

A.J. Eggenberger, Chairman
Joseph F. Bader
John E. Mansfield
R. Bruce Matthews

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700 Washington, D.C. 20004-2901
(202) 694-7000



September 14, 2005

The Honorable J. Clay Sell
Deputy Secretary of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Mr. Sell:

The Defense Nuclear Facilities Safety Board (Board) has noted some instances of reduced rigor in the selection of readiness review processes for defense nuclear facilities. Such reduced rigor also affects the application of design requirements and preparation of safety documents. One cause for this situation appears to be inconsistent interpretation and implementation of rules and orders that apply to new Hazard Category 1, 2, and 3 nuclear facilities and major modifications to existing nuclear facilities. In the cases noted by the Board, some sites have used nonconservative interpretations that can lead to less vigorous readiness reviews and omission of required Department of Energy (DOE) reviews of design and safety documentation.

The Board recently conducted a detailed review of both DOE and contractor procedures at several sites to assess the implementation of the requirements of DOE Order 425.1C, *Startup and Restart of Nuclear Facilities*. In the course of this review, the Board noted that some requirements have been misinterpreted. Of particular concern is a practice whereby new Hazard Category 2 nuclear facilities have been considered to be modifications instead of new facilities. In some cases, the new facilities have even been considered less-than-substantial modifications. This determination leads to a less rigorous readiness review for the facility (e.g., a contractor Readiness Assessment instead of an Operational Readiness Review). This determination can also lead to the omission of nuclear safety requirements in Title 10, Code of Federal Regulations, Part 830 (10 CFR 830), *Nuclear Safety Management*, Subpart B, "Safety Basis Requirements," and design requirements in DOE Order 420.1A, *Facility Safety*.

The misinterpretation hinges primarily on the definition of a "new Hazard Category 1, 2, or 3 nuclear facility," as discussed in all three directives. A closely related shortcoming stems from nonconservative interpretations of what constitutes a "substantial process, system, or facility modification" (from DOE Order 425.1C), a "major modification . . . that substantially changes the existing safety basis" (from 10 CFR 830), and a modification that "significantly degrades the approved safety basis for the facility" (from DOE Order 420.1A).

Regarding shortcomings in selecting the proper readiness review, the Board has noted similar difficulties in the past, as discussed in a letter dated August 26, 1999. Although DOE and its contractors took some corrective actions in response, it is apparent that additional problems have surfaced.

Detailed observations are presented in the enclosed report. The Board believes DOE needs to take prompt action to address the inconsistent implementation of requirements related to startups, restarts, safety basis documents, and facility design. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report from DOE within 90 days of receipt of this letter on the following issues:

- The adequacy of local DOE and contractor implementation procedures for DOE Order 420.1A, DOE Order 425.1C, and 10 CFR 830, Subpart B, with particular focus on the definition of a “new Hazard Category 1, 2, or 3 nuclear facility,” and “substantial modification.”
- The actions necessary to ensure that any deficient site procedures are corrected and that site contractors appropriately apply design requirements, develop Preliminary Documented Safety Analyses, and perform Operational Readiness Reviews for new Hazard Category 1, 2, and 3 nuclear facilities as required.
- The need for revision or clarification of the definition of a “new Hazard Category 1, 2, or 3 nuclear facility” and/or “substantial modification” within the DOE directives system.

If you have any questions on these matters, please contact me.

Sincerely,



A. J. Eggenberger
Chairman

c: The Honorable Linton F. Brooks
Mr. Thomas P. D'Agostino
Mr. James Rispoli
Mr. Jeffrey M. Allison
Mr. Keith A. Klein
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

July 18, 2005

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: D. G. Ogg

SUBJECT: Requirements for New Nuclear Facilities and Major Modifications

The staff of the Defense Nuclear Facilities Safety Board (Board) has noted some instances in which contractor personnel have been inconsistent in applying the definitions of a “new nuclear facility” and a “substantial modification” to an existing nuclear facility or process. The definitions of these terms directly affect three aspects of nuclear facility safety: determination of the level of startup review, determination of the formality of the safety basis, and application of formal design requirements.

Level of Startup Review. The Department of Energy (DOE) Order 425.1C, *Startup and Restart of Nuclear Facilities*, Attachment 1, *Contractor Requirements Document*, contains a straightforward requirement [4.a.(1)(a)] that contractors conduct an Operational Readiness Review (ORR) for the initial startup of a new Hazard Category 1, 2, or 3 nuclear facility.

DOE Order 425.1C and accompanying DOE Standard 3006-2000, *Planning and Conduct of Operational Readiness Reviews*, define nuclear facilities as “activities or operations that involve radioactive and/or fissionable materials in such form and quantity that a nuclear hazard potentially exists to the employees or the general public.” Although the requirement to perform an ORR is straightforward, certain contractors have applied an interpretation that allows a new nuclear facility to be considered a modification to an existing process, system, or facility, and in extreme cases, a less-than-substantial modification. If a new nuclear facility is determined to be a less-than-substantial modification, contractor personnel may then choose a form of readiness determination that is less rigorous than an ORR.

Example 1—At the Savannah River Site, both DOE and contractor procedures contain guidance that contributes to an interpretation of the startup requirements that is less than conservative. The Westinghouse Savannah River Company (WSRC)12 Q Manual, *Assessment Manual*, does not adequately define a new facility to distinguish it from a modification, nor does it explicitly require an ORR for a “new Hazard Category 1, 2, or 3 nuclear facility” as defined in DOE Order 425.1C. Instead, the procedure provides general guidance in an attachment. Although the guidance addresses new nuclear facilities, it does not require project managers to choose an ORR as the review process for these new facilities. In some cases, project managers have recommended lesser startup reviews (e.g., Readiness Assessments).

In contrast, contractors at several other sites have implemented procedures or screening checklists that are not merely provided as guidance, but are required for determining the level of startup review. The first question in these screening checklists is: "Does the activity require the startup of a new Hazard Category 2 or 3 system, process or operation?" A positive answer to this question requires that an ORR be conducted; no further screening is required. As an example, the Y-12 National Security Complex (Y-12) checklist, UCN-21058, *Review Level Determination*, employs this approach. The Board's staff believes this is a proper means of implementing the requirements of DOE Order 425.1C relative to new facility startups.

When making a readiness determination, WSRC managers are allowed under their procedure to consider whether a new facility or activity can be categorized as a "substantial facility modification." In a note within the WSRC procedure, "substantial modification" is defined as follows:

Substantial modification shall normally be defined as changes that modify the fundamental process, increases [sic] the bounding risk already approved by DOE for the activity, or exceeds [sic] \$100M in costs (major project). For determination of increased risk, no new controls (engineered and administrative) shall be included in the new accident evaluation unless the control strategy is extremely simplistic or nearly identical to already existing controls.

This definition also exists in the local DOE site procedure, SRIP [Savannah River Implementing Procedure] 400, Chapter 425.1, *Nuclear Facility Startup Approval Process*. By applying this definition, site personnel may conclude that a new nuclear facility or activity is not a new facility but a modification. Furthermore, they may conclude that the new facility or activity is not even a substantial modification to a nuclear facility.

The WSRC startup procedure and definition of "substantial modification" are problematic in two areas:

- In DOE Order 425.1C, Section 4.a.(1)(e) applies to the "restart of hazard category 1 and 2 nuclear facilities after substantial process, system, or facility modifications." However, WSRC is applying the definition to new activities or facilities for which "restart" is not applicable. The proper determination from the Order is to conduct an ORR for the initial startup of a new Hazard Category 1, 2, or 3 nuclear facility.
- The WSRC procedure introduces the use of cost as a measure for applying safety requirements. DOE Order 425.1C does not recognize the cost of a project as having any bearing on the hazard it poses.

The Board's staff notes that this definition of a substantial modification exists, verbatim, in procedure Y15-190, *Readiness Manual*, at the Y-12 National Security Complex (Y-12), and believes it ought to be removed or modified at both the Savannah River Site and Y-12. It appears, however, that this definition may not directly affect the readiness determination process at Y-12 because it is included as general guidance in Y-12's *Readiness Manual*. The *Readiness Manual* refers facility managers to the checklist, UCN-21058, *Review Level Determination*,

which properly directs that an ORR be selected for the restart of Hazard Category 2 nuclear facilities after substantial modifications.

Example 2—At the Hanford Site, guidance on startup readiness provided in Fluor-Hanford procedures provides ambiguous direction concerning readiness reviews. Procedure HNF-PRO-055, *Startup Readiness*, contains instructions to contractor personnel for preparing a facility or activity for startup. In Section 4, which includes the citation of DOE requirements, and in Appendix A, “ORR and RA [Readiness Assessment] Requirements Table,” the procedure correctly identifies the requirement to conduct an ORR for the initial startup of a new nuclear facility and for restart following substantial modifications. However, in Section 5.1, *Startup Review Determination*, the procedure provides conflicting guidance. This section gives project personnel step-by-step instructions for making a determination regarding the level of readiness review necessary for a new or modified nuclear facility or activity. Here, project managers are given an option not recognized by DOE Order 425.1C. The procedure states:

Implementation of a safety basis change that supports an activity determined to be subject to a Readiness Assessment or Operational Readiness Review may be excluded from startup review when using the implementation validation review (IVR) process of HNF-PRO-8317, *Safety Basis Implementation and Maintenance*. In this case, the IVR process incorporates the rigor, scope, and requirements of this procedure to validate the safety basis changes. When properly performed, the IVR process may allow a subsequent readiness assessment be [sic] performed in lieu of an operational readiness review at the time an activity is to commence.

This guidance appears to be intended to apply to implementation of changes to the safety basis, but in practice has been used by project managers at the Hanford Site to recommend an IVR followed by a contractor Readiness Assessment, in lieu of an ORR, for the startup of a new Hazard Category 2 nuclear activity. For example, this approach was recommended for the Hose-in-Hose Transfer Line at the K-Basin Closure Project—a new Hazard Category 2 activity with new hazards, new safety-significant equipment, and new Technical Safety Requirements.

In the example cited, the DOE Richland Operations Office did not accept the contractor’s recommendation and directed the contractor to conduct an ORR. However, the Board’s staff believes that the contractor procedure allowing the alternative approach is inappropriate.

Staff Observations—The staff believes the intent of DOE Order 425.1C is clear—that the formality and thoroughness of an ORR are required for new Hazard Category 1, 2, and 3 nuclear facilities and for substantial process, system, or facility modifications. Although contractors sometimes conduct a Readiness Assessment with a rigor approaching that of an ORR, more often they apply a much less rigorous approach. The many differences in requirements for an ORR and a Readiness Assessment, particularly the required breadth of an ORR, are detailed in DOE Order 425.1C and DOE Standard 3006-2000. Because of inconsistent interpretations at some sites, the staff believes DOE may need to clarify what is meant by a “new nuclear facility” and a “major modification” so as to facilitate a more consistent application of the DOE requirements.

Formality of the Safety Basis. The staff reviewed site procedures used to implement the requirements of Title 10, Code of Federal Regulations, Part 830 (10 CFR 830), *Nuclear Safety Management*, Subpart B, “Safety Basis Requirements.” At nearly all sites, the implementing procedures properly cite the definition of a “major modification” as one that would substantially change the existing safety basis of a facility. The site procedures direct that a Preliminary Documented Safety Analysis (PDSA) be developed for such modifications. At some sites, the procedures recognize that there may need to be some discussion regarding what constitutes a “major modification,” and in these cases, the procedure directs the contractor to consult with the DOE/National Nuclear Security Administration startup authority.

At some sites, however, a “facility” is considered to comprise many buildings, activities, and operations in a large geographic area. The safety basis for each of these groupings consists of one DSA. In practice, when a new building or activity is proposed, project managers do not consider the new building or activity a “new nuclear facility,” but instead screen it to determine whether it is a major or a minor modification. In some cases, project managers determine that a new building or activity is a minor modification and therefore does not meet the requirement for development of a PDSA. Instead, they may direct site analysts to use a less-formal safety basis, such as a Consolidated Hazards Analysis.

When contractor analysts develop a safety basis that is less rigorous than a PDSA, they may omit many of the requirements of 10 CFR 830, Subpart B, including the following:

- Section 830.206, “Preliminary Documented Safety Analyses,” which states that the contractor must obtain DOE approval of the PDSA before the contractor can procure materials or components or begin construction (with some exceptions).
- Section 830.207, “DOE Approval of the Safety Basis,” which requires DOE to review and approve the safety basis and issue a safety evaluation report prior to operation of the new facility or modification.
- Appendix A, Section F, “Documented Safety Analysis,” which elaborates that by issuing a PDSA, the contractor can ensure that substantial costs and time are not wasted in constructing a nuclear facility that will not be acceptable to DOE.

Design Requirements. Although the staff did not review site-specific guidance pertaining to facility design, the same issue regarding the definitions of new facilities and major modifications applies in the design arena as well. DOE Order 420.1A, *Facility Safety*, stipulates that the contractor must follow the requirements of the Order for the “design and construction of new DOE nuclear facilities and of modifications to existing DOE Hazard Category 1, 2, and 3 non-reactor nuclear facilities when the proposed modifications significantly degrades [sic] the approved safety basis for the facility.” The design requirements of DOE Order 420.1A are usually more stringent than the requirements to which the existing facilities were built. Consequently, building a new facility (or a major modification to an existing facility) using the old design requirements would not meet DOE’s safety expectations. The staff believes it would be appropriate for DOE managers to review site procedures used to implement these requirements to ensure that the definitions and interpretations of “new facility” and “modification” are properly applied.