality safety expertise to respond to abnormal events, etc. This is addressed in DOE Order 420.1B in Chapter III, paragraphs 2–4. Specifically, a CSP that meets the expectations of Chapter III of the Order is required whenever a facility or a process exceeds the single parameter sub-critical limits listed in ANSI/ANS-8.1 and 8.15. The requirements of the Order may be graded and tailored appropriately but a HC 3 facility that has greater than the specified single parameter limits would still need a CSP. How the CSP is tailored to match the risk would be described in detail by the mandatory CSP description document that must be submitted to, and approved by, DOE. It is still possible for a facility to have greater than the single parameter limits of fissionable materials that necessitate a CSP, but yet be designated as HC 3 by virtue of an analysis of the nature of process or by crediting segmentation. A discussion of nature of process and segmentation aspects of DOE-STD-1027 was included in the June 2005 NNSA Technical Bulletin.

In summary, designating a facility HC 3 does not automatically eliminate the need for a CSP. Likewise, having a CSP does not automatically preclude a facility from being designated HC 3. If the fissionable mass limits specified in DOE Order 420.1B are exceeded, a CSP is always required.

Any questions in this area should be addressed to Dr. Jerry McKamy, 301-903-8031 or e-mail mailto:jerry.mckamy@hq.doe.gov.

TECHNICAL BULLETIN
2006-04



DECEMBER 2006

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- Site Manager, LSO
- NA-10

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Service Center
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NA-11
NA-12
NA-26
ES&H Advisor

In This Edition…

Message from the Administrator

When we decided to establish the position of Chief of Defense Nuclear Safety I had two goals in mind. The first was to provide another opportunity for me to ensure we were meeting our responsibilities in nuclear safety. In general I believe that Headquarters should not excessively supervise the field. But nuclear safety is different because of the great consequences of failing to meet high standards. But the second, and probably more important, reason was to provide sites with a resource in our quest for continual improvement in all areas but particularly in operational nuclear safety. Sharing the results of the CDNS reviews is one of many ways to help us continue to improve. It has been said that smart people learn from experience. Smarter people learn from the experience of others. The smartest people, however, don't wait to experience problems but learn from experts how to prevent them. Sharing results of observations made during these reviews lets us be among the smartest. I urge you to make use of this information in whatever way suits your own particular site best.

This will be the last NATB during my tenure as Administrator. I know that Tom D'Agostino, who will be Acting Administrator beginning January 22, shares my deep commitment to nuclear safety and my belief that it is best insured through highly competent technical experts following a disciplined and formal process. The NATBs, like the CDNS reviews, are a way for those highly competent people to share information, insights and experience. I urge you to continue using this document in training and as a way to share lessons learned. I also urge you to contribute your thoughts using this mechanism as we continue to build a strong safety community and move toward our goal of a flawless nuclear safety record.

Linton Brooks

SECTION I. <u>FOCUS AREA</u>

The focus this month is on the CDNS Biennial Reviews. The first focus article is an invited article, requested by the Administrator. It discusses the approach that the Sandia Site Office (SSO) followed to prepare for and present the results of their management self assessment. Their preparation and presentation were exemplary, and serve as useful models. The second focus article presents some of the broad observations that have been extracted from the Biennial Reviews conducted thus far. Currently, all NNSA Site Offices have had Biennial Reviews with the exception of the Kansas City Site Office and the Los Alamos Site Office. The Los Alamos review will be conducted in May 2007, and a review is not planned for the Kansas City Site Office.

Conducting and Presenting a Self-Assessment in Preparation for a CDNS Review

Submitted by Jeff Petraglia
Sandia Site Office

Background.

The Chief of Defense Nuclear Safety (CDNS) is responsible for conducting biennial reviews of the NNSA site offices, which occurred in June 2006 for the Sandia Site Office (SSO). In February 2006, the SSO conducted an internal SSO Self-Assessment (SA) to establish a baseline for the SSO. The results of the SSO SA and preparation activities for the CDNS review have led to effective improvements throughout the SSO including a recent reorganization. The subsequent results of the CDNS review were overall positive. Accordingly, SSO's approach for how the SSO SA was conducted, the preparation activities for the CDNS Review, and some of the benefits that have occurred since the SSO SA was conducted almost a year ago are being described herein in order to share information with other sites.

Performing the Self-Assessment.

In early January, the SSO Site Manager appointed the Acting Deputy Site Manager as the Team Lead for the SSO SA, which ensured consistency and coordination of the assessment across the SSO. Following the Team Lead selection, a team from SSO and Service Center (SC) staff was formed for 17 functional areas. Team members were assigned to functional areas independent of their day-to-day responsibilities in order to achieve a more critical review of the SSO. In addition to the SSO SA, Sandia National Laboratories (SNL) conducted an internal contractor SA for each functional area (independent of the SSO SA). Although the SSO and SNL SAs were conducted independent of each other, both teams utilized the same criteria review and approach documents (CRADs) for CDNS reviews at other sites. The SSO (federal) and SNL (contractor) SA teams dedicated two weeks to perform the SAs in February and March 2006 and published their reports in March and April 2006. The SSO Team identified 45 findings, 31 weaknesses, and 44 observations and the Sandia Team identified 34 findings and 17 observations for the 17 functional areas. The two independent SAs resulted in a thorough review identifying issues with many opportunities for improvements for both federal and contractor programs.

Preparation for the CDNS Review.

The two (federal and contractor) teams met weekly from February through June to discuss and close issues found during the SAs and prepare for the CDNS Review. These two teams maintained separation of responsibilities and authority throughout the process. Project planners were identified for each team to coordinate day-to-day activities including completing the two SAs, preparing for joint meetings, directing logistics, and completing corrective action plans (CAPs) for each of the findings and weaknesses. The CAPs were finished prior to the CDNS arrival for the May 2006 pre-visit. While the CAPs were being reviewed for approval, the SSO and SNL teams worked together to close issues, resulting in approximately 25% of the CAP milestones being either closed or in the process of closure for the CDNS May pre-visit. By the CDNS Review in June 2006, SSO and SNL had closed approximately 50% of the milestones with evidence packages available for the CDNS Review Team. The CDNS Review Team identified a smaller set of issues including 12 findings, 27 weaknesses, and 36 observations. The CDNS Review Team stated that SSO understood the issues needing correction, had well thought-out plans for correcting the issues, and was already making progress on closing the issues.

A logistics team began preparations in April for the CDNS Review by securing dedicated meeting rooms, setting up facilities tours, setting up interview schedules, and securing computer support. During the CDNS pre-visit, binders were provided to the CDNS Team with the SAs, the CAPs, and status briefings for all functional areas. Each team member received a 1 GB Thumb Drive with all information and over a 1000 reference documents. All information was updated for the actual CDNS Review in June 2006.

One of the communication tools used for a status briefing of a functional area at the pre-visit and CDNS Review was the Stop Light chart depicted on the page following this article. Separate Stop Light charts were created for each functional area for both the SSO and SNL programs. The Stop Light charts were reviewed at weekly team meetings before the CDNS arrived to validate that progress was being made in each functional area. The Stop Light chart assured consistency across all functional areas. The right side provided the status for each of the criteria in the CRAD. The left side provided the status of each of the short-term and long-term milestones that had been identified in the CAP for the functional area with red text for changes that occurred between the pre-visit and review. The risk bar at the bottom stated the overall risk for the functional area.

SSO Criticality Safety

Risk Evaluation

Risk	Handling Strategy
Short Term	
Oversight of SNL NCS program	Completed and approved the NCS Oversight Procedure for oversight and assessment of SNL NCS program (SSO Procedure 1303.02)
Oversight of SNL NCS program	Complete and transmitted to SNL performance measures for SNL NCS program (letter to SNL on 6/2)
Oversight of SNL NCS program	Obtained adequate staff to support SSO and started required training per training plans for General Basic Training, Nuclear Safety Specialist & Criticality Safety
Oversight of SNL NCS program	Completed four of five milestones in finding for NCS identified in recent DOE SPR ORR
Transition to 420.1B	Completed getting DOE O 420.1B into SNL contract
Long Term	
Transition to 420.1B	Perform gap analysis, prepare a plan, and assess to assure SNL is meeting DOE O 420.1B
Risk	

Criteria Status

1. SSO procedures incorporate NCS requirements	
2. SSO is adequately staffed for NCS responsibilities	
3. SSO NCS oversight activities are conducted in an orderly and systematic manner by qualified and competent NNSA personnel	
4. The contractor criticality safety program demonstrates effective site office oversight	

Fails to meet CRAD

Needs Improvement

Meets CRAD

Benefits and Summary.

Several improvements have occurred at SSO as a result of the corrective actions generated from the SAs (as well as the CDNS Review).

1. The office was reorganized on October 1 to address organizational issues
2. The Pegasus issues management system was rolled-out on December 4
3. Oversight procedures were written for eight SSO programs
4. Achieved a better state of overall compliance

In summary, the following is recommended in preparing for a large multifunctional review:

- Start early and appoint a high-level Team Lead to ensure priority
- Encourage and maintain communication between the Site Office and Contractor
- Continue and standardize functional area self-assessments
- Commit adequate resources for logistics; it is worth the investment
- Implement a methodology to identify, track, and correct findings, weaknesses, and observations
- Management commitment with follow-up

Any questions should be addressed to Mr. Jeff Petraglia at 505-284-7668 or jpetraglia@.doeal.gov.

Highlights from the First Round of Biennial Reviews

Submitted by Dick Crowe
CDNS Biennial Review Team Leader

In NNSA Technical Bulletin 5-04 dated December 2005, brief insights were made concerning the first three biennial reviews. Since then, the first round of reviews has been completed with the exception of the Los Alamos Site Office (scheduled for May, 2007). The following are highlights from the six reviews completed at SRSO, NSO, PXSO, LSO, SSO, and YSO. These highlights concentrate on the Noteworthy Practices, Management Concerns and Significant Weaknesses documented as a result of these reviews.

A more extensive report summarizing the biennial review lessons learned by functional area is being developed. This report will be published as a separate document in the next few months.

Noteworthy Practices.

A Noteworthy Practice is defined as a condition, practice, or situation identified at the site that is highlighted for the attention of management for possible expanded implementation at the site or communication to other NNSA sites. The following Noteworthy Practices were identified during the biennial reviews:

Site Office Management Self-Assessments: Site Office performance of an in-depth and self-critical management self-assessment (MSA) is a noteworthy practice that could be of extraordinary benefit if institutionalized as part of a feedback and continuous improvement program. Most Site Offices performed a rigorous self assessment to identify areas of weakness. The MSAs performed by LSO and SSO were especially noteworthy. It should be noted that at these sites, few additional issues were discovered by the biennial review team.

As a general comment on the review process, it should be noted that SSO personnel proactively evaluated lessons learned from CDNS reviews at other NNSA sites and adopted a number of improvements that significantly enhanced the effectiveness of the review. The performance of the management self-assessment prior to the CDNS review was the most thorough seen to date.

Safety Basis: Several noteworthy practices were identified in the safety basis area, including:

- The LSO AMTS Nuclear Safety Basis Docket is an important and useful tool for prioritizing and tracking the assignment and status of all safety basis actions.

- The YSO documented safety basis document review processes, defined in YSO-5.20, are mature and well defined, including detailed criteria and expectations for use in determining the acceptability of contractor safety basis documents.

- Attachment 1 of YSO-5.15 provides a detailed review checklist, based on 10 CFR 830.203 and DOE G 424.1-1, to be used when reviewing the contractor's USQ procedure.

- Both YSO and the contractor possess a well defined Implementation Validation Review (IVR) process to confirm that revised safety basis conditions and/or requirements are fully and adequately implemented.

Conduct of Engineering: Several noteworthy practices were identified in the Conduct of Engineering area, including:

- The PXSO SSO Program as established and implemented by the "Safety System Oversight Program Procedure" (IOP-AMNE-02) demonstrates an outstanding effort — from the development of a procedure that includes guidance for the performance of safety system walkdowns and guidance to ensure that nuclear safety design criteria is adequately addressed during the project review process — to ensuring effective implementation of all aspects of a SSO Program.

- At NSO, the RadNucCTEC PDSA tables identify those codes and standards to be used for safety significant SSC design, and cross walks them to the requirements found in both 10 CFR 830 Subpart B, and DOE O 420.1A.

- SRSO has a detailed process description for conducting VSS assessments documented in SV-08 and the conduct of these assessments.

- The SSO Safety System Oversight procedure requires a "Safety System Oversight Annual Report" be provided to both the contractor and Site Office management that will include SSO-SE activities, status of issues and opportunities for improvement.

Radiological Protection: Noteworthy practices regarding Radiological Protection included:

- At PXSO, ALARA techniques used over the past few years have drastically reduced overall dose for the plant. The general Administrative Control Limit (ACL) for plant staff was reduced from 1,000 mrem ten years ago, to 200 mrem today.

- At YSO, in addition to the normal qualification process, the Dosimetry and Records Section Manager personally reviews the knowledge of section staff on key requirements and procedural documents to ensure their competency.

Startup and Restart of Nuclear Facilities: Numerous noteworthy practices were identified with respect to the Startup and Restart of Nuclear Facilities.

- PXSO is performing a structured readiness review like process to determine the effective implementation of DSA and TSR upgrades.

- The YSO readiness procedure includes specific requirements and guidance for developing and maintaining a routine oversight schedule of assessments for the process of achieving readiness.

- The YSO procedure includes detailed provisions and guidance for establishing and implementing a Readiness Verification Review team, where appropriate, to support certification of contractor and YSO readiness.

- YSO has included the readiness program as a feedback topic in its monthly Performance Analysis Matrix and accompanying reports, including as elements key features such as the quality of justification on SNRs and premature declarations of readiness.

- The Y-12 Readiness Manual is comprehensive and very well written, and with a few exceptions represents a very robust implementation of the Order.

- The Y-12 contractor has incorporated readiness planning into its project execution plan procedure, beginning with the CD1 milestone and continuing as appropriate through transition to operations.

- The Y-12 contractor implementation of checklist type Readiness Assessments is exemplary.

Feedback and Improvement: Several Feedback and Improvement noteworthy practices were identified including:

- At SRSO, the provision for and execution of management walkthroughs is formally tracked, with issues recorded and corrective actions identified and tracked, is a noteworthy practice that supports strong SRSO operational awareness by senior management.

- SSO has demonstrated a strong management commitment to a Federal Lessons Learned / Operating Experience program.

- At Y-12, the electronic integration between the Site Office and Contractor corrective action management systems is an excellent tool to track the status of corrective actions and to communicate actions between YSO and BWXT Y-12.

- At YSO, on-line availability of the contractor performance indicator data and analysis is further enhanced by providing the Site Office SMEs electronic pop-up notifications for stoplight chart color changes.

Federal Training and Qualification: The LSO Technical Qualification Council (TQC) model is an effective tool for engaging Site Office senior management and line management on a routine basis to ensure adequate implementation of the FTCP.

Conduct of Operations: At SRSO, personnel involved with the startup of the Tritium Extraction Facility have recognized the recurring, complex-wide problem with procedure quality during most readiness assessments and readiness reviews and have initiated a procedures improvement team to enhance the quality of procedure validation efforts during the startup up process rather than have these problems corrected as part of the readiness review process. (Note: This led to development and implementation of an outstanding set of procedures as identified by the NNSA TEF ORR Team.)

Integrated Safety Management: The SSO FRAM includes a listing of all delegations that have been transferred to/from other organizations and also includes a list of authorities delegated from the Site Office Manager and other SSO individuals.

Contractor Training and Qualification: The YSO Training Program Manager has included in the FY07 Y-12 Performance Evaluation Plan (PEP) incentives for the Y-12 training staff to perform assessments of the operators performing activities at their work stations.

Maintenance: At Y-12, the Reliability Centered Maintenance (RCM) analyses are thorough reviews of major equipment that lead to an effective prioritization and implementation of required maintenance activities.

Management Concerns.

A Management Concern is defined as a significant issue or several similar issues that indicate a systemic problem. Management Concerns identified during the reviews include:

Feedback and Improvement: Numerous concerns were identified including slow or no tracking and completion of corrective actions from assessments; inadequate oversight of nuclear safety; absence of in-depth reviews of safety management programs and formal oversight of the contractors' assessment programs; and several examples of inadequate information in the issues management systems to corroborate the corrective actions and closure of issues.

Conduct of Operations and **Maintenance:** Numerous concerns were identified including the need to improve formality of operations in nuclear facilities; less than adequate implementation of processes and procedures to ensure compliance with documented safety analysis requirements from the Nuclear Safety Rule; less than adequate conduct of operations; and inadequate implementation of the principles and functions of ISM in maintenance activities.

Federal Training and Qualification: Several concerns were raised including a concern that Federal Training roles and responsibilities are not well defined between Headquarters, the Service Center, and the Site Office and are not correlated to the requirements of DOE Directives. In general, training needs are conformed to available budget rather than the training budget being based on actual training needs.

Integrated Safety Management: Several concerns were raised in the maintenance of nuclear safety requirements in contracts, processes, and procedures. These concerns include inadequate management attention to maintaining up-to-date requirements; not documenting the reviews of requirements; and not demonstrating the flowdown of requirements to implementing procedures.

Quality Assurance: Concerns were identified in the timeliness of Headquarters approval of QAPs and the level of attention and integration of facility quality and weapons quality.

Significant Weaknesses.

A Significant Weakness is an area where performance is degraded to a point that outside direction/guidance is required to successfully correct the issue. These areas normally require compensatory measures and Headquarters intervention.

At one Site Office, significant weaknesses included oversight and assessment of contractor performance in most functional areas. These weaknesses led to inadequate assurance of contractor implementation of nuclear safety requirements and significant concerns identified in the implementation of supporting processes and procedures needed to ensure compliance with documented safety analysis requirements of the Nuclear Safety Rule.

At another Site Office, the readiness process adopted readiness review mechanisms that were inconsistent with requirements and current NNSA expectations. This led to confusion in a number of areas: planning and documentation, the need for approval of review levels, the expected rigor of review, and the treatment of findings. In some cases, the Site Office approved review approaches it believed to be Readiness Assessments in the context of DOE O 425.1C, *Startup and Restart of Nuclear Facilities*, but which the contractor intended to be reviews that did not rise to the level and rigor of a Readiness Assessment under the Order.

For more information, contact Dick Crowe at 301-903-6214 (richard.crowe@nnsa.doe.gov).

SECTION II. <u>QUESTIONS AND ANSWERS</u>

This section is dedicated to answering questions and providing general information related to nuclear safety.

1. When is it appropriate for Contractors to startup or restart nuclear activities and operations using routine operating procedures, and when should site offices require their contractors to conduct a graded Readiness Assessment instead?

Note: Readiness Assessments (RAs) and Operational Readiness Reviews (ORRs) are only required for Hazard Category 1, 2 or 3 nuclear facilities, and this answer is limited to those facilities. The requirements for when to conduct ORRs are well defined in DOE O 425.1C; this answer is limited to the need for RAs. The following discussion uses the term 'program work' as defined in DOE STD 3006-2000.

The readiness order (DOE O 425.1C) and its accompanying standard (DOE STD 3006-2000) do not specify a bright-line that separates the situations for which site offices should require RAs from the situations for which routine operating procedures should be used for startups and restarts. Both directives say that the contractor must evaluate whether an RA is needed for situations where an ORR is not required. They also say that if a readiness review is needed, it must be at least an RA. They allow that a readiness review is not needed for short and routine shutdowns of program work, but in other situations they relegate to the site office and contractor readiness procedures the task of defining when a readiness review (and hence an RA) is needed. Neither the Order nor the Standard provides much discussion to help guide the choice between using an RA or routine contractor procedures; they focus on the choice between RAs and ORRs.

Deciding whether to conduct an RA or to verify readiness using contractor operating procedures requires some judgment. Obviously, restarting operations after they were routinely shutdown at the end of the day does not require an RA when they start back up the next morning. But, what if other factors arise and the shutdown stretches to a week, then a month or longer? Similarly, if I add a new common hand tool to an ongoing operation then I wouldn't usually expect an RA; but what if the tool isn't common? At what point is an operating procedure no longer adequate and an RA needed?

An aide to judgment when deciding if an RA is warranted is to consider the reason we perform readiness reviews. Readiness reviews are conducted to verify that hardware, personnel and management control systems are ready to safely conduct program work within the bounds of the authorization basis (AB). The bounds of the AB are defined by the commitments made in the AB and for which the site is responsible. AB commitments include the safety basis safety systems, structures and components but are not limited to those controls; AB commitments also include other provisions that have been established to protect the environment, safety and health of workers and the public. When work suspension or other changes call into question the readiness of hardware, personnel and management control systems to safely conduct program work within the bounds established by AB commitments, then management should exercise a formal process to achieve readiness, and should verify that readiness has been achieved prior to conducting program work. If there could be a significant failure to meet AB commitments, or if the ability to conduct program work could be significantly impacted if it turned out that people, hardware or procedures were not ready to perform work safely, then the readiness verification should take the form of an RA. The type of review and the authorization authority is proposed by the contractor and discussed with the Site Office. The final decision on the type of review belongs to the NNSA Site Office Manager, and is formalized through the approval of the Startup Notification Report.

Some sites have formalized tools that they use to help them to make this judgment. Tools such as checklists of high-priority commitments may be helpful as aides to help ensure potential issues are not overlooked when proposing a review type; but these checklists should never be used in place of judgment as a definitive means to assign review levels. Neither is it useful to narrowly define what constitutes a commitment in the AB; it would be incorrect, for example, to restrict the term 'commitments' to just those controls for which Technical Safety Requirements exist. The point of the exercise is to think about the suite of areas for which a site is accountable through the AB or with respect to programs, and to then judge the significance of the impact that a premature startup or restart could have.

As an aside, this same thought process is useful for determining whether the contractor or NNSA should be the Authorization Authority for an RA. For certain RAs, the required Authorization Authority is already specified in DOE STD 3006. In other situations, if the potential impacts to safety, program work, and other AB commitments are small, and the contractor has demonstrated adequate performance of readiness reviews for similar activities, it is appropriate for the contractor to serve as the Authorization Authority if permitted by the Site Office procedure. Otherwise, a higher level authority is warranted. The final decision on the Authorization Authority also belongs to the NNSA Site Office Manager, and is formalized through the approval of the Startup Notification Report.

Any questions in this area should be addressed to the Technical Lead for Operations and Readiness (Dick Crowe 301-903-6214, richard.crowe@nnsa.doe.gov).

2. My site does not have a credible criticality safety accident scenario in our safety basis, and had not installed a Criticality Accident Alarm System (CAAS). DOE O 420.1A, Facility Safety, said that a CAAS wasn't needed if a credible accident didn't exist, but that language is not in the revised DOE O 420.1B. Do we need an exemption now?

No. The language in DOE O 420.1B regarding criticality safety requirements was adjusted to be consistent with contemporary consensus criticality safety standards. Under ANSI standards, the need for a CAAS implies a non-trivial risk of a criticality accident. Where no such risk exists, a CAAS is not required.

For questions regarding this topic, please contact Jerry McKamy (301-903-8031, Jerry.McKamy@nnsa.doe.gov).

3. DOE O 420.1B deleted the DOE exception to the definition of double contingency for criticality safety, as discussed in ANSI standards; the ANSI definition now applies to NNSA. Does the change to the order mean that NNSA has to approve all instances where the use of multiple controls on a single parameter is the selected approach for criticality safety during design, for existing processes, or for modified processes?

The short answer is yes. The ANS/ANSI double contingency principle states that: "Process designs should incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible." DOE O 420.1A modified this principle slightly, changing 'should' to 'shall,' but also adding the following caveat: "Protection shall be provided by either (i) the control of two independent process parameters (which is the preferred approach, when practical, to prevent common-mode failure), or (ii) a system of multiple controls on a single process parameter." This caveat became a source of concern because the use of multiple controls on a single parameter to preclude criticality does not satisfy double contingency principle for processes where a criticality accident is credible. Thus, the language in the order created confusion over whether applying two controls to a single process parameter was a generally acceptable substitute under 420.1A for satisfying the need for double contingency.

With the release of DOE O 420.1B, DOE has reverted to the ANSI standard language and eliminated the caveat regarding multiple controls on a single parameter to make it clear that double contingency, consistent with the ANSI standards, is a requirement for DOE fissionable material operations. Section 3.b of the Order states that the double contingency principle of ANSI/ANS 8.1 "must be implemented for all fissionable material processes, operations, and facility designs within the scope of [the chapter on Nuclear Criticality Safety] unless the deviation is documented, justified, and approved by DOE." Note that this is not just a design requirement applicable to new processes; it also applies to existing fissile material processes. Section 5.b.(6) of the Order assigns the responsibility for approving deviations from the double contingency principle to Secretarial Officers.

So, if an operation involving fissionable material relies upon multiple controls on a single process parameter to prevent criticality in situations where criticality is credible, that reliance needs to be documented and justified, and approved by DOE. Sites in this situation should include within their implementation plan for DOE O 420.1B provisions for obtaining approval.

For questions regarding this topic, please contact Jerry McKamy (301-903-8031, Jerry.McKamy@nnsa.doe.gov).

4). Under DOE O 420.1B, does DOE have to approve a stand alone Criticality Safety Program (CSP) description document or can it be approved as part of the Documented Safety Analysis (DSA)?

DOE approval of a stand-alone CSP document was the intent of the Order. Even though the Criticality Safety Program is described in its own chapter in most DSAs, the descriptions of safety management programs in DSAs are not expected to contain the level of specificity required for an adequate CSP document (e.g. the DSA would not normally contain justification for not implementing 'should' statements in ANSI/ANS-Standards). Thus, the Criticality Safety Program descriptions in DSAs would not normally serve as adequate CSP description documents, and their approval by NNSA would not satisfy the need for approved CSP description documents.

However, while not advised, it would not violate the approved safe harbors for the creation of DSAs to make an adequate CSP description document directly part of a DSA. Any decision to do so should not be made lightly, because including the details of the CSP in the DSA may cause unintended complications. Information included in the DSA serves as a basis for identification of discrepant as found conditions resulting in declaration of Potential Inadequacies in the existing Safety Analyses (PISAs) and Unreviewed Safety Questions (USQs). Discrepancies associated with the level of detail appropriate for inclusion in a CSP would not usually warrant the actions needed in response to the declaration of a PISA or a USQ, and thus this detail is usually not advisable for inclusion in the DSA.

For questions regarding this topic, please contact Jerry McKamy (301-903-8031, Jerry.McKamy@nnsa.doe.gov).

5. In DOE Order 420.1B, Facility Safety, there is a requirement for new facility designs to include confinement systems. Specifically, Chapter 1, Section 3.b(4) requires the following:

> ***Hazard category 1, 2, and 3 nuclear facilities with uncontained radioactive material (as opposed to material determined by safety analysis to be adequately contained within drums, grout, or vitrified materials) must have the means to confine the uncontained radioactive materials to minimize their potential release in facility effluents during normal operations and during and following accidents. Confinement design considerations must include:***
>
> ***(a) for a specific nuclear facility, the number, arrangement, and characteristics of confinement barriers as determined on a case-by-case basis;***
>
> ***(b) consideration of the type, quantity, form, and conditions for dispersing the radioactive material in the confinement system design;***
>
> ***(c) use of engineering evaluations, tradeoffs, and experience to develop practical designs that achieve confinement system objectives; and***

(d) ***the adequacy of confinement systems to perform required functions as documented and accepted through the preliminary DSA (PDSA) and DSA.***

For new facilities, such as nuclear explosive facilities, where multiple layers of confinement may be impractical, is it necessary to seek an exemption to this requirement?

The requirement for confinement in DOE O 420.1B does not necessarily mandate multiple confinement systems for all new nuclear facilities. Instead, this requirement mandates the identification of means for adequate confinement of uncontained radioactive materials during normal operations and following accidents. The performance goal of the defined confinement strategy is to minimize potential releases during normal and accident conditions. The concept of minimization carries with it practical considerations.

The design considerations listed for this requirement address those practical concerns. Consideration (a) for this requirement provides for tailoring of the confinement strategy on a case-by-case basis. Considerations (b) and (c) associated with this requirement provide guidance for tailoring the confinement system design. The strategy for confinement can credit the type, quantity and form of the material (encapsulated solids for nuclear explosive operations, for example) and consider practical design considerations where there are tradeoffs with other design criteria (such as the design criteria for an explosives facility).

For some new facilities, such as nuclear explosive facilities, the traditional three-level confinement strategy discussed in DOE G 420.1-1 may not always be practical. For these facilities, however, contractors are still required to develop a confinement strategy that meets the intent of the requirement above. This strategy (encapsulation of the material, passive facility structure, ventilation systems, etc.) should be documented in the PDSA and DSA. Approval of these documents constitutes NNSA's acceptance of the identified confinement strategy and its effectiveness in minimizing potential releases. No exemption to this requirement in DOE O 420.1B should be necessary.

Elements of the confinement strategy are not automatically classified as safety-class or safety-significant systems. The safety classification and specific design criteria for elements of the confinement strategy are driven by the hazard analysis in the PDSA/DSA.

For questions regarding this topic, please contact Ike White (202-586-8214, William.white@nnsa.doe.gov) or Jim Poppiti (301-903-1733, james.poppiti@nnsa.doe.gov) in the CDNS office.

6. DOE O 5480.19, Chg 2, Conduct of Operations Requirements for DOE Facilities, requires that the guidelines of this order be considered for application to all DOE facilities. The order does not specify nuclear or non-nuclear facilities. Can you discuss the graded application of the guidelines to non-nuclear facilities?

DOE O 5480.19 covers a broad range of topics important to ensuring a consistent, formal approach to operations in DOE facilities. The order contains within it a requirement that contractors describe their approach to implementing of each of the guidelines in the order and have the DOE field element approve that approach. Consistent with the principles of integrated safety management, this approach should be tailored to the hazards and complexity of the work involved.

For nuclear facilities, minimal tailoring of the guidelines should be expected, and exceptions taken should be clearly justified. For lower hazard, non-nuclear facilities, however, a rigorous application of the guidelines is not normally warranted. The graded approach taken for these facilities should be dependent on the hazards associated with work in those facilities. For non-nuclear facilities, a given site might choose to replace DOE O 5480.19 with other site programs (lockout/tag out program, activity-level work planning program, etc) that provide an adequate assurance of safe operations for the facilities involved, particularly where these facilities contain few operational hazards. For these facilities, the level of justification required should also be tailored to the hazards involved.

Ultimately, the site office manager approves the graded approach for NNSA sites. A decision to replace DOE O 5480.19 with other standards, orders and programs that provide necessary and sufficient requirements for safe operations in non-nuclear facilities can be made at the site office level. The requirement for CTA concurrence with exceptions taken to DOE O 5480.19 through the contracting process applies only to nuclear facilities. For nuclear facilities, a documented, tailored approach to the guidelines is allowed under the order, so no exemption is necessary to tailor the application of the guidelines using the approach defined in the order.

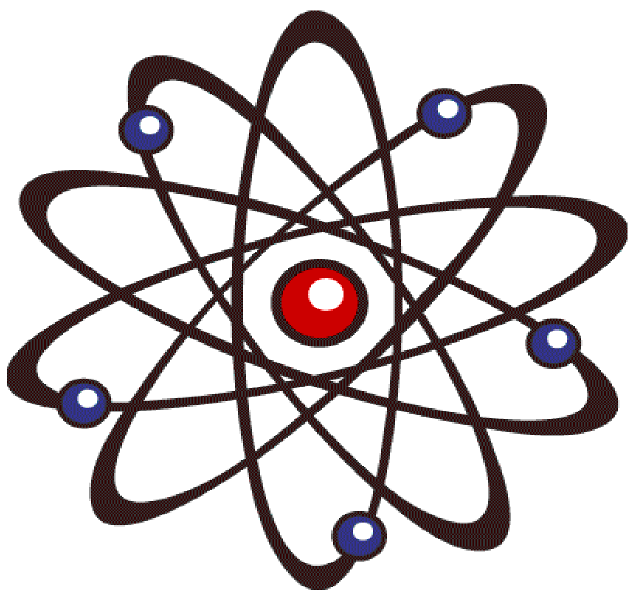
For questions regarding this topic, please contact Ike White (202-586-8214, William.white@nnsa.doe.gov)

7. The June 2006 NATB contained an article on the NNSA Risk Informed Decision Making (NRID) project. Is the first pilot complete and how can we get involved in the second one?

In FY 2006, the Y-12 Site Office (YSO) performed a Facility Risk Review (FRR) for Building 9212 in order to address the Defense Nuclear Facilities Safety Board's concerns regarding the structural integrity of the facility. Since the YSO review involved the same decision making tools as the NRID project (the Analytic Hierarchy Process and the Expert Choice software), CDNS seized the opportunity to perform a pilot while observing the FRR. We expect to complete the draft report from the first pilot and draft guidance on the NRID process in the in a few months. In the mean time, CDNS is gearing up for the second pilot. We are soliciting projects and/or sites for the second pilot. If you are interested in participating please contact Sharon Steele (202-586-9554, sharon.steele@nnsa.doe.gov).

National Nuclear Security Administration

TECHNICAL BULLETIN
2007-2



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In This Edition…

Focus Area: Differing Professional Opinions

Questions and Answers: Unreviewed Safety Questions

Perspectives: Equivalency or Exemption

Section I. Focus Area

On May 8, 2007, the NNSA Acting Administrator approved NNSA Supplemental Directive NA-1 SD 442.1-1, *NNSA Differing Professional Opinions Manual for Technical Issues Involving Environment, Safety and Health.* The focus area for this NNSA technical bulletin is the NNSA Differing Professional Opinions (DPO) process, as described in this supplemental directive and in the parent Department of Energy (DOE) Manual 442.1-1, *Differing Professional Opinions Manual for Technical Issues Involving Environment, Safety and Health.*

The following statement was made by the NNSA Acting Administrator in the cover letter forwarding the new supplemental directive to site office managers:

> "NNSA expects its Federal managers and contractor to actively foster full evaluation and discussion of technical issues affecting the environment, safety and health (ES&H) of workers and the public. Most professional disagreements on such matters will be resolved through this routine technical discourse; however, technical personnel will sometimes differ on the best approach to address some issues, even after the issues have been thoroughly explored. When agreement cannot be reached, it is a recognized function of the responsible line manager to make a decision on how best to proceed.
>
> In some cases, however, dissenting NNSA or contractor personnel may think that a situation has sufficiently significant ES&H impacts that are appropriate to raise the issue to a higher level. The DPO process is designed for those cases. . . Over the next few months, I expect each NNSA Site Office Manager to take action to make the provisions of the Contractor Requirements Document for DOE Manual 442.1-1 binding upon the contractors under their responsibility who manage and operate our nuclear facilities.
>
> It is my policy to foster an environment where technical concerns can be raised without fear of retaliation or reprisal in any form, so I fully encourage the use of the DPO process where appropriate. No NNSA manager shall discourage or in any way retaliate against an individual for taking advantage of this channel to actively put forth alternate technical opinions. Where individuals believe that a technical decision is unsound and unsafe, they have an affirmative obligation to take advantage of this channel to ensure a thorough review."

So far this year, there have been two differing professional opinions resolved at the Headquarters level through the NNSA DPO process. Summaries of these DPOs follow.

A. Hazard Categorization of the Joint Actinide Shock Physics Experimental Research (JASPER) Facility.

The JASPER facility is currently classified and operated as a radiological facility as documented in the Lawrence Livermore National Laboratory (LLNL) approved JASPER

Hazard Analysis Report (HAR). The NNSA Nevada Site Office (NSO) documented its concurrence with this facility's classification by letter: Carlson to Anastasio, "Joint Actinide Shock Physics Experimental Research Facility Hazard Category and Readiness Review Process," dated October 22, 2000. A biennial review of the NSO performed by the Chief of Defense Nuclear Safety (CDNS) (October 2005) identified a finding related to the improper hazard classification of the JASPER facility. As part of the corrective action in response to this finding, both LLNL and NSO reviewed the final hazard categorization methodology documented in the JASPER HAR and reached differing conclusions. LLNL's review report substantiated the original hazard categorization of radiological, while the NSO assessment concluded the facility should be categorized as at least hazard category 3. The Administrator for the NNSA directed the NNSA Differing Professional Opinion Manager to convene an ad hoc panel of experts to review this issue and provide a recommendation to the Central Technical Authority (CTA). Specifically, the panel was asked to review the differences between the LLNL and NSO technical reports, recommend a hazard category for JASPER, and propose implementing guidance for the application of DOE-STD-1027.

Five subject matter experts (SME) consisting of four members and a chairperson were selected by the NNSA Differing Professional Opinion Manager to convene the panel. The panel members operated independently of any program responsibilities associated with JASPER facility operations. The panel's decisions and recommendations are documented in a report provided to the NNSA Differing Professional Opinion Manager.

The basic premise of the difference in opinion (i.e., whether the hazard categorization is hazard category 2, hazard category 3, or simply a radiological facility) was centered on the determination of the alternate airborne release fraction (ARF) and its subsequent contribution in making the final determination of the Facility Hazard Categorization in accordance with DOE STD-1027. Both technical reports identified the facility's initial hazard categorization as hazard category 3 based on inventory. Both reports acknowledged that DOE-STD-1027 allows the use of alternate ARFs for final categorization of a facility, which would essentially change the threshold values used for final classification of the facility.

NSO's assessment re-evaluated JASPER's hazard categorization and determined that the facility is, at a minimum, a hazard category 3 nuclear facility. NSO stated the final categorization should be based on an "unmitigated release" of available radioactive material, without crediting the confinement of the Target Assembly (TA), Primary Target Chamber (PTC), and Secondary Confinement Chamber (SCC) in the development of an adjusted leak path factor or alternate release fraction. Consequently, the NSO assessment concluded that the manner in which LLNL justified the alternate release fractions amounted to providing mitigation.

LLNL's report re-evaluated the final hazard categorization methodology and determination for the events previously considered in the HAR. It concluded the alternate release fractions developed as the basis for the final hazard categorization were either acceptable or overly conservative, resulting in a conclusion that the final hazard categorization for JASPER should remain as a radiological facility. In the report, LLNL validated the HAR scenarios using the confinement of the TA, PTC, and the SCC with a derived leak path factor (LPF) to determine alternate release fractions resulting in the less than hazard category 3 level. LLNL's report stated that given the unique nature of JASPER experimental operations, where the initial source term is deliberately created and cannot accidentally occur in the absence of robust passive features, the common interpretation [i.e., "parking lot" release scenario where the initial source term at the point of generation is fully released] should not be considered definitive by rule.

Based on compliance with explicit requirements of 10 CFR 830 and DOE-STD-1027-92, the DPO panel concluded that the JASPER facility should be categorized as a hazard category 3 Nuclear Facility. DOE-STD-1027-92, Paragraph 3.1.2 states, "The final categorization is based on an 'unmitigated release' of available hazardous material. For the purposes of hazard categorization, 'unmitigated' is meant to consider material quantity, form, location, and interaction with available energy sources, but not to consider safety features (e.g., ventilation system, fire suppression, etc.) which will prevent or mitigate a release."

The panel also concluded that, if no adjustment to an ARF is considered, the JASPER facility is a hazard category 3 nuclear facility as the HAR clearly demonstrates that hazardous material quantities in excess of the Category 3 threshold quantities (for either Pu-238 or Pu-239) can be acted on by available energy sources.

The DPO panel also made recommendations with respect to potential changes or clarifications in DOE-STD-1027.

- DOE-STD-1027 should be revised to support the requirement in 10 CFR 830 for determining the need for completing a documented safety analysis (DSA) and should include clarification of NNSA expectations with respect to determining the ***initial*** and ***final*** hazard categorization of a nuclear facility. Specifically, clarification should provide a concise, simple methodology for performing final hazard categorization, clearly addressing the role and required characteristics of passive features when determining alternative airborne release fractions.

- DOE-STD-1027 should clearly articulate the process for downgrading or upgrading a final categorization based on the application of adjusted threshold quantities using an alternate ARF. This should include moving between all the category levels: HC-2, HC-3, and non-nuclear (commonly referred to as radiological). Specifically, if an operational process or hazard involves only a percentage of a facility's inventory and results in an alternate ARF, it is unclear if threshold quantities should be revised based on this alternate ARF and compared to the entire facility inventory or only the percentage of the facility's inventory represented by the process or hazard.

- DOE STD-1027 should clarify that no adjustments to the LPF are allowed for the purpose of final hazard categorization.

B. Fire Protection for the Waste Characterization Glovebox at the LANL Waste Characterization, Reduction and Repackaging Facility (WCRRF).

A Consent Order from the State of New Mexico requires DOE to dispose of higher activity transuranic wastes that are stored in drums at the Los Alamos National Laboratory (LANL). The contractor, Los Alamos National Security, LLC (LANS), is making modifications to the WCRRF in order to process the waste packages and certify them for transportation to the Waste Isolation Pilot Plant. The current WCRRF Basis for Interim Operations (BIO) analyzed credible accident scenarios and subsequent bounding consequences in order to develop many physical and administrative controls. Thus, the risks associated with the new operation are mitigated, in part, through the implementation of safety upgrades and controls.

However, LANS sought relief from certain requirements and standards. For example, the waste processing operations will be performed in the single, tabletop glovebox, the Waste Characterization Glovebox (WCG). LANS requested temporary relief from the provisions in the National Fire Protection Association codes and DOE technical standards for automatic fire suppression inside the glovebox. In addition, the contractor requested permanent relief from the DOE requirement to provide adequate capacity for the containment of potentially contaminated run-off water from fire-fighting activities.

The WCRRF BIO (with input from the Fire Hazards Analysis) supports the view that the consequences associated with the WCG fire are minimal (local onsite) compared to the consequences of delaying the processing of material-at-risk (public offsite) in order to install an automatic suppression system. Specifically, the BIO indicates that for waste greater than 56 Plutonium Equivalent Curies (PE-Ci) but less than 300 PE-Ci the offsite risk is minimal; worker risk could be accommodated through manual suppression techniques and compensatory measures, including a fire watch. The BIO identified potential risk to the public when greater than 300 PE-Ci is being processed; therefore, it limits inventory in the entire facility to less than or equal to 300 PE-Ci. LANS requested the noncompliance for the glovebox only for the phase when processing less than 300 PE-Ci. LANS will process the higher activity waste later. As part of the future BIO revision for that phase, LANS committed to evaluate and install, as necessary, an appropriate automatic fire suppression system. The noncompliance regarding the inadequate containment of run-off water was proposed for the duration of the new operations.

After considering the results of the Fire Hazards Analysis, the BIO, and mission needs, LASO accepted LANL's justification for the noncompliance. However, the SME on fire protection disagreed with the site office decision. He argued that the manual suppression features in the WCG (Metal-X and a fire blanket) would not suppress a fire involving combustible materials. He stated that an automatic suppression system in the glovebox would quickly detect and suppress any potential fire from materials in the drums. Also, with sprinklers suppressing the fire inside the glovebox, the overhead sprinklers in the building would be less likely to actuate. As a result, a lower volume of run-off water would flow to the facility drains, thereby minimizing potential contamination of the facility and the environment. Subsequently, on April 23, 2007, he filed a DPO.

Following local procedures, LASO initiated a DPO panel. Based on the BIO conclusions, technical safety requirements, operating history and the LANS commitment to evaluate additional suppression features before processing very high activity waste (that is, >300 PE-Ci), the local panel supported the site office position. The SME appealed the panel’s decision to Headquarters on May 22, 2007. Headquarters initiated a panel consisting of three DOE and NNSA fire protection engineers and a DPO panel manager. The Headquarters DPO panel concluded that the “proposed activities in the WCG do not present an unreasonable risk to the public” and recommended that the NNSA CTA concur with the requested relief. On June 29, the CTA wrote to the SME notifying him that he accepted the panel's recommendation, and that he directed NNSA to continue to process the LANS request for relief through LASO.

For questions on the NNSA process for DPO’s, contact one of NNSA’s DPO Managers. For nuclear safety issues, the NNSA DPO Manager is James McConnell, Chief of Defense Nuclear Safety (202-586-4379, james.mcconnell@nnsa.doe.gov). For non-nuclear safety issues, the NNSA DPO Manager is Frank Russo, Senior Advisor for Environment, Safety and Health (202-586-8395, frank.russo@nnsa.doe.gov).

Section II. Questions and Answers

The Nuclear Safety Management Rule, 10 CFR 830, contains requirements regarding the process for Unreviewed Safety Questions (USQs). Contractor USQ procedures must be consistent with these requirements. In addition, through the approval process for the USQ procedure, site offices may mandate that the contractor's USQ procedure contain whatever additional requirements the site office manager finds necessary at his or her site. These requirements are added at the discretion of the site office manager and may include, but are not limited to, the good practices discussed in DOE Guide 424.1-1A. It is important to make a distinction between requirements added at the manager's discretion and requirements mandated by the rule.

1. ***Both 10 CFR 830 and DOE Guide 424.1-1A state that upon declaration of a potential inadequacy in the safety analysis (PISA), the contractor must take action to "place the facility in a safe condition." Must the action(s) taken to place the facility in a safe condition be completely within the defined control set in the Technical Safety Requirements (TSRs) (unless an emergency has been declared)?***

With respect to required actions associated with a PISA, 10 CFR 830.203 states the following:

> (g) If a contractor responsible for a hazard category 1, 2, or 3 DOE nuclear facility discovers or is made aware of a potential inadequacy of the documented safety analysis, it must:
>
> (1) Take action, as appropriate, to place or maintain the facility in a safe condition until an evaluation of the safety of the situation is completed;
>
> (2) Notify DOE of the situation;
>
> (3) Perform a USQ determination and notify DOE promptly of the results; and
>
> (4) Submit the evaluation of the safety of the situation to DOE prior to removing any operational restrictions initiated to meet paragraph (g)(1) of this section.

Contractors are required by 10 CFR 830 to "take action, as appropriate, to place or maintain the facility in a safe condition until an evaluation of the safety of the situation is completed." This is the first thing contractors must do, even before notifying DOE of the situation. The burden is on contractors to determine what actions are appropriate and to take those actions first. Section (b) of 10 CFR 830.205 allows contractors to take emergency actions that depart from the TSRs when no actions consistent with the TSRs are immediately apparent and when action is necessary to protect workers, the public or environment from "imminent and significant harm." 10 CFR 830 contains restrictions on who can authorize these actions, but it does not say that an operational emergency must be declared. The only criterion is the need to prevent imminent and significant harm. If a contractor thinks a TSR must be violated to make the situation safe, and yet the situation does not constitute an operational emergency, the contractor would have to defend the actions taken as being necessary to prevent imminent and significant harm. DOE would consider the contractor's justification when deciding whether a TSR violation occurred.

2. ***Would the 'operational restrictions' mentioned in 10 CFR 830.203 (g)(4) include restrictions imposed as compensatory measures from a justification for continued operations (JCO) if that JCO was written in response to a PISA ?***

No. In 10 CFR 830.203, paragraph (g)(4) refers to "operational restrictions initiated to meet paragraph (g)(1)" when discussing what must be maintained until after the evaluation of the safety of the situation is submitted. As used in (g)(1), operational restrictions for PISAs are those immediate action controls put in place by the contractor to place or maintain the facility in a safe condition. These controls can not be lifted at least until an evaluation of the safety of the situation (EOSS) has been submitted. Once a PISA is discovered, putting in any necessary operational restrictions happens first, before time is taken to write a JCO. Even though the USQ guide discusses JCOs in the PISA section, JCOs are not the mechanism for putting operational restrictions in place to create/maintain a safe condition.

If the PISA results in a USQ being declared, this might lead to the submittal of a JCO. Compensatory measures may be included in the JCO, but these compensatory measures are not subject to the restrictions in (g)(4). Any requirements on lifting compensatory measures in a JCO should be included in the JCO. The JCO may also provide the basis for lifting or modifying some or all of the operational restrictions, or for replacing them with different compensatory measures.

3. ***Is it possible for a TSR violation to result in a PISA or vice versa? For example, a TSR violation resulting from a programmatic breakdown or SAC violation does not have clearly identified corrective actions to place the facility back into compliance with the TSRs, as is the case with an LCO. For these types of violations, it may be prudent for a contractor to declare a PISA, complete an evaluation of the safety of the situation, perform a backward-looking USQ Determination (USQD), and notify DOE of the results of the USQD. Neither 10 CFR 830 nor DOE Guide 424.1-1A state that a TSR violation precludes a PISA (or vice versa). Is it good practice to require the contractor to consider the need to declare a PISA for TSR violations that are not easily corrected so that adequate DOE oversight and/or approval is provided regarding removal of operational restrictions and/or compensatory actions required to return to full TSR compliance?***

Neither the Rule nor the Guide addresses this situation. However, according to the criteria in DOE Manual 231.1-2, a TSR violation is a reportable occurrence, as is a PISA. DOE Manual 231.1-2 section 5.1 requires operations personnel to "take appropriate immediate action to stabilize and/or place the facility/operation in a safe condition and ensure that any potential environmental effects are stabilized and workers are treated for injuries sustained." The Manual requires that DOE be informed within two hours of the categorization of the occurrence. That allows DOE engagement on the contractor's path forward at that time, if DOE so desires. DOE is permitted to levy additional reporting requirements with which the contractor must comply. The formal report required for an occurrence includes an assessment of the cause and corrective actions to be taken. Although the declaration of an occurrence does not require declaration of a USQ or performance of a USQD, the site office may choose to declare that a USQ exists and thus require site office approval of subsequent actions (see paragraph B.5. in the USQ Guide).

Thus, the occurrence reporting procedures to be followed in the case of a TSR violation give DOE opportunity to require the contractor to perform all of the elements of the required actions for a PISA, should the situation warrant. Practically speaking, the only part of the PISA process that is missing from the declaration and reporting of a TSR violation is the requirement for DOE approval prior to the removal of operational restrictions. However, DOE can assert that requirement once it is notified of the event by declaring a USQ exists and requiring DOE approval prior to removal of the restrictions. Other mechanisms are also available to site offices for control of subsequent actions, such as requiring in the TSRs that site office approval is necessary for any actions needed as a result of a TSR violation.

The situations where a TSR violation should also be a USQ (and hence a PISA) could be treated by a detailed discussion in the site USQ procedure. However, the potential for confusion is significant with that approach. It is better to write the USQ procedure to address the situations that are most usually encountered—and usually a TSR violation would not result in a PISA. It may be more effective to simply note in the USQ procedure that the site office has the prerogative to declare that a PISA or a USQ exists, particularly for situations where the site office thinks that the events that resulted in a TSR violation also indicate an inadequacy in the safety analyses.

4. ***Should an Evaluation of the Safety of the Situation (EOSS) resulting from a PISA discuss the results of the causal analysis of the situation? Is the causal analysis conducted as a requirement of the occurrence reporting process adequate documentation of the causal factors and extent of condition associated with the PISA? The causal analysis could help site offices evaluate the relevance and effectiveness of actions or measures proposed prior to approving the removal of "operational restrictions" that were initiated to place the facility in a safe condition.***

The USQ requirements relating to the EOSS do not require a causal analysis. The EOSS is simply what it says it is. According to B.14.3 in the USQ Guide (2007 version), "Basically, a safety evaluation is a safety analysis that demonstrates adequate safety with the existing situation so that any interim measures (operational restrictions) to maintain the facility in a safe condition can be removed." The role of the EOSS is not to determine extent of condition, root cause, or systemic corrective actions that may be needed. It is simply to demonstrate that the situation is safe without continued application of the operational restrictions.

However, a PISA is a reportable occurrence, and the occurrence report and its closeout do require a causal analysis (per M 231.1-2). If the USQD is positive and site offices need a more detailed causal analysis than was created for the occurrence report, site offices may withhold approval for removal of operational restrictions until the needed information is received.

5. ***Is it appropriate to have a categorical exclusion that excludes procedures that exclusively implement a new or revised Safety Basis (SB) or that are no longer required under a new or revised SB? The justification for this categorical exclusion would be that these procedures do not require screening/evaluating by the USQ process provided that the procedures were developed/changed to ensure safety basis compliance.***

The application of a Categorical Exclusion (CATX) is part of the USQ process. A CATX is not used to exclude items from the USQ process, it is used as a supplementary screening criterion that can only be applied by a trained USQ evaluator. Technically, 'standing' CATXs should not actually be in the USQ procedure; they should be converted to screening criteria. The way a CATX is supposed to come into being is after a USQ procedure has been approved, when it becomes apparent that there is a generic type of change that would have been written as a screening criterion had it been known. A generic USQ determination is written for the situation, and it is added to the list of CATXs that trained evaluators can use when screening changes.

Since CATXs are used as a part of the USQ process, and not to exclude items from the USQ process, the question is whether it is appropriate to streamline the application of the USQ process for a predefined type of change through the use of a particular screening criterion. Said differently: is it appropriate, as a blanket rule, not to perform a USQD on a change to a procedure when a qualified USQ evaluator determines that all the change does is implement an approved safety basis or an approved modification to a safety basis?

All new procedures (or changes to procedures) mentioned or implied in the safety analysis must be reviewed by a qualified USQ evaluator as part of the USQ process to ensure their consistency with the safety basis. New procedures are generally created to do many things besides simply implement a safety basis control. Some new process and procedure changes go through much iteration that may involve changes to hardware and process. The final procedure should be reviewed through the USQ process for unintended consequences. A blanket screening criterion for new procedures that implement the safety basis is generally inappropriate. The implementation verification activity conducted to evaluate the readiness of a facility to conduct a new or revised process might verify procedural consistency with the approved safety basis. However, the depth and/or breadth of a readiness activity would not necessarily ensure that new or revised procedures do not inadvertently introduce an unsafe condition or change the safe operating envelope defined by the approved safety basis.

On the other hand, there are situations where it can be redundant to perform a USQD because the change in question has already been reviewed and authorized. For example, if a JCO or other safety basis document is written that says that a certain procedure will be modified to include specified language, the incorporation of that language into the procedure is approved as part of the safety basis change approval. The USQ process should apply to the procedure change made to implement the insertion of the required language, but if a qualified evaluator determines that the only change to the previously reviewed procedure was to implement the language as already approved, there is no way it could result in a USQ. Thus, it should be possible to craft a simple criterion that can be used to screen out the change as not requiring a USQD. If the USQ procedure is not yet approved or is being revised, this could be added as a valid screening criterion. If the USQ procedure is already approved, it could be added as a CATX. In any event, it must be applied by a qualified evaluator as part of the USQ process in the screening step.

For more information regarding these questions and answers contact Don Nichols at (202) 586-8216, (don.nichols@nnsa.doe.gov); or Patrick Cahalane at (301) 903-2609, (Patrick.cahalane@nnsa.doe.gov).

Section III. Perspectives: Equivalency or Exemption

A recent request to approve an exemption to DOE Order 420.1B, "Facility Safety," raised an interesting issue with respect to noncompliance with codes required under DOE orders and whether it is possible to obtain equivalencies to those codes without getting an exemption from the order that requires the use of the codes. The example below highlights the distinction between an equivalency and an exemption.

An NNSA contractor is not planning to install automatic suppression in an existing single tabletop glovebox. The facility is being modified to handle Hazard Category 2 quantity materials. Would this noncompliance require an exemption to paragraph II.3.c (11) of Order 420.1B?

Paragraph II.3.c (11) of Order 420.1B states that the DOE fire protection design program must provide

> *a means to address fire and related hazards that are unique to DOE and not addressed by industry codes and standards. Mitigation features may consist of isolation, segregation or the use of special fire control systems (water mist, clean agent, or other special suppression systems) as determined by the FHA.*

However, DOE and industry standards specifically address fire protection of gloveboxes. Standards such as the National Fire Protection Association (NFPA) Standard 801, *Fire Protection for Facilities Handling Radioactive Materials* (NFPA 801), can be used to determine the necessary protective measures.

For variances from this and similar standards, Paragraph 6.b of DOE Order 420.1B states

> *Exemptions, exclusions, and equivalencies to standards or other documents referenced in this Order should follow the provisions explicitly set forth in those documents; for example: the equivalency, alternative, and modification provisions in the NFPA Code.*

Paragraph 5d of DOE Order 420.1B assigns responsibilities for the Heads of Field Elements. Paragraph 5.d (10) lists one assignment as follows:

> *Unless otherwise directed by the Secretarial Officer fulfill the role and responsibilities for the authority having jurisdiction (AHJ) for matters involving fire protection as defined by the National Fire Protection Association (NFPA) codes and standards. Ensure any comments from designated fire protection subject matter experts (SMEs) are appropriately addressed.*

DOE Order 420.1B allows the use of the NFPA equivalency process where the NFPA code applies, and it gives the Heads of Field Elements (or the DOE AHJ) authority to decide on the variance or alternative method. The site office AHJ should rely on input from the SMEs and supporting documentation such as the Fire Hazards Analysis (FHA) or the DSA in order to assess whether the level of protection that is provided for the glovebox is equivalent to what is prescribed in the codes. An exemption from DOE Order 420.1B would not be required to approve such an equivalency.

A lingering question is whether Chapter II 3.c (4) of the Order applies. That section states:

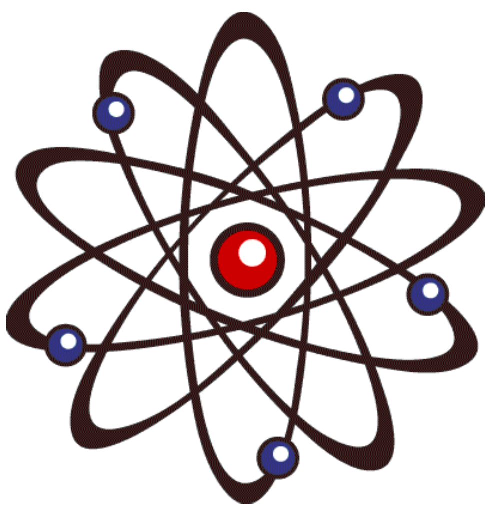
> *Automatic fire extinguishing systems throughout all significant facilities and in all facilities and areas with potential for loss of safety class systems (other then fire protection systems), significant life safety hazards, unacceptable program interruption, or fire loss potential in excess of limits defined by DOE.*

If it can be substantiated that this particular glovebox has potential for significant losses as described in foregoing paragraph, and that the glovebox is an “area” then the Order applies, and an exemption to the Order would be needed. However, nuclear safety professionals have long recognized that gloveboxes, hot cells and caves have unique hazards and require special attention, which is why NFPA 801 and DOE STD-1066, *Fire Protection Design Criteria,* spell out numerous specific protective measures for them. It is not necessary to describe the glovebox as an “area” to ensure that it will have automatic suppression and therefore will be adequately protected. DOE STD-1066 supports this view when it stipulates that the automatic detection and suppression provisions do not apply to single tabletop gloveboxes. Therefore, the requirement in the section of Chapter II 3.c (4) would not apply.

For more questions, please contact Sharon Steele at 202-586-9554 or Sharon.steele@nnsa.doe.gov.

National Nuclear Security Administration

TECHNICAL BULLETIN
2007-3



SEPTEMBER 2007

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In This Edition…

Startup and Restart of Nuclear Facilities

William C. Ostendorff, Central Technical Authority

NNSA ensures that nuclear facilities are safely started up and restarted through the rigorous process set forth in DOE Order 425.1C, "Startup and Restart of Nuclear Facilities," and DOE-STD-3006-2000, "Planning and Conduct of Operational Readiness Reviews." During the last 18 months, several instances have occurred in which DOE requirements and best practices for startup activities may have been circumvented. On September 27, 2007, I issued a memorandum directing NA-10 to establish clear expectations in two key areas and to institutionalize these expectations through the directives process.

The first key area that requires clear expectations involves facility safety documentation. DOE Order 425.1C specifies a set of Minimum Core Requirements (MCRs) for ensuring readiness. The seventh MCR requires that safety documentation describing the safety envelope of the facility being started or restarted be ***approved and implemented****. It is an NNSA expectation that this MCR applies to all readiness assessments and reviews. Safety documentation describing an activity being started or restarted must be* ***approved and implemented*** *before the contractor readiness assessment or readiness review can begin. When facility safety documentation requires NNSA approval, that approval must be obtained before the start of the contractor's readiness assessment or review.*

The second area involves startup notification reports (SNRs). DOE Order 425.1C establishes SNRs as the vehicles by which agreement on types of review and authorization authority is documented, and by which senior management is kept informed. The Order requires that SNRs be submitted and recommends a quarterly periodicity. Effective October 15, 2007, SNRs are to be submitted quarterly. Copies are to be submitted to the Deputy Administrator for Defense Programs (NA-10) and to the Chief of Defense Nuclear Safety (CDNS). Quarterly SNRs include summary-level information on all scheduled activities that may require readiness reviews and that are projected to occur within the subsequent 12 months. More detailed information is included for activities that have not been included on previous SNRs. Proposed startups or restarts that arise between quarterly SNR submittals (e.g., for short-notice activities or unplanned shutdowns) may be approved as amendments to the previous quarterly SNR.

NA-10 will formalize these expectations for all Hazard Category 1, 2, and 3 nuclear activities and operations under its authority and will work with the CDNS to ensure that these expectations are institutionalized through the directives process.

Section I. Focus Area

A. Selection of Dose Conversion Factors for Safety System Classification

Classification of safety systems depends on calculated doses to the public and collocated workers during postulated accidents. In most cases, the dose to the public is determined by the amount of radioactive material potentially inhaled. In these cases, the dose is calculated by multiplying a source term (ST), an atmospheric dispersion coefficient (χ/Q), a Breathing Rate (BR), and a dose conversion factor (DCF) (Equation 1). The source term and the atmospheric dispersion coefficient are made up of several other parameters, and the BR is selected based on the activity level being modeled.

$$Dose = ST \times \frac{\chi}{Q} \times BR \times DCF \qquad (1)$$

DCFs are specific for each isotope, the chemical form of the isotope, the particle size of the inhaled material that contains the isotope, and the deposition model. The deposition model predicts where the particle (isotope) goes in the body and how long it stays there. That is, the model is used to predict how much radioactive material gets deposited in various organs, tissues, and bones and how long the irradiation lasts. The amount of radiation (i.e., energy) can then be converted to dose. As shown in Equation 1, the DCF is directly proportional to the calculated dose.

In 1978, the International Commission on Radiological Protection (ICRP) introduced a model of the respiratory tract (ICRP Publication 30—referred to as ICRP 30). This model was used to derive DCFs for radioactive isotopes in different chemical forms using a particle size of 1μm. The Department of Energy (DOE), the Nuclear Regulatory Commission (NRC), and the Environmental Protection Agency (EPA) adopted ICRP methodology as a standard for dose calculations. In 1994 ICRP introduced a more sophisticated model (ICRP 66) and assumed a larger particle size (5 μm) for worker exposure. This model was used to develop a new set of DCFs for workers (ICRP 68) and a set of DCFs for members of the public (ICRP 72).

On June 8, 2007, DOE published an amendment to 10 CFR 835, *Occupational Radiation Protection*, to reflect the DCFs[1] from ICRP 68 for calculating doses to workers.

There are significant differences between the models used in ICRP 30 and ICRP 66. As a result, there are significant differences in the DCFs. Because of the differences in the models, tissue weighting factors[2], and assumed particle size, the DCFs derived in ICRP 68 are generally lower than those in ICRP 30. This is the case for several isotopes important to DOE (e.g., isotopes of uranium and plutonium). If the DCFs from ICRP 68 and 72 are used to estimate doses to workers and the public instead of those from ICRP 30, the calculated doses go down in most cases. This may affect the classification of safety systems in nuclear facilities.

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[1] The change actually updated derived air concentrations; however, these are based on ICRP 68 DCFs.
[2] Tissue weighting factors were updated in ICRP 60 and are subsequently used in ICRP 68 and 72.

The regulation governing the development and maintenance of safety bases for nuclear facilities (10 CFR 830, Nuclear Safety Management) provides the general framework for establishing controls to prevent or mitigate public and worker exposures to radioactive materials. 10 CFR 830 relies on other DOE sources to provide more detail in establishing controls; for example DOE-STD-3009. Neither the Rule nor compliance with this Standard requires the use of ICRP 30, although there are indirect references to ICRP 30 due to terminology. Compliance with two recent standards (DOE-STD-5506-2007 and draft DOE-STD-1189-XXXX) requires the use of ICRP 68 and 72 for dose calculations.

An informal survey[3] of DOE sites indicated that about half of the sites are using ICRP 68 and 72 for dose calculations. Many DOE health physicists either recommend the use of ICRP 68 or 72, or have no objection to their use so long as the models are used consistently (that is, do not mix assumptions from ICRP 30 with those used in ICRP 68 and 72).

Which set of DCFs should NNSA sites use? The answer is whichever is permitted by the Approval Authority for the safety basis or other analysis being developed. There is no Regulation, Order, Notice, or Manual that requires the use of ICRP 30 values. In situations where the Approval Authority for safety basis documents concludes that the overall control scheme, particularly the selection and classification of controls, remains reasonably conservative using the ICRP 68 and 72 values, the Approval Authority may approve of their use. In the future, it is likely that the use of ICRP 68 and 72 values will be the standard practice adopted throughout NNSA.

B. Disposition of Legacy Item—Object 77 at Livermore

In December 1999, Lawrence Livermore National Laboratory (LLNL) informed the DOE Oakland Operations Office about Object 77, a legacy item stored within Building 332 (B332) containing special nuclear material (SNM). One of the most significant issues with Object 77 was the potential for buildup of hydrogen gas inside the item due to radiolysis of organic material used in its assembly.

LLNL submitted, and DOE approved in March 2000, a plan for placing Object 77 into an interim storage configuration until a plan for the final disposition of Object 77 could be completed, approved, and implemented. The interim storage plan included addition of a secondary containment unit around Object 77, followed by placement of this package into a pressure vessel. Object 77 was placed into this interim storage configuration in March 2000.

In November 2003, LLNL submitted a B332 Safety Basis amendment for final disposition of Object 77. This safety basis amendment was necessary as the disposition activities for Object 77 were outside of the scope of the B332 Safety Basis. The NNSA Livermore Site Office (LSO) approved this safety basis amendment in February 2004 and subsequent revisions through September 2004.

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[3] Louis Restrepo, letter report, July 14, 2003.

The disposition plans submitted to LSO included relieving any potential pressure buildup, followed by the removal and processing of the radiological contents and disassembly of the associated hardware. The disposition of Object 77 was divided into five phases:

1. Move Object 77 from its current location to Room 1006 of B332;
2. Remove Object 77 from the pressure vessel, install a pressure baffle, and insert it into the Metal Conversion Glovebox;
3. Drill a hole into Object 77 to relieve any pressure buildup;
4. Access, remove, and repackage the Object 77 contents and remove the SNM from the Metal Conversion Glovebox; and
5. Disposition the Object 77 hardware.

Because operations in B332 were stood down for significant safety issues (unrelated to the legacy item), it was not until August 2006 that LLNL submitted a Readiness Plan for final disposition of Object 77 that was subsequently approved by LSO. The preparations to perform this activity included dry runs of discrete sequences of the evolution that were intended to demonstrate procedural adequacy, operator proficiency, and equipment operability. LSO formed a team to observe the LLNL Readiness Assessment (RA) that began later in August 2006. The LLNL RA team conducted interviews, reviewed analyses and procedures, and observed dry runs of the operations to be performed.

The activity to disposition Object 77 presented unusual challenges to B332 personnel since existing work control processes were not well suited for this unique, one-time activity. Documents containing specific work controls had to be generated to prevent or mitigate hazards. The potential hazards associated with the disposition of Object 77 included radiation, contamination, criticality, deflagration, high pressure, and other industrial safety hazards. To safely conduct this activity, general controls contained in the B332 Facility Safety Plan and an activity-specific Operational Safety Plan were supplemented by specific controls contained in critical lift plans, work permits, an emergency response plan, and special assembly procedures.

The B332 procedures and plans invoked safety management programs and engineered equipment. LLNL designed and constructed special equipment, developed specific machining techniques, and performed extensive analyses to confirm the adequacy of the engineered equipment. Even with the special equipment and techniques, rigorous implementation of conduct of operations would be critical to the success of the disposition activity.

During the performance of the dry runs of the activity for the LLNL RA, several deficiencies were observed: conduct of operations lacked rigor, mockup training did not effectively validate procedures, and installation of specially designed equipment was problematic. As a result of these deficiencies, LLNL suspended the RA. LLNL planned to correct the deficiencies and conduct a management self-assessment (MSA) before restarting the RA. The MSA identified concerns pertaining to procedures, training for emergency response personnel, testing and inspection of hoists and cranes, and personal protective equipment. LLNL declared that issues from the RA and the MSA were resolved; they restarted the RA in late January 2007.

Dry runs conducted for the RA demonstrated significant improvements in areas where issues were identified in the previous LLNL RA. For example, conduct of operations was more rigorous, procedures had been validated, and the equipment fit and function was verified. The RA Report, issued in early February 2007 identified four pre-start findings and no post-start findings. The four pre-start findings were that 1) the Emergency Response Plan was not fully implemented; 2) the design of the containment tent required resolution of fire protection issues; 3) NOMEX® hoods required for Phase 2 were not available; and 4) closure of MSA findings were not managed, as required. LLNL fissile material handler (FMH) knowledge and conduct of operations discipline were recognized as strengths. In late February 2007, LLNL completed resolution of the pre-start findings and declared readiness for LSO to begin their RA.

The LSO RA Report was issued in late March 2007 with two pre-start findings and two observations. The pre-start findings were that 1) there was a lack of evidence confirming that personnel involved in the Object 77 disposition activities were appropriately trained; and 2) a formal plan ensuring that all requisite tasks were defined and completed before operations begin had not been developed.

By late April 2007, preparations to disposition Object 77 were well underway. For example, the following tasks were completed:

- Construction and testing of a containment tent at the entrance to the room
- Training of FMHs on off-normal egress and use of NOMEX® fire-resistant hoods with anti-contamination clothing
- Documents to address LSO RA pre-start findings related to training and startup activities
- A final dry run of the handling operations in full personal protective equipment (PPE) consisting of anti-contamination and NOMEX® suits - both with hoods - plus powered air-purifying respirators
- Briefing of emergency responders on the operation and familiarization with the facility
- A LLNL letter requesting LSO approval to conduct the activity

LLNL completed the first and second phases of the disposition of Object 77 in early May 2007. The first phase consisted of the transfer of the item from its storage location to a laboratory room for disposition activities. This phase required the startup of a new (uncontaminated) workstation. Startup activities included equipment checks and the establishment of applicable criticality safety and radiological controls. The first phase was successfully completed.

The second phase posed the highest potential safety risk to the involved workers from hazards including radiation exposure, radioactive contamination, criticality, deflagration, and high pressure. The objective of this phase was to install a pressure baffle on the item and then place the item in a glovebox for further disassembly. The glovebox was then connected to the facility glovebox exhaust system and purged with inert gas. The FMHs performed this phase in full PPE consisting of anti-contamination and NOMEX suits – both with hoods – plus powered air-purifying respirators. During this phase, the LLNL team successfully implemented safety controls integrated through the use of procedures, special equipment, and FMH proficiency. The conduct of operations of the FMHs was disciplined and the implementation of radiological controls and ALARA techniques was effective.

LLNL completed the third phase of the disposition of Object 77 in early May 2007. This phase consisted of a complex drilling operation in a glovebox. The drilling was intended to relieve any potential pressure buildup in Object 77 to eliminate the unique hazards of Object 77. The operation was conducted using a procedure that required verbatim compliance. The FMHs performed the work with an appropriate level of formality of operations and the drilling operation was performed in the same manner that the FMHs had demonstrated during the RA. The FMHs effectively implemented the safety controls, radiological controls, and ALARA techniques. Internal pressure was released during the drilling operation showing that the pressure and flammable gas hazards were real rather than hypothetical. This was also the last phase that was included in the RA and safety basis amendment for the activity. The remaining work was considered to be routine glovebox operations. The only special controls for the final phases that disassembled the item and removed the SNM were in the area of radiological controls. External radiation levels from neutrons and gamma rays were expected to be relatively high compared to normal B332 operations. For this reason, extremity dosimetry, electronic personal dosimeters (with job-specific alarm setpoints), and an ALARA plan were utilized.

In August 2007, LLNL completed the recovery of SNM from Object 77. This activity consisted of extraction of the SNM from the item, placing the material in approved containers, and bagging out the material for processing. The FMHs performed the work with an appropriate level of formality of operations and effectively implemented the safety controls, radiological controls, and ALARA techniques.

All phases of the disposition of Object 77 have now been completed. All hardware and SNM related to Object 77 has been removed from the glovebox where the disposition activities occurred. The SNM from Object 77 has been packaged and placed into storage.

The following are lessons learned related to the disposition of Object 77:

- The approach to readiness should be consistent, justifiable and clearly documented. LLNL stood down operations in B332 in early 2005. It was almost 15 months before B332 returned to full operations. The approach prior to the stand down only required a Memorandum of Understanding, and it was not intended to meet DOE O 425.1C, *Startup and Restart of Nuclear Facilities*. Unfortunately, assumptions and justifications associated with the approach were not well documented; therefore, a great deal of effort was devoted to re-evaluating and re-scoping core requirements after B332 returned to full operations.

- LLNL used a "graded approach" to determine the degree to which core requirements from DOE O 425.1C applied. It is recommended that the determination is made first on if the core requirement applies; if it does, then grading can be applied to the depth of the review.

- Since so much time had elapsed since initial planning for the disposition of Object 77, many of the LLNL staff originally identified for the project were no longer available. Available LLNL staff did not have the appropriate training.

- Prior to declaring readiness to begin a contractor RA, all procedures need to be verified to be consistent with the equipment and personnel required by the procedure, as well as the tasks that need to be accomplished. Personnel training needs to be completed at this time.

- After observing poor execution of the initial LLNL RA, the responsible LLNL manager took appropriate action and suspended the RA. It is important that the contractor perform a MSA prior to a readiness review to ensure that personnel, procedures, and equipment are ready for the activity.

- Prior to declaring readiness, it is important for the contractor to check out all equipment required for the project for fit and function. For example, during the initial contractor RA, the pressure baffle did not fit.

- For projects such as the disposition of Object 77 that require significant analysis, unique equipment, trained personnel, and detailed procedures, it is significantly more cost effective to prepare for and complete the project expeditiously versus over the long term.

- In preparing for the RA, the operators performed dry runs on discrete activity sequences. However, during the contractor RA operators made mistakes as a result of not performing integrated dry runs for the entire evolution.

C. NNSA Risk-Informed Decisionmaking (NRID) Project, Pilot #2: Using the Analytic Hierarchy Process (AHP) to Prioritize Initiatives for the Chemistry and Metallurgy Research (CMR) Life Extension Project

For the vast majority of everyday personal and professional decisions, intuition and management judgment will produce acceptable results because the decisions involve few objectives, criteria, and attributes and a very limited number of decisionmakers and stakeholders. However, in the area of nuclear safety, problems are often much more complex. Most decisions involve multiple objectives, criteria, and attributes as well as multiple stakeholders whose objectives, criteria may be in conflict. The AHP is a disciplined and transparent decisionmaking process that provides:

- A structured approach to complex problems

- A rationale for decisions

- Consistency in the decisionmaking process

- Objectivity

- Documented assumptions, criteria, and values used to make decisions

As a result, decisions stemming from the AHP are reviewable, revisable, and easy to understand or communicate.

Analytic Hierarchy Process

The AHP decomposes a complex multi-attribute decisionmaking problem into a system of hierarchies. AHP utilizes pair-wise comparison to analyze judgments from experts on various attributes and alternatives. A trained facilitator uses the "elicitation" process to gather expert judgment (from decisionmakers, technical staff, and subject matter experts) through formal and repeatable methods of verbal or written communications. For this exercise, the CDNS staff used the *Expert Choice*® software which stores and evaluates the expert judgments for the AHP. To foster open discussions and to appreciate opposing views, the expert group used a consensus method of decision making rather than individual voting.

Initial steps in using the AHP are to develop a hierarchy of attributes and to identify alternatives. The facilitator asks, and the expert panel responds to, a series of pair-wise comparison questions that lead to an implied numerical evaluation of each attribute. Then each alternative is compared to each attribute by asking the experts which alternative they prefer more, and the strength of the preference when considering a particular attribute.

CMR Life Extension Project

On August 27–29, 2007, the Office of the Chief of Defense Nuclear Safety (CDNS) conducted a second pilot study using an NRID tool. Los Alamos National Laboratory (LANL) and the Los Alamos Site Office (LASO) management wanted to prioritize a list of initiatives that would increase the ability of the CMR to support critical CMR missions beyond 2010. This effort was similar to the first pilot at Y-12 in that the existing facility still has to operate safely and securely for a limited number of years until the replacement facility is built. Because of the numerous initiatives and criteria being considered, the analytic hierarchy process was also chosen for this pilot.

CMR Background

Built between 1948 and 1952, the CMR facility is a Hazard Category 2 nuclear facility that houses numerous capabilities essential to nuclear materials programs for the National Nuclear Security Administration and the Department of Energy. Capabilities include actinide analytical chemistry, materials characterization, and actinide research and development for stockpile management projects, waste characterization, and nondestructive analysis. Since 1999, the facility has been operating under the Basis for Interim Operations (BIO) and approved Technical Safety Requirements (TSRs). Over the years project upgrades (based on the BIO/TSRs, programmatic requirements, public and worker safety, risk reduction and reliability improvements) have been identified, evaluated and prioritized within allocated funding to support safe operations. In 2001, Defense Programs authorized the CMR Replacement (CMRR) project with a stated purpose to "relocate and consolidate mission critical CMR capabilities … at LANL beyond 2010." In anticipated scenarios for

CMRR, NNSA and LANL have determined that some operations would still need to continue beyond 2010 in the CMR building through some period of time until the CMRR facility is complete and fully operational. .

Execution of the Analytic Hierarchy Process (AHP)

Team Selection

The opportunity to pilot NRID was recognized by Los Alamos Site Office (LASO) project managers. Initially the LASO and contractor project managers made decisions about the project scope, goal, and initiatives. Later they identified up to ten key project participants and subject matter experts representing programs, safety basis, operations, engineering, and program integration. These individuals represented varied perspectives of the different project stakeholders from both LASO and LANL.

Purpose Statement

To help ensure that the team of experts has a consistent understanding of the objective of the review, it is necessary to have a clear and concise purpose statement that focuses on the problem to be solved. The team might occasionally revisit and reflect upon the purpose statement during the AHP process. The LASO and LANL project managers proposed the following stated purpose for the review:

> *Provide recommendations regarding CMR Life Extension to LANS/NNSA Senior Management to support decisionmaking for continued operation of CMR Building in support of NNSA missions assigned to LANL. The strategic objective is protecting core mission-critical analytical chemistry, materials characterization and actinide R&D capabilities currently housed in the CMR Building at LANL an operationally safe, secure, and compliant manner beyond 2010. The main focus of this AHP is to prioritize actions and activities needed to allow continued operation of CMR beyond 2010. Recommendations from this AHP will be fed directly into the Program/Project Execution Plan for the CMR Life-Extension.*

Later, during the exercise, the following project goal/purpose statement was synthesized from the more complete one above:

Establish a prioritized list of initiatives to ensure CMR's ability to support missions in a safe, secure, and compliant manner beyond 2010.

Attributes

Focusing on the purpose statement, the project team identified attributes that might be important to selecting investments to operate CMR safely, productively, and reliably. The project team agreed on five attributes that were important to selecting investments to operate CMR. The team then compared the attributes to each other, and used pair wise comparison to determine a numerical weighting of each attribute. The attributes are described as follows:

- ***Maximize nuclear safety benefit***—focus on real safety benefit and not regulatory compliance. For example, new fire horns and lights should score higher than fire suppression in locked inaccessible locations. *In addition, nuclear safety pertains to measures beyond worker safety since CMR already operates to a baseline that includes personnel safety*.

- ***Maximize robustness of program capabilities***—focus on mission critical capability maintenance and redundancy. For example, activities that support the plutonium assay capabilities should score higher than activities that support hot cell capabilities.

- ***Maximize operational reliability***—focus on wings and systems that are critical to missions. For example, ventilation upgrades in Wing 7 should score higher than Wing 4 ventilation upgrades.

- ***Minimize impacts to programs during implementation***—focus on activities that can be implemented without impact to programmatic operations. For example, waste processing line repairs in a few select areas should score higher than a system wide upgrade.

- ***Minimize implementation costs and time***—This attribute should deliver the maximum benefit in a short time frame for minimum cost.

The attributes and the resulting weights are depicted in Figure 1 below.

Figure 1.

Alternatives

The scope of the exercise was to include initiatives for facility infrastructure upgrades, facility support, programmatic infrastructure and instrument, and Material at Risk (MAR) reduction. Before the exercise, the team identified over 80 initiatives that they needed for the CMR Life Extension Project. The alternative list included costs to implement and the drivers behind each initiative. To reduce the number of initiatives, the team grouped the proposed upgrades by wing (location in CMR) and by function. Some functions pertained to many wings; in that case they were combined. For example, the upgrade of Wing 9 fire protection system, upgrade for fire alarm horns lights, pull stations, and barriers in all the wings, and the fire hydrant conversions were combined into one initiative called “Fire—ALL (alarms, barriers, sprinklers).”

Potential upgrades had different funding sources. Initiatives were prioritized regardless of the funding source, under the assumption that the program manager will ensure funding us available for high-priority alternatives.

Each alternative group was compared to each of the five attributes by asking, “With respect to attribute A, do you prefer alternative *p* or alternative *q*?” If alternative *p* is selected as the more preferred of the two alternatives from the point of view of Attribute A, then the experts are asked to indicate the strength of their preference for *p* over *q* according to a set scale. The degree of preference was decided on a verbal scale, that is, the team members had to decide whether the strength of the preference of alternative *p* over *q* was “equal,” “moderate,” “strong,” “very strong,” or “extreme.” For this exercise, over two thousand pair-wise comparisons were completed in 1½ days. Based on responses to all pair-wise comparisons, the *Expert Choice*® software calculated the weights of each alternative, which are presented in Figure 2 below (*See page 14*).

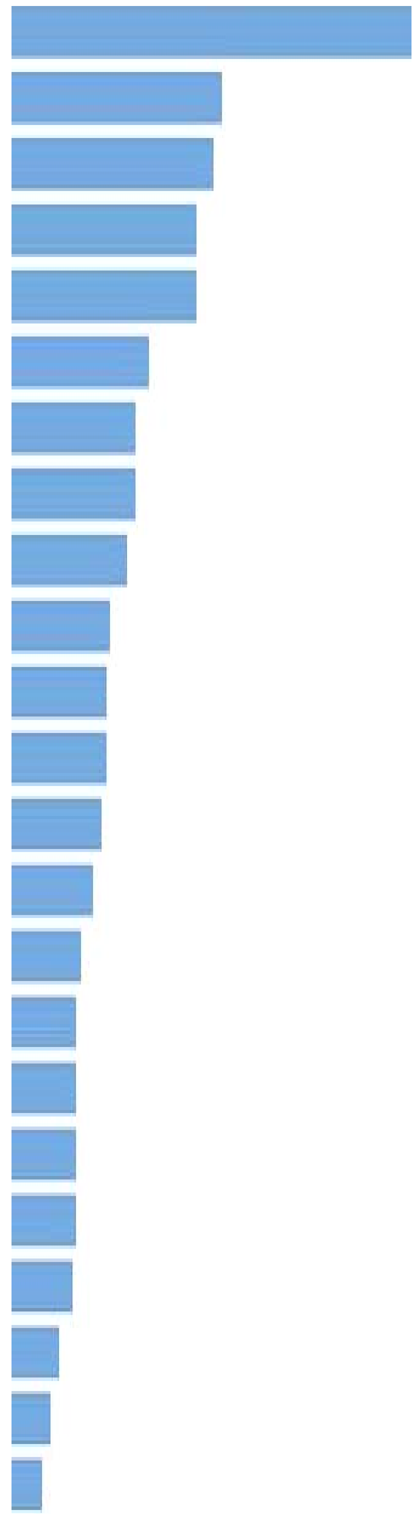
Discussion of Results

The alternatives prioritization indicates that given the attributes previously identified, it is most prudent to invest in upgrades associated with the confinement ventilation systems in all the wings of CMR. The confinement ventilation upgrade scored approximately a factor of two above the second ranked upgrade—Facility systems for Wings 5 or 7 associated with the LIMS material tracking systems. The computer software depicted the distribution of the alternatives (see Figure 1). The figure indicates four possible groups of upgrades; that is, after the ventilation upgrade for all wings, the most important group might consist of the facility systems upgrades for Wings 5, 7 and 9, the electrical upgrades for all the wings, and equipment associated with radiological equipment in all wings. The prioritization range for this group is from 0.075 to 0.066. The next important group of upgrades might have a numerical range between 0.051 and 0.026. The remaining items would make up the fourth group. This grouping or a similar scheme could be used to decide which sets of initiatives to pursue based on available funding.

The simplest upgrade was the security/egress enhancements, which involved replacing and/or installing two turnstiles. Even though it is not a major safety upgrade, the installation of turnstiles is by far the least expensive, takes the least time to complete and has minimal impact on the program during implementation. Given the attributes for this exercise, this upgrade ranked higher than other upgrades that impacted safety more, such as the emergency generator. The team agreed that the emergency generator should rank low because it was for backup power; it was more important to ensure the operation and reliability of primary systems and program instruments and equipment rather than installing backup power equipment.

Figure 2. Distribution of the Alternatives

Alternative /Initiative	Weight	Graphical distribution
Vent—All Wings (ALL)	.141	
Facility Systems (Fac Sys)—Wing (W) 5/7 (LIMS material tracking system)	.075	
Fac Sys—W9 (roof ladders, east bank hydraulic, hot cell rad monitoring, door enclosure, roll up door)	.072	
Electrical—ALL (breaker maintenance, MCC surge suppression, distributor upgrade)	.066	
Rad Con—ALL (replace PCMs, HRMs, Ludlum 214s, CAMs)	.066	
Fac Sys—ALL (freight elevator, CA-003, critical spares, potable water, fan removal, forklifts, house vacuum)	.051	
Radiation Liquid Waste Plumbing (Rad Plumb)—W5/7 (replace sinks, leaking traps, liquid waste lines and pumps, acid drain line)	.047	
Material Risk Reduction (R&R) —W7 (Remove overhead trolley, DC Arc of GB, old Pu-238 GB)	.047	
Fac Sys—W7 (replace deionized water pre-treatment system, rollup door)	.043	
Fac Sys—W7/9 (replace liquid argon dewatering system)	.038	
Fac Sys—W3 (Penthouse roof repair for lightning protection	.036	
HVAC ALL (steam relief valve, warehouse, evaporative cooling)	.036	
HVAC W5/7 (lab temperature control)	.035	
Electrical—W9 (infrastructure, switchgear)	.032	
Fire—ALL (alarms, barriers, sprinklers, hydrant)	.028	
Electrical—W5/7 (power conditioning)	.027	
Program Equipment (PE) —W 5 (upgrade or replace gas mass spec, high-temp furnace, coulometer, glovebox train)	.027	
PE—W7 (ICP-MS, ICP-AES, XRF, Hg analyzer, LSC, auto gamma counter, UPS backup for instruments, GB)	.027	
Security—ALL Wings (repair or install turnstiles)	.027	
PE—W5/7 (clean compressed air, bottled air, or nitrogen supply)	.026	
PE—W9 (containment vessel system tie-in to ventilation, alpha box inserts, manipulator set replacements, electrical outlets, periscope, double HEPA vent system for hot cells, stack monitoring)	.021	
Communication Systems—ALL	.018	
Emergency Generator—ALL	.015	



Sensitivity Analysis

From a technical perspective, sensitivity analysis is the objective examination of the effect on the output of a model of changes in input parameters of the model. The input parameters are the value functions, scores, and weights as determined by the decisionmakers. A technical sensitivity analysis will determine which, if any, of the input parameters have a critical influence on the overall evaluations.

The project team conducted analyses to see if the preliminary conclusions were robust or sensitive to changes in various aspects of the model. Figure 2 represents the base case. It shows the weights of each attribute, and the resultant ranking of each alternative in decreasing order. The team wanted to know whether increasing the weight of nuclear safety would impact the prioritization. The distribution was altered such that the nuclear safety benefit was fully maximized (i.e., 100%), and the other attributes were not considered. The software automatically adjusted the distribution of the remaining attributes; the numerical ranking value of each alternative group changed little. See Figure 3 (*See page 16*); it shows ventilation upgrades at the top of the list. The priority for the other top four items in the base case (such as facility systems upgrades for wings 5, 7 and 9, and equipment for radiological contamination) remained relatively high. However, other alternatives became much more prominent. For example, the distribution for material risk reduction (RR—W7) changed from 4.7% in the base case to 8.4% in the alternate case. The upgrade for lightning protection (Fac Sys—W3) went from 3.6% to 7.2%, and the fire protection upgrades went from 2.8% to 10.6%. Comparison of Figures 2 and 3 might indicate that generally the ranking of alternatives were insensitive to nuclear safety. However, as to be expected, the relative rankings associated with initiatives that largely improve nuclear safety (such as fire protection and material risk reduction) increased.

Expert Choice® allows sensitivity exercises to be performed easily. In another case the attributes for nuclear safety, robustness of program capabilities and operational reliability were equally maximized. The team wanted to know how the alternatives would rank if cost, time, and impact to operations were unimportant. Figure 4 (*See page 17*) shows the results. Here again, the confinement ventilation upgrade outranks the other alternatives by far. However, there were not many dramatic changes, except for the rankings for fire protection upgrades (Fire—ALL) and the emergency generator; their distributions went from 2.8% in the base case to 4.8%, and 1.5% to 3.1%, respectively). Ignoring cost, time, and program impact did not affect the overall outcome because these attributes were relatively unimportant in the base case, together accounting for approximately 16% in the base case.

Figure 3. Sensitivity Results—Safety, Program, and Reliability are Equally Maximized

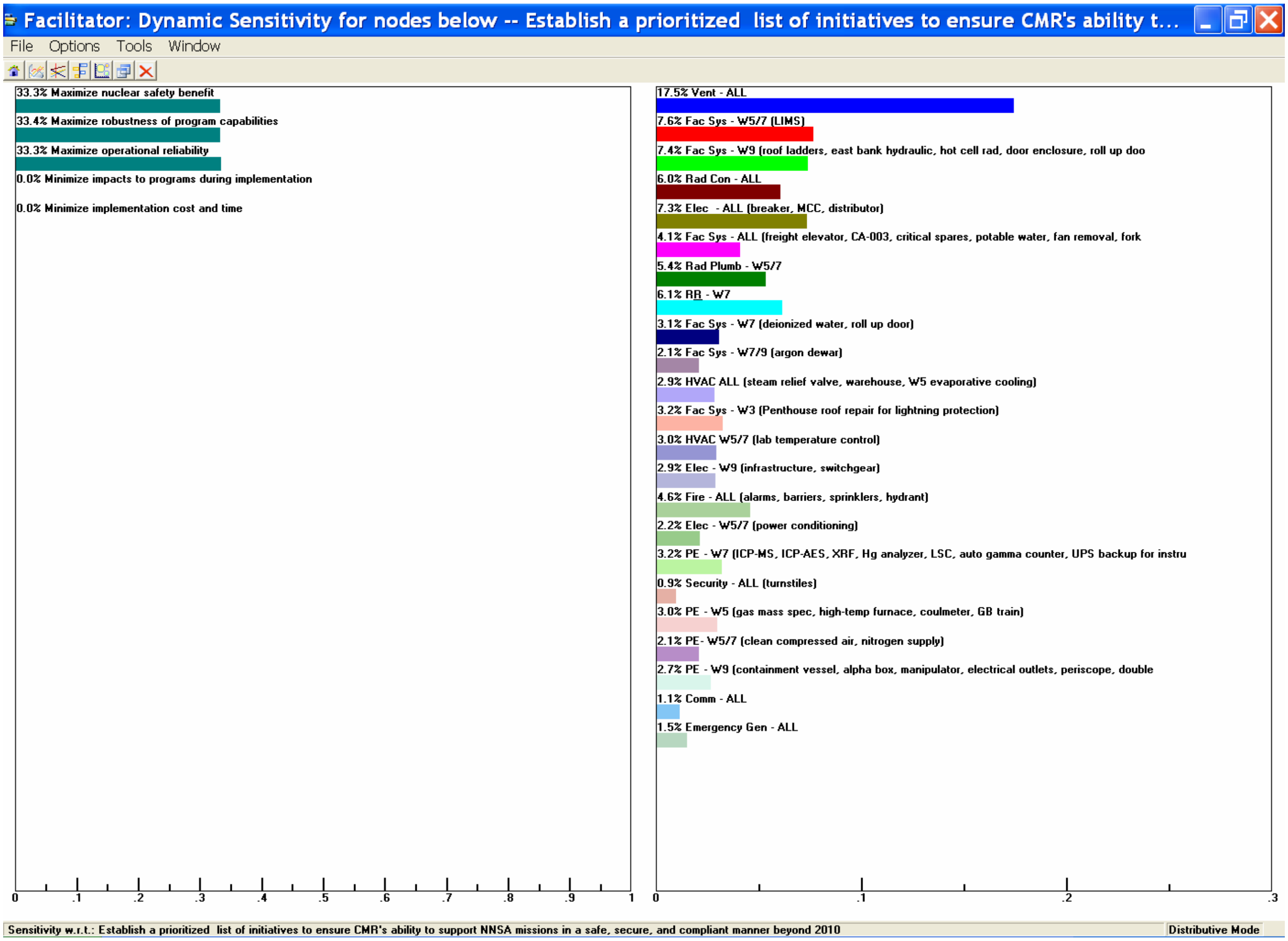
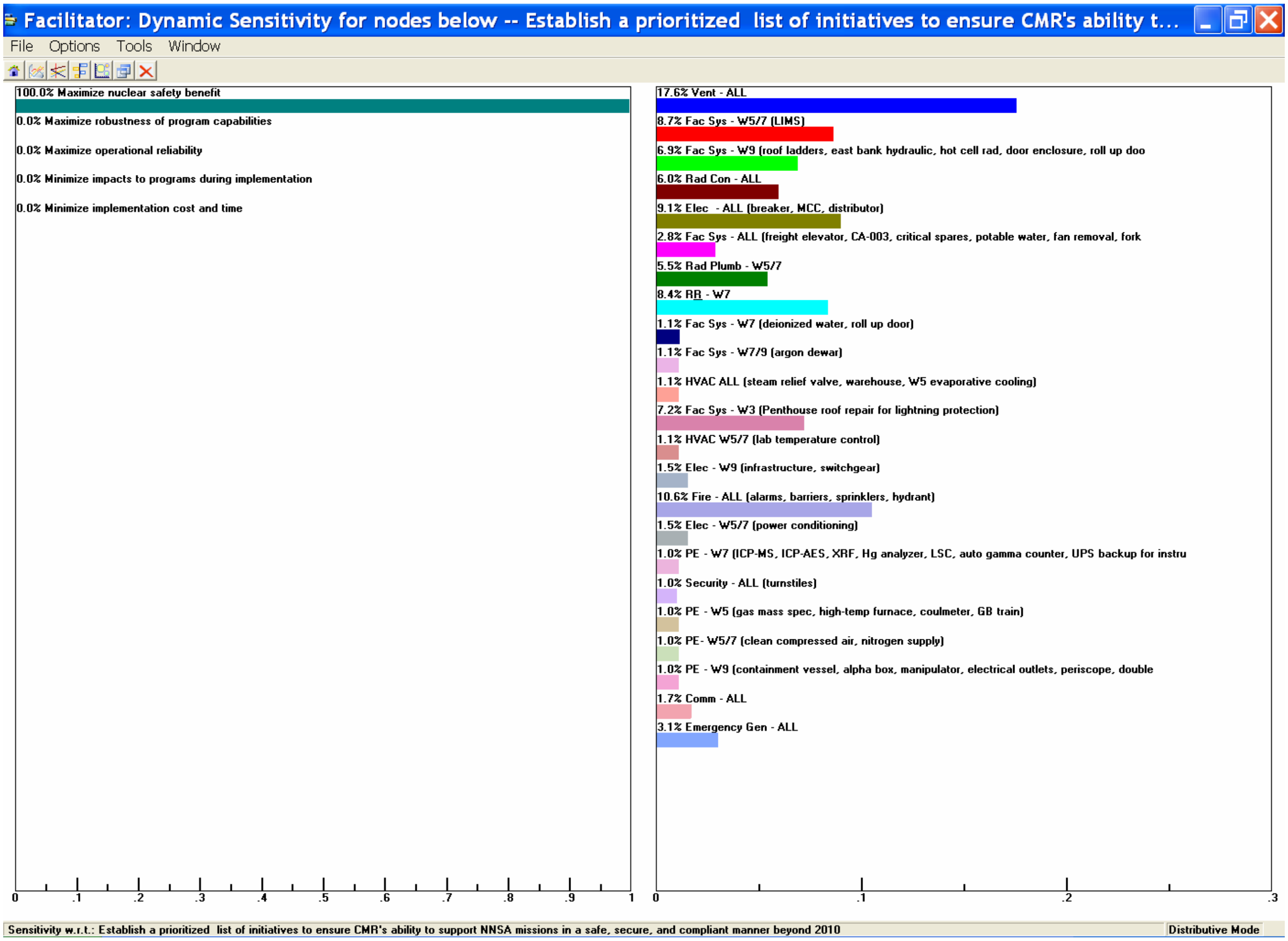


Figure 4. Sensitivity Results—Nuclear Safety Benefit Maximized



Key Assumptions

Before and during the exercise, the team made many assumptions regarding funding resources, definition of safety, and programmatic operations that became the basis of the decision. The key assumptions were documented and are summarized below:

- The attribute "nuclear safety" pertains to safety that goes beyond, and is separate from, safety to workers, public and the environment. The facility would not be allowed to operate in a manner unsafe to personnel.
- The current safety envelope will be maintained.
- CMR life extension is predicated on MAR and hazard reductions.

- Even though the project goal is to ensure CMR's ability to support missions beyond 2010, it was understood that CMR life extension could be beyond 2016.

- Programmatic operations will cease at the end of CY 2016.

- Hazard reduction and decontamination and decommissioning operations will continue beyond 2016.

- Radiation protection, waste service and facility infrastructure may need to extend beyond 2016 to support hazard reduction, de-inventory, D&D activities.

- Since 1999, CMR has been operating under the current Basis for Interim Operations (BIO) and approved Technical Safety Requirements (TSRs). The new Documented Safety Analysis (DSA) will be funded, and completed in 2008.

- The proposed upgrades are not necessarily related to the existing BIO or the preliminary DSA. It is assumed that upgrades related to the revised DSA would take priority in the future.

- Operations in and upgrades to Wings 2, 3, and 4 will not be supported. Only Wings 5, 7, and 9 will be viable.

- No upgrades included repair of equipment or systems. Most CMR equipment has reached the end of life; therefore replacing them is generally less expensive than repairing them.

- Seismic upgrades were not considered due to the remaining life span of the facility.

- Security requirements are outside of the scope of this effort. Such requirements would affect all facilities, and would not be specific to CMR.

- Funds for the replacement of CA-003 are already obligated.

- 10 CFR 851 requirements could be substantial, but were not specifically considered for the exercise. Specific requirements needed to meet the rule were not known.

Observations

The LASO and LANL project participants were very knowledgeable about their operations and systems. At the conclusion of the exercise, some experts stated that they would have provided different inputs if they were clear about the project exercise. In fact, some participants stated that they provided all the nice-to-have upgrades regardless of the BIO/TSRs. Some participants provided data only on upgrades that were needed in 2007. They noted that there was not much fidelity in the data pertaining to cost or time to complete. The participants struggled over whether they had the right set of upgrades, and concluded that they would not know until the DSA was completed. Some participants questioned whether they used the best method to bin the upgrades.

Even though all participants were not equally prepared, the opportunity to collaborate and discuss their differences openly was valuable. Participants stated that if LASO/LANL decides to do another AHP exercise after the DSA is completed, they will pre-brief the participants on the AHP method and spend more time refining the data, the project goal and the definition of attributes before the actual AHP exercise.

Section II. Questions and Answers: Exemptions

1. ***We have a situation in which meeting a particular nuclear safety requirement would actually reduce safety. How hard is it to get Central Technical Authority (CTA) concurrence on an exemption, and how long does it generally take?***

   It is rare that meeting a nuclear safety requirement would actually reduce safety. In most circumstances, a combination of actions are available that, with proper planning, would permit meeting the requirement without a prohibitive cost, delay, or negative safety impact. Where possible, advance planning should consider the requirements that must be met and build appropriate resources into the schedule to accommodate the requirements. When a contingency arises that creates a conflict with a nuclear safety requirement, NNSA personnel should thoroughly evaluate whether other actions are feasible that could resolve the conflict before applying for an exemption or writing an exception in the contract. In those rare situations where an exemption or exception is the only viable alternative, it must be supported with a rigorous, defensible technical assessment that demonstrates that the relief is justified and would not present an undue risk to public health and safety, the environment, facility workers, or security. The burden of proof is on the requestor to rigorously demonstrate and document in the submittal that the action is warranted and that other alternatives are not feasible.

   Between August 2005 and August 2007, the NNSA CTA concurred on 13 exemption requests, or roughly one every two months. This rate is more than is desirable for a high-reliability organization, and we will be looking for ways to reduce the need for future exemptions. The 13 exemptions included 4 exemptions from 10 CFR 830, *Nuclear Safety Management*, and 9 exemptions to DOE Directives (DOE O 420.1A and its successor O 420.1B, O 440.1-1, O 461.1A, O 425.1C, O 452.2B, and O 452.2C). For one of these, an exemption from DOE O 425.1C, *Startup and Restart of Nuclear Facilities*, CTA concurrence was subsequently withdrawn.

   Although DOE-STD-1083-95, *Requesting and Granting Exemptions to Nuclear Safety Rules,* allows up to 180 calendar days for the review of exemptions from 10 CFR 830, the CTA concurred on 10 CFR 830 exemption requests within 15 to 51 days of submittal, with an average of 29 days. The average time for CTA concurrence on exemptions from DOE Orders was 15 business days (3 weeks), with processing times ranging from as short as 1 day to as long as 45 business days from the date of submission.

In most cases, Site Office Manager pre-coordination with the Chief of Defense Nuclear Safety (CDNS) has resulted in issues being resolved without the need for a CTA non-concurrence. In some cases, the approval official decided not to pursue the exemption. Other times, significant issues were worked out before the final exemption request was submitted. On a few occasions the CTA has specified conditions for his concurrence to address details that were not resolved in advance.

One exemption request was signed the day after it was received, and three were processed within a week. The request that was processed in one day was the concurrence on a National Security Exemption for the shipment of fissile material from Los Alamos National Laboratory to the Nevada Test Site. Extensive preparations and analyses had been performed in the field to demonstrate that the proposed activity was safe long before the formal exemption paperwork was submitted to the CTA. The requesters had the foresight to coordinate the safety information with the CDNS as the analysis was being developed. This allowed CTA personnel to review the request and to keep the CTA apprised as the information was being finalized. When the final request arrived at CDNS, the CTA was already fully informed on the issue and the concurrence package was ready for signature.

2. ***Our Management and Operating contractor has an opening for a Manager with responsibility for Fissionable Material Handlers. The contractor is considering a candidate who has many years of logistics management experience, but does not have a college degree and does not have any nuclear experience. Does the DOE Training Order, DOE Order 5480.20A, allow the contractor to assign this person as a Manager if they also assign someone else, who does have a engineering baccalaureate degree and over four years of nuclear experience, to provide technical support to the manager?***

No. DOE Order 5480.20A, Attachment 2, Chapter IV, section 2.a. discusses the entry-level requirements for Managers and does not contain provisions that would authorize this approach. If the candidate has equivalent education or experience that is job-related, that experience may be substituted for a degree and experience on a case-by-case basis. The provision for alternative experience and education for Managers is included in section 2.a. as “Special Requirements,” and is expanded upon in Chapter 1, section 13, ALTERNATIVES TO EDUCATION AND EXPERIENCE REQUIREMENTS. However, the use of a second, qualified individual to serve as a compensatory measure for the lack of qualifications in a Manager is not an approach that is authorized in either of these sections.

To qualify a Manager who does not have the required or alternative qualifications and experience described in the Order would require either an exemption to the Order or an exception as provided for in the Order. Section 7.c.(7) in the body of the Order gives the Site Office Manager authority to “approve contractor procedures which are established to grant exceptions to specific training or qualification requirements for an individual.” Sub-section 11.c. of the Order states that “exceptions from qualification or certification requirements may be approved by contractor management after approval of the exception procedure by the Operations Office Manager/Field Manager for NNSA Operations.” Requirements for exemptions from the Order are provided in DOE M 251.1B, *Departmental Directives Program*. Either an exemption or an exception could be requested to authorize the situation described in the question; however, it is extremely unlikely that an exemption would be approved.

For more details on the exemption process, see NA1-SD 251.1-1, *CTA Management of Nuclear Safety Requirements*, available on the NNSA Intranet under the NNSA Policy link, or contact Don Nichols at (202) 586-8216 or by e-mail at don.nichols@nnsa.doe.gov.

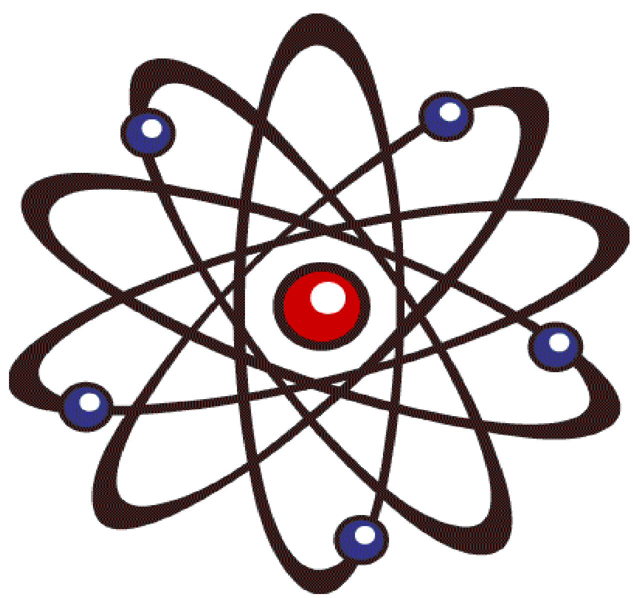
3. ***On August 16, 2007, the Office of Health, Safety and Security announced the availability of RESRAD-OFFSITE software for evaluating dose and risk for environmental cleanup. An NNSA site asked whether the RESRAD codes are approved toolbox codes for safety analysis, and, if not, what are the requirements to use the codes and what are the requirements to become a toolbox code.***

   The RESRAD codes were developed primarily to model the fate and transport of radioactive materials that enter the environment. For example, these codes can be used to predict the groundwater concentration of radionuclides several hundred or thousands of years after a release. As such, these codes are especially useful for evaluating different cleanup methods. These codes are generally not intended for safety analyses associated with operating facilities; however, they can be configured to provide short-term dose estimates.

   The RESRAD codes are not included in the toolbox codes. The requirements of the Quality Assurance Order (DOE O 414.1C) would need to be met prior to using these codes for safety analyses. The associated guide, DOE G 414.1-4, provides additional information regarding use of safety software and contains a procedure for adding and deleting codes from the central registry (i.e., the toolbox).

National Nuclear Security Administration

TECHNICAL BULLETIN
2007-04



DECEMBER 2007

<u>Distribution:</u> The offices on distribution are expected to maintain a record copy (archive) of all NATBs at their site or office.

- Site Manager, SRSO
- Site Manager, YSO
- Site Manager, PXSO
- Site Manager, SSO
- Site Manager, LASO
- Site Manager, NSO
- Site Manager, LSO
- NA-10

cc: Service Center
Kansas City Site Office
NA-11
NA-12
NA-26
ES&H Advisor

In This Edition…

Nuclear Safety Oversight

William C. Ostendorff, Central Technical Authority

As the Central Technical Authority for NNSA, one of my roles is to establish expectations for NNSA Federal employees' and contractors' implementation of nuclear safety requirements. One of my other roles, concurring with exemptions to safety requirements in Rules and Directives, is an opportunity to set and clarify expectations. Recently, I concurred with an exemption to allow the Joint Actinide Shock Physics Experimental Research (JASPER) Facility to start operations prior to conducting an Operational Readiness Review. JASPER has recently been recategorized as a Hazard Category 3 nuclear facility and therefore the next JASPER shot is essentially the startup of a new Hazard Category 3 nuclear facility. As indicated in the following basis for that decision, the circumstances surrounding JASPER are unique and are unlikely to be repeated. While I agreed that the exemption is the proper course of action for JASPER, I want to make it clear that it is my expectation that NNSA will conduct readiness reviews in accordance with DOE Order 425.1C, "Startup and Restart of Nuclear Facilities" (or its successor Orders) including after recategorizing an existing facility.

Record of Decision for the
Joint Actinide Shock Physics Experimental Research Facility
Exemption to DOE O 425.1C, *Startup and Restart of Nuclear Facilities*

On December 21, 2007, I concurred on an exemption for the Joint Actinide Shock Physics Experimental Research (JASPER) Facility that allows JASPER to start operations as a Hazard Category (HC)-3 nuclear facility without completing the set of Operational Readiness Reviews (ORRs) and related activities required by DOE O 425.1C, Startup and Restart of Nuclear Facilities. I granted my concurrence based on several key considerations. First and foremost, I am convinced that the degree of hazard associated with operating this facility is very low. Because of its remote location, there is no hazard to the public from its operation. Worker hazards are controlled by a suite of controls that, while not compliant with requirements for HC-3 nuclear facilities, are consistent with the operations of other gas gun facilities and that have been informed by the lessons learned from operating those facilities.

I recognize that past performance is not a solid indicator of future performance without confirmation of a robust set of quality assurance and safety management processes. However, the startup of this facility as an HC-3 facility does not reflect a shift in operations; rather, it reflects a continuation of activities that have been successfully conducted in this facility for a significant period of time. Furthermore, the contractor intends to perform a limited number of operations (fewer than 25 experiments) for a relatively short period of time (no longer than 12 months). Prior to the resumption of operations at JASPER, both the contractor and the Nevada Site Office will conduct performance-based reviews based on the core requirements of DOE O 425.1C. These reviews will evaluate implementation of the Justification for Continued Operations (JCO) *and the safety management program requirements that define the safety basis and controls for JASPER during the limited period that the JCO is in effect. While not fully compliant with DOE O 425.1C, these reviews will increase confidence that operations conducted during the next 12 months will be safe.*

During the period of this exemption, responsibility for the facility will transition from Lawrence Livermore National Laboratory to National Security Technologies LLC, and a compliant safety basis will be completed. A full set of ORRs will be performed before any additional shots involving HC-3 quantities of material are conducted.

I am convinced that it is acceptable to grant an exemption under these circumstances, but the circumstances are unique and it is unlikely that this decision will be a useful precedent for future potential exemptions to the ORR process.

* * * * * *

Revision of the "NNSA Safety Management Functions, Responsibilities and Authorities Manual" (FRAM)

During the last quarter of 2007, the NNSA Deputy and Associate Administrators, and the Administrator's Senior Advisors embarked on the very important journey to revise the "NNSA Safety Management FRAM." Since publishing the 2005 FRAM, significant changes occurred in the NNSA reporting relationships, in safety authorities and in DOE/NNSA requirements. Thus, a new FRAM was needed to accurately reflect the roles and responsibilities of the current NNSA organization. The Senior Environment, Safety and Health Advisor spearheaded this collaborative effort to ensure that the final product would be usable and provide sufficient information to ensure the flowdown of responsibilities to each NNSA staff. The revised FRAM (NA-1 SD 411.1-1C) was issued on February 15, 2008. It incorporates requirements from new and updated directives; and delineates authorities and responsibilities for safety management within NNSA organizations.

But the journey continues. Since the FRAM helps us remain responsible and accountable for planning, executing and assessing our safety management systems, we will have to continue updating the FRAM so it reflects our current mission needs, new regulatory requirements, and improved oversight strategies.

* * * * * *

Section I. Technical Articles

A. Pantex Plant Scheduled Electrical Outage Summary

The Pantex Site Office and B&W Pantex worked closely together to successfully complete a scheduled plant-wide electrical outage on October 10, 2007. Using a comprehensive plan and formal procedures, B&W Pantex carefully removed and restored power over a five-day period to all of the plant's facilities.

The outage supported the completion of preventive maintenance on the high voltage substations providing all 115KV service to the Pantex Plant as well as the switchgear providing electrical service to the nuclear and high explosive operations areas. After the initial work on the substations and interconnecting switchgear was completed, power was removed from individual circuits, allowing maintenance procedures on facility high voltage components.

The completion of the outage was the result of a two-month planning effort involving Maintenance, System Engineering, Security, Safety and Weapons Facility Management. Increased throughput by the Pantex Plant coupled with advances in the Electrical Safety Program provided the confidence that the work would be completed safely and that the loss of production during the outage would not impact FY08 deliverables supporting Nuclear Weapons Complex commitments.

The Outage Manager, located in the Pantex Plant Emergency Operations Center, directed coordination with Facility Management, Support Operations and Security while maintaining command and control of the outage evolution. The Field Director supervised field operations.

The outage began on the evening of October 5 with the systematic impairment of vital systems and deenergization of facility electrical loads. Complete restoration of electrical service was attained the evening of October 10, one day ahead of the planned schedule.

Extensive pre-outage planning, coupled with safe and professional performance in the field by the B&W Pantex crafts workers, made this project a success. The work was controlled and coordinated with a detailed project management plan that helped coordinate the efforts of the multiple departments at the plant. This project plan helped identify key details to assure nothing was overlooked. Formalized, detailed switching orders and procedures were used to control all aspects of the work. In all, 154 preventive maintenance procedures and 54 corrective maintenance procedures were completed during the outage.

The much-needed maintenance performed on the electrical distribution system will increase reliability of critical systems that support the Nation's defense mission. The comprehensive approach of completing this work at one time will eliminate the historic practice of interrupting weapons operations with shorter outages throughout the year.

Lessons learned from this major evolution were compiled and will be factored into future operations planning. Examples of such lessons learned include the need to evaluate plans for concurrent system operations for potential conflicts (major steam system repairs performed during the electrical outage delayed the restart of facility heating, ventilation and air conditioning equipment in some areas); and, the need to anticipate potential failure of old or obsolete equipment and plan accordingly (one facility back-up generator did not operate reliably during the entire outage period).

Pantex Site Office personnel conducted oversight activities during the five-day field operation. Significant coordination was required by the Facility Representatives, Systems Engineers, Maintenance and Safety Subject Matter Experts to provide coverage of the electrical outage over a holiday weekend.

For further information, contact Scott Dolezal at (806) 477-5248 or by e-mail at sdolezal@pantex.doe.gov.

B. Completion of the First Round of Biennial Reviews

The Chief of Defense Nuclear Safety (CDNS) provides operational awareness information to National Nuclear Security Administration (NNSA) management regarding the safety of nuclear operations. One of the critical elements for obtaining this information and providing subsequent assurance of the effective implementation of DOE and NNSA nuclear safety requirements is a biennial review of site (or NA-10, Defense Programs) nuclear safety performance. The first round of CDNS biennial reviews was completed at the seven nuclear site offices (Savannah River Site Office, Pantex Site Office, Nevada Site Office, Livermore Site Office, Sandia Site Office, Y-12 Site Office, Los Alamos Site Office) and NA-10. Each of the reviews was performed in accordance with the principles of the *Biennial Review of Site Nuclear Safety Performance Protocol*, and a detailed report exists summarizing the results of each review. NNSA Technical Bulletin 2006-04 presented the highlights from the first round of biennial reviews completed in 2006 including Noteworthy Practices and Management Concerns. This article summarizes the results of all the first set of reviews. The article also discusses the approach for the second round of reviews.

The first round of biennial reviews highlighted the importance of a strong self-assessment program. Having a rigorous self-assessment program is invaluable to any learning organization and is required by DOE O 226.1A, *Implementation of Department of Energy Oversight Policy*, for DOE Headquarters and field organizations. Most site offices performed a self assessment to identify areas of weakness prior to the biennial review. The management self-assessments performed by the **Livermore Site Office** and the **Sandia Site Office** were especially noteworthy. At these sites, few additional issues were discovered by the biennial review team. In addition, prior to the review, these site offices had already made significant progress in developing and implementing corrective actions to address the issues identified in their self-assessment. However, the self assessments were performed specifically in preparation for the biennial review, and not as part of a regular self assessment program. As NNSA moves forward with strengthening its federal oversight programs as envisioned by DOE O 226.1A, it is important to keep in mind the importance of a rigorous self-assessment function within each organization, and to incorporate self assessment in a way that does not depend upon the imminence of an external review.

In looking across the broad scope of functional areas and sites evaluated during the first round of biennial reviews, there are a few key areas that stood as being essential areas for improvement within NNSA. In several of these areas a few sites had developed exemplary programs. Corporate efforts should be considered to foster complex-wide continuous improvement in these areas, and should take advantage of the sites where outstanding performance was observed.

- The Safety System Oversight program is one of the most vital oversight programs NNSA has to effect improvements in contractor nuclear safety performance. The Safety System Oversight Program at the **Pantex Site Office (PXSO)** was particularly strong, resulting in a grade of **Exceeds Expectations** in the area of Conduct of Engineering. However, most sites needed improvement to ensure clear roles and responsibilities, adequate staffing, and consistent evaluations of Vital Safety Systems.

- Effective implementation of the Readiness Program is essential to ensure safe startup and restart of Hazard Category 1, 2, and 3 nuclear facilities. The readiness program at the **Y-12 Site Office (YSO)** was exemplary, receiving a grade of **Exceeds Expectations.** In addition, the Savannah River Site Contractor utilized a novel and effective approach to ensuring the readiness of operating procedures prior to the startup of the Tritium Extraction Facility. However, the Departmental directives for Startup and Restart of Nuclear Facilities need improvement to clarify requirements, effectively achieve readiness, and to ensure adequate and consistent training of line and review personnel; most sites displayed implementation weaknesses in these areas. An effort to revise DOE O 425.1C and DOE STD 3006 is underway with the DOE Office of Health, Safety and Security (HSS) as the lead. NNSA is participating in the effort.

- Site office involvement in the implementation and periodic validation of safety basis controls is essential to ensuring that the controls remain consistent with NNSA safety basis expectations. This involvement is typically through effective use of assessments generated by Facility Representatives, Safety System Oversight personnel and Safety Basis personnel. **YSO** and **PXSO** were especially noteworthy in their assessments of safety basis controls.

- A vibrant training program is necessary to ensure a qualified work force, and also to maintain a culture of continuous improvement. Unfortunately, at most NNSA sites, training needs are conformed to available budget rather than the training budget being based on actual training needs. Federal Training roles and responsibilities are not well-defined between Headquarters, the Service

Center, and the site office and are not correlated to the requirements of DOE Directives. Recently, efforts have been taken to accredit the implementation of the Technical Qualification Program at NNSA sites, and **YSO** was successful in obtaining accreditation. Successful accreditation combined with evidence of a robust self assessment program resulted in Federal Training and Qualification not being evaluated at **YSO** as part of the biennial review.

Second Round of Biennial Reviews

The first round of Biennial Reviews of the seven nuclear sites and NA-10 is complete. These reviews were full reviews and established a baseline of nuclear safety performance. The second round of reviews commenced in early December with the PXSO review. The schedule for the second round is provided below. Based on the results of the first round of reviews and the lessons learned in conducting the reviews, the *Headquarters Biennial Review of Site Nuclear Safety Performance Protocol* and generic CRADs are being revised. This revision will describe the process to be used to establish the scope for the follow-on reviews.

The CDNS office will propose a review scope to the site office being reviewed. The proposed scope will take into consideration the results of the previous biennial review, other review results since the last biennial review (HSS, etc.), and any other pertinent nuclear safety activities at the site. This proposed scope will be used to start discussions with site office personnel in order to gain their input on the scope including additions or deletions and reasons for modifications to the proposed scope. These discussions will normally occur during the pre-visit and the results will be documented in the final review CRADs.

Criteria CDNS is considering in proposing the scope include:

- If a previous grade of **Exceeds Expectations** was received in a functional area, this area will not be reviewed during the current review unless there is evidence of degraded performance. The next review will cover this area to ensure at least one comprehensive assessment every four years.

- If a previous grade of **Needs Improvement** was received in a functional area, this area would normally be a full scope review. This area would normally be the only CRAD assigned to a reviewer focused on that area.

- Most, if not all other functional areas will at least be reviewed to follow up on previous review results. This may result in a CRAD with only one or two criteria. One reviewer may review several of these reduced scope CRADs. As with the functional areas exceeding expectations, the next review of these areas will be a complete review to ensure a comprehensive assessment at least once every four years.

- All nuclear safety delegations will be reviewed to revalidate the delegations.

- The process to add or revise nuclear safety directives in contracts will be reviewed to ensure the Central Technical Authority responsibilities are met.

- Criticality safety will be reviewed as appropriate to support the NNSA Criticality Safety Program.

- Special emphasis areas designated by NA-10 and the Site Office Manager. NA-10 participation in each review is anticipated.

- As a result of the first round of reviews, Emergency Management (EM) will not be reviewed during this round. After the second round, EM inclusion will be reconsidered.

NNSA Biennial Review Schedule

Year/Quarter	NNSA Schedule	HSS Schedule
CY08/Q1	Savannah River Site Office	Sandia
CY08/Q2	Nevada Site Office	Y-12
CY08/Q3	Livermore Site Office	
CY08/Q4	Sandia Site Office	
CY09/Q1	Y-12 Site Office	Pantex

For further information, contact Richard Crowe at (301) 903-6214 or by e-mail at richard.crowe@nnsa.doe.gov.

C. Fire Testing of Water-Extended Polyester (WEP)

The Savannah River Site design contractor for the Plutonium Disassembly and Conversion Facility (PDCF) Project, Washington Group International (WGI), proposed the use of water-extended polyester (WEP) and polymethylmethacrylate (PMMA), commonly known as Plexiglas™ in the glovebox design. Plexiglas is commonly used in nuclear handling facilities to shield glovebox operators from radiological exposure. WEP is a polyester resin-water emulsion that is used for neutron shielding.

The high water content, excellent neutron shielding capability, and ease of use make WEP a natural choice for glovebox shielding material. Combustible materials enclosed in metals are typically derated in fire analyses based on the enclosure design. Therefore, a key assumption in the PDCF fire analysis was that a derating of 90% could be applied to metal-clad WEP shielded designs. To investigate the combustibility of the WEP, WGI contracted with the Southwest Research Institute (SwRI) Fire Technology Department in August 2007 to perform three individual fire tests. This article describes the test plan and preliminary test results, and lessons learned.

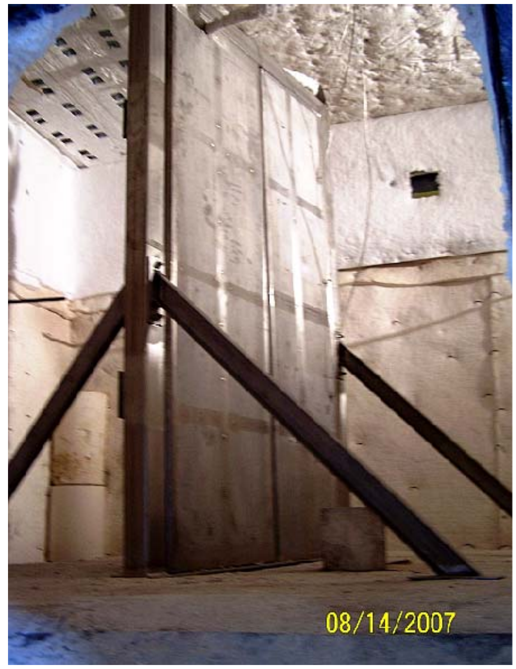


Figure 1: Test 1—Two doors within panel frame, before testing

Test Assemblies

SwRI tested two panels and one glove box constructed of metal-clad WEP. The dimensions of the panels were 88 H x 54 W x 4 inches thick. The panel consisted of two doors, sealed on all sides, installed in a freestanding frame (see Figure 1). The panels contained a layer of lead sheeting one-half inch thick and a layer of WEP 3½ inches thick. To prepare the test panels, borated WEP resin pellets were slowly and carefully mixed with water, poured into the door frame, and then allowed to solidify. Only one door panel within each frame was welded closed.

The glovebox measured 46½ H x 47 W x 39 D inches. The box was placed on legs 34 inches tall for an overall height of 85½ inches. The front, back, and one side, and bottom of the glovebox were constructed of 3½ inches borated WEP and one-half inch lead sheeting sealed within a stainless steel outer cover. The front of the glove box contained a 4-inch thick window composed of ⅛-inch outer safety glass, 1-inch leaded glass, 2½ inches of Plexiglas, and ⅜-inch safety glass on the inside. Four gloved access holes with gloves were present in the window. All of the assemblies were instrumented with thermocouples and pressure transducers.

Temperature Exposure

The test plan specified a fire duration of two hours. Two of the test assemblies were exposed to the elevated temperatures in accordance with the American Society for Testing and Material (ASTM) E 119-07, *Standard Test Methods for Fire Tests of Building Construction and Materials*. The temperature profile of the ASTM E 119 test furnace simulates a room fully engulfed in flames and is used to qualify or determine the fire rating of building materials. For example, a one-hour wall should not show degradation after one hour, a two-hour wall should not show degradation after two hours, and so on. The ASTM E119 test requires that the test chamber rapidly reaches a temperature of 1300°F in 10 minutes. The temperature rises more gradually to a maximum of about 2000°F after 3 hours. To simulate the expected temperature profile of a PDCF room fire, the third test required an initial exposure to the ASTM E119 test until the chamber reached 800°F, that temperature was held steady for two hours.

Test 1—Panel Exposed to 800°F

The instrumented panel was placed upright in the furnace (Figure 1). As the furnace temperature reached 800°F, one door panel expanded and bulged. Five minutes into the test, the internal door pressure was recorded as 42 psi, and WEP began weeping out of penetrations. Material was observed bubbling and burning from the top thermocouple location. Approximately, twenty minutes later, a welded support on the inside of the panel popped, and a small amount of WEP seeped out of the torn weld. About 1 hour into the test, the WEP ignited. Flaming continued for about 30 minutes on the top of the door and on the floor. Combustion ceased near the end of the test.

Test 2—One Panel Door Exposed to ASTM E119 test

Because of the behavior of the sealed door in Test 1, only one door was used to conduct Test 2. No thermocouples were installed, and all openings in the door were sealed to prevent WEP material from free flowing. This included welding shut the holes used for pouring the WEP material into the panel.

Figure 2: Test 2—Single door, after testing

About 11 minutes into the test, the door overpressurized to about 120 psi and bulged. The weld seam on the bottom of the panel split open after 15 minutes (Figure 2). WEP material continued to leak out and burn throughout the duration of the 2-hour test. Approximately 580 lb of WEP and lead were released during the test.

Test 3—Glovebox

Test 3 involved the glovebox, which had one window and was equipped with standard glovebox gloves. Thermocouples were removed from the glove box wall and the openings were welded shut. The pour spout holes on top of the glovebox that was used to pour WEP into the panels were left open to provide relief venting.

One minute into the test, one glove ignites and is quickly consumed. The outer shield safety glass on the window broke off after 4 minutes. The Plexiglas ignited shortly after. WEP or lead bubbled out of the pour spout holes. Within 13 minutes the lead glass layer

Figure 3: Test 3—Glovebox, 42 minutes

failed and flames spread across the face of the glovebox window. After 42 minutes, the test furnace temperature was well above 2,200°F. The Plexiglas, WEP, and lead material burned intensely (Figure 3).

Some Key Observations/Lessons Learned

- Off gassing from unvented WEP over pressurizes the metal cladding to failure.
- Metal cladding failure was not catastrophic (under the test conditions evaluated) and did not eject large quantities of combustible material.
- Venting of metal clad WEP effectively maintains cladding integrity.
- Weight loss (combustibles and water) was approximately 60% in each test.
- Derating assumption for metal-clad WEP must be revised downward.
- Although the gloves ignited quickly, they did not cause the shielding on the windows to fail. Failure of glass barriers is required to involve the PMMA
- The glovebox test does not support derating of windows—appropriate to assume all PMMA (from shielded windows) burns.
- Using materials like WEP and PMMA may challenge the confinement ventilation system, and fire barriers.

Path Forward

As a result of the tests, WGI is enhancing the fire strategy for the PDCF. Enhancements will include material substitution, fire modeling demonstration, and verification of confinement design criteria. WGI will complete the post fire tests examination, perform small scale tests to better characterize the combustibility of WEP, and may consider additional full scale tests.

For further information, contact Sharon Steele at (202) 586-9554 or by e-mail at sharon.steele@nnsa.doe.gov.

Section II. Guidance and Expectations

1. Central Technical Authority Clarification of Dose Calculation Parameters in DOE-STD-5506-2007

On August 30, 2007, the Los Alamos Site Office requested Central Technical Authority (CTA) clarification of the use of the specific breathing rate (BR) of $3.3 \times 10^{-4} m^3/s$ that is specified in DOE-STD-5506-2007, *Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities.* The CTA concurred with this Standard (formerly identified as SAFT-0113) on May 15, 2007, after resolution of comments from NNSA stakeholders. No NNSA comments were provided regarding the BR specified in the Standard.

The Standard specifies the use of $3.3 \times 10^{-4} m^3/s$ as BR in conjunction with dose conversion factors (DCFs) from International Commission on Radiation Protection (ICRP) Publications 72 and 68. The DCFs in ICRP 72 and 68 are based on a model described in ICRP 66. ICRP 66 provides a range of BRs depending on the age and sex of the person and the type of activity being modeled. The BR specified in the Standard had been called into question because it is not specifically listed in ICRP 66. Since the DCFs in ICRP 72 and 68 are based on the ICRP 66 model, a conclusion was drawn that the BR used in dose calculations must be one of the values explicitly used in ICRP 66.

The BR in the Standard represents a weighted average of two BRs in ICRP 66. This average BR is widely used. It is defined and used in ICRP 68 to represent light work: a combination of 2½ hours of rest/sitting and 5½ hours of light exercise, as defined in ICRP 66. This BR is used by DOE in 10 CFR 835, *Occupational Radiation Protection,* for establishing derived air concentrations for worker protection and in its toolbox modeling codes.

The CTA determined that the DCFs documented in ICRP 72 are not explicitly linked to the BRs identified in ICRP 66. Therefore, using a BR that is within the range specified in ICRP 66 and in conjunction with the DCFs in ICRP 72 is acceptable for a member of the public at a similar activity level. Using this criterion, the BR used in the Standard is within the range of BR values given in ICRP 66 and is reasonable for calculating dose to the public, assuming that the activity level being modeled is the same. That is, the BR specified in DOE-STD-5506 is consistent with that in ICRP 72 for calculating public doses. If a higher activity is likely for a member of the public based on the local conditions at the site boundary, it may then be appropriate to use a higher BR within the range provided in ICRP 66 in the dose calculations.

For further information, contact James Poppiti at (301) 903-1733 or by e-mail at james.poppiti@nnsa.doe.gov.

2. Central Technical Authority Concurrence on the HSS Technical Position on the Use of National Consensus and Building Codes

On January 2, 2008, the NNSA CTA joined with other DOE CTAs to concur on the HSS *Technical Position on the Use of National Consensus and Building Codes*. HSS developed technical position, NSEP-TP-2007-1, in response to line organization requests. The position clarifies and provides important guidance on the Department's expectations for using national consensus standards and building codes to meet DOE Order 420.1B, *Facility Safety*. HSS plans to post the position its web page http://www.hss.energy.gov/NuclearSafety/nsps/interpretations.html.

For further information, contact Sharon Steele at (202) 586-9554 or by e-mail at sharon.steele@nnsa.doe.gov.

Section III. Questions and Answers

1. Is a contractor and federal Operational Readiness Review (ORR) required when a facility moves to a higher nuclear hazard categorization?

When a facility moves to a higher hazard category such as from a radiological facility to a hazard category 3 facility or from a hazard category 3 facility to a hazard category 2 facility, this is considered a new startup with respect to DOE O 425.1C. This would require a contractor and federal ORR.

2. A start-up or restart requiring a DOE O 425.1C readiness review is to be conducted. The activity is covered under an existing, approved Documented Safety Analysis (DSA). A new DSA covering this activity has been approved by DOE but not yet implemented. Does the September 27, 2007 letter from the CTA concerning Startup and Restart of Nuclear Facilities require the new DSA be implemented prior to the contractor readiness review?

The answer to this question would depend on whether DOE requires implementation of the new DSA prior to startup or restart of the activity in question. In making this decision, DOE should evaluate changes made to the DSA with respect to this activity to determine if those portions of the new DSA need to be implemented to conduct the activity. Bottom line is the readiness reviews can be conducted under the previous DSA unless DOE requires the new DSA (or parts thereof) be implemented prior to startup or restart. In order to meet the CTA direction, these parts (or all) of the new DSA need to be implemented prior to the contractor readiness review.

For further information, contact Dick Crowe at (301) 903-6214 or by e-mail at richard.crowe@nnsa.doe.gov.

3. ***We have a Hazard Category 2 facility which is treated as two operations; one stores TRU waste, and the other treats low level waste in sufficient quantities to require an allowance for Hazard Category 3 inventories. The storage and treatment operations require different management structure, focus and organization. Segmentation has always been deemed the safest and most efficient approach to managing these facilities, but they do share a common wall. The performance characteristics of this wall are adequate to maintain separation for design basis fires and natural phenomena. The wall will be maintained as a TSR Design Feature. Would this situation be a candidate for exemption from the segmentation requirements in DOE-STD-1027-92? Is it permissible to operate the facility as a Hazard Category 2 waste facility and a Hazard Category 3 low level waste treatment facility?***

   The short answer is yes, the facilities could be operated as you have described, but you would probably need an exemption for reasons discussed below:

   Segmentation Discussion. Technical Bulletin 2006-3 (September, 2006) discussed a situation involving a request for exemption from 10 CFR 830.202(b)(3) relative to facility segmentation. That situation involved the Tritium Facility (B331) at Lawrence Livermore National Laboratory. A proposal existed to segment this Hazard Category 2 facility into two Hazard Category 3 facilities using a physically robust fire wall. The NNSA Central Technical Authority concluded that segmentation of facilities sharing common structural members is not consistent with the provisions of DOE-STD-1027-92. Specifically, common structural members result in dependent structural behavior that may (unless specifically designed to withstand the event) cause both facilities to experience structural damage from common, credible severe phenomenon (e.g., seismic event). However, from a safety perspective, the CTA determined that the approach to "separate" the building into two facilities through the use of a fire barrier, and their subsequent treatment as two facilities provided adequate protection of workers, the public and the environment. Thus, an exemption to the segmentation requirements of DOE-STD-1027-92 was deemed appropriate and ultimately approved.

   Segmentation exemptions can be useful in facilitating efficient management of NNSA nuclear facilities. The principal criteria for approval of such exemptions are twofold. First, safety should not be adversely affected or left open to question. For example, if the segment definition becomes excessively complex, thereby maximizing the potential for either human error or overlooking potential segment interactions, it is inappropriate. Additionally, subdividing one Hazard Category 2 facility into multiple Less Than Hazard Category 3 facilities eliminates the 10 CFR 830 requirements for Documented Safety Analyses (DSAs). Therefore, any such exemption request would necessitate a high burden of proof for approval. The burden of proof is lower for cases where DSA requirements remain in effect (e.g., one Hazard Category 2 facility becomes two Hazard Category 3 facilities).

Second, segmentation exemptions are most appropriate when they yield clear improvements in safety. In the case cited in Technical Bulletin 2006-3, the net effect of segmentation was to divide the facility inventory between two segments separated by a barrier specifically designed to withstand all design basis events in the DSA. Therefore, while a low risk beyond design basis event could still breach the barrier, the planned operating environment was safer than one where no barrier existed and the total facility inventory could be freely collocated.

In the case cited by this question, the Hazard Category 3 segment is a relatively minor contributor to the overall building release potential. Yet, due to the waste processing operations occurring, it provides a greater variety of accident initiator potentials than the high inventory storage activity. Providing clear management separation between these activities and physical separation via a reliable wall that will be maintained as a TSR Design Feature appears to represent a safer configuration. CDNS believes this scenario would be a strong candidate for relief from the segmentation requirements in DOE-STD-1027-92.

For further information, contact Sharon Steele at (202) 586-9554 or by e-mail at sharon.steele@nnsa.doe.gov.

4. In May 2007, HSS issued guidance to supplement DOE-STD-1027-92 and provided a copy to the Defense Nuclear Facilities Safety Board (DNFSB). The supplemental guidance states that the 1E-03 release fraction is appropriate for the typical processing and storage operations historically performed at DOE facilities when determining the Hazard Category (HC) of the facility. We have a storage facility where three fourths of the maximum inventory is distributed in 450,000 gallons of liquid waste, and the remaining fourth is in cement contained in steel drums. Total facility activity is about 4 times the threshold for an HC-2 facility. However, our contractor asserts that, for final categorization, a portion of the inventory could be excluded based on the potential for release. Our contractor also asserts 1E-04 is a better release fraction than 1E-03 because of the material distribution, form, location, and availability of energy sources. Use of this release fraction would result in the facility being categorized as a HC-3. Assuming the contractor's technical arguments are valid and the 1E-04 material dispersal factor is conservative, are we required to use the 1E-03 release fraction specified in the HSS supplemental guidance? A criticality event is not possible for this facility.

The supplemental guidance referred to is a position paper that HSS provided to the DOE and NNSA Central Technical Authorities (CTA) and to the DNFSB. It is not a directive, and the NNSA CTA has not officially promulgated it as constituting NNSA expectations or requirements. The guidance does not fully address situations such as the one you describe. In particular, the supplemental guidance does not address all the reasons for which material could be excluded from analysis for the purposes of final categorization. Consequently, the use of the 1E-03 release fraction specified in the guidance does not constitute an NNSA requirement or expectation. In fact, per DOE-STD-1027, Section 3.1.2, Final Hazard Categorization, it may be appropriate to use a release fraction smaller than 1E-03 (e.g., 1E-04) if justified by the supporting analysis. This analysis would need to take into consideration the physical and chemical form of the material, along with available dispersive energy sources.

The HC-2 threshold values in DOE-STD-1027 are based on the amount of material that, if released, could result in a dose to an on-site individual of 1 rem at 300 meters (paragraph 3, page A-7). The Standard's calculation of the threshold ignored ground contamination as an exposure pathway (see Exposure Pathways, page A-6), and did not consider environmental contamination as a basis for facility categorization. The Standard indicates that final categorization is based on the results of an unmitigated release, which is meant to consider material quantity, form, location, dispersibility and interaction with available energy sources, but not to consider safety features (e.g., ventilation system, fire suppression, etc.) which will prevent or mitigate a release.

There are a number of reasons why a certain subset of material would not be involved in an accident and, therefore, could not be released. The supplemental guidance mentions some, but not all appropriate reasons. To exclude material from final hazard categorization, the contractor would need to perform an assessment of the potential for material release without relying on safety controls. The assessment would have to conservatively demonstrate that the fraction of the material to be excluded could not be released (either into an occupied space within the facility or external to the facility other than into the ground), and that it could not be exposed to an energy source that could cause it to become airborne (resulting in personnel exposure). A large underground storage tank that contains radioactive material and no energetic material or other mechanism for a release is a situation where an appropriate argument might be made to exclude a portion of the material.

If, however, the material in an underground tank is connected through piping to other tanks, the system as a whole needs to be evaluated. Situations can exist where material in an otherwise non-dispersible location and form gets pumped into an area where a fire, explosive or spill dispersal hazard exists, which can complicate the question of how much of the material in the tank can legitimately be excluded during final categorization. This is particularly true for operations that have treatment, processing and storage operations. In situations where criticality was not precluded, the potential for criticality would also have to be evaluated.

For further information, contact Don Nichols at (202) 586-8216 or don.nichols@nnsa.doe.gov; or Patrick Cahalane at (301) 903-2609 or patrick.cahalane@nnsa.doe.gov.

5. ***Our contractor has a Hazard Category 2 nuclear facility that currently operates with a Documented Safety Analysis (DSA) that was developed using DOE-STD-3009, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis. Current plans are to end the facility's mission over the next 5 years and to initiate deactivation and decommissioning. There is no follow-on mission for this facility other than clean-up. For the remaining life of this facility, the contractor does not want to maintain the DOE-STD-3009-compliant***

DSA, but wants instead to maintain a DSA that is compliant with DOE-STD-3011-2002, Guidance for Preparation of Basis for Interim Operation (BIO) Documents, based on the allowance in Table 2 of the Nuclear Safety Management Rule (10 CFR 830) for developing DSAs for facilities with short remaining operational lives. The problem is, although we don't think that full compliance with DOE-STD-3009 is necessary to safely operate the facility, we don't feel comfortable with the minimum requirements of DOE-STD-3011-2002. Is there something we can require in between? Would requiring less than full compliance with DOE-STD-3009 but more than DOE-STD-3011-2002 need approval as an alternate methodology to satisfy 10 CFR 830?

The 'safe harbors' listed in Table 2 of 10 CFR 830.207 for developing a DSA provide methods that are acceptable to comply with the minimum requirements of the Rule. For a nuclear facility for which there is a short remaining operational period before ending the facility's mission and initiating deactivation and decommissioning (less than 5 years according to DOE-STD-3011-2002) and for which there are no intended additional missions other than cleanup, the Rule allows the use of DOE-STD-3011-2002.

However, as with all of the Rule requirements, complying with the methodology requirements is necessary but not always sufficient to ensure adequate safety for a particular operation. The approval authority for the DSA is responsible to ensure that the resulting DSA and Hazard Controls provide an adequate basis for safely operating the facility. It is well within the prerogative of the approval authority to determine that additional content is necessary beyond that included in whatever safe harbor methodology is chosen.

Assuming that the 5-year schedule is realistic, the requirements of the Rule would be met by a safety analysis developed using the guidance in DOE-STD-3011-2002. The approval authority may also require the contractor to include some of the sections discussed in DOE-STD-3009 but not required to comply with DOE-STD-3011-2002. Including those sections goes above and beyond the minimum requirements of the Rule; since the requirements of the Rule are met, approval of an alternate methodology is not necessary.

For further information, contact Patrick Cahalane at (301) 903-2609 or by e-mail at patrick.cahalane@nnsa.doe.gov.