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From: Steele, Sharon [Sharon.Steele@nnsa.doe.gov]
Sent: Tuesday, April 08, 2008 4:46 PM
To: Rex Wescott
Subject: FW: Quarterly NNSA Technical Bulletin, December 07
Attachments: Clear Day Bkgrd.JPG; NATB 2007-04.pdf

Rex
Go to page 10 of the attached bulletin. This might answer all your concerns. I wrote the article, so call me if you need more info.
Sharon

From: Megary, Sue
Sent: Monday, March 17, 2008 7:49 PM
To: Arkin, Richard; Ascanio, Xavier; Balke, Katherine N; Brunell, Donald C; Cahalane, Patrick; Chen, Frank; Cramberg, Rosemary; Crandall, David; Crowe, Richard; DAgostino, Thomas; Davis, Kimberly A; Erhart, Steven (PANTEX); Glenn, Dan; gossje@yso.doe.gov; Hardwick, Ray; James Liverman; Talbot, Gerald; Williams, Alice; Winchell, Donald; Christenbury, Glenn; croweds@yso.doe.gov; 'Doug Dearolph'; JeffreyK@dnfsb.gov; Karney, Catherine (KCSO); Kozak, Peter (SRS); Sherry, Theodore (Y-12); timothyd@dnfsb.gov; Underwood, Jefferson; Wagner, Patty; White, William; Wilson, Bruce-W. (SRS); Wu, Paul; Yuan-Soo Hoo, Camille; Zamorski, Michael; Evans, Timothy; Lagdon, Chip; Lewis, Roger; McConnell, James; McKamy, Jerry; Megary, Sue; Nichols, Don; Ostendorff, Bill; Pace, Lawrence; Peoples, Denise; Poppiti, James; Pyatt, David; Rodriguez, Eugene Gene; Russo, Frank; Schlapper, Gerald; Schoenbauer, Martin; Singh, Rabindra; SMaez@doeal.gov; Steele, Christopher; Steele, Sharon; Taylor, Steve (KCSO); Thompson, Michael; Tomlinson, Kelly
Cc: King, Robert F; Kuklova, Olga; Merchant, Elaine; Schlapper, Gerald
Subject: Quarterly NNSA Technical Bulletin, December 07

Please find attached NNSA Technical Bulletin for December 07. It is posted on the NNSA HQ Intranet: http://hq.na.gov and through the Service Center website: http://nnsaweb.na.gov

If you have any questions, you can call me. I am happy to add others to this distribution, if it is helpful in any way.

Thanks.

Sue

Sue A. Megary
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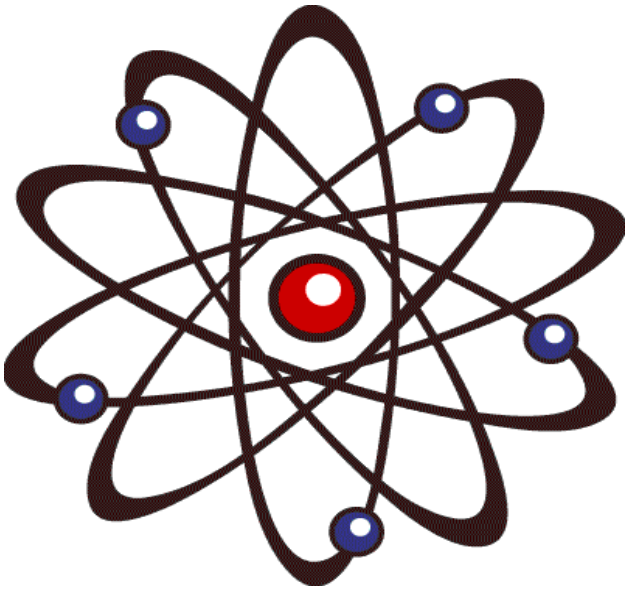

DECEMBER 2007

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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) <u>including</u> 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.

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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.

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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.

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