DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

October 29, 2010

The Honorable Steven Chu
Secretary of Energy
U. S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Chu:

On October 29, 2010, the Defense Nuclear Facilities Safety Board (Board), in accordance with 42 U.S.C. § 2286a(a)(5), unanimously approved Recommendation 2010-1, *Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers*, which is enclosed for your consideration.

After you have received this Recommendation and as required by 42 U.S.C. § 2286d(a), the Board will promptly make it available to the public. The Board believes that this Recommendation contains no information that is classified or otherwise restricted. To the extent that this Recommendation does not include information restricted by the Department of Energy (DOE) under the Atomic Energy Act of 1954, 42 U.S.C. §§ 2161-2168, as amended, please arrange to have it placed promptly on file in your regional public reading rooms. The Board will also publish this Recommendation in the *Federal Register*.

The Board will evaluate DOE's response to this Recommendation in accordance with the Board's Policy Statement 1, *Criteria for Judging the Adequacy of DOE Responses and Implementation Plans for DNFSB Recommendations*.

Sincerely,

Peter S. Winokur, Ph.D.
Chairman

Enclosure

c: Mrs. Mari-Jo Campagnone

RECOMMENDATION 2010-1 TO THE SECRETARY OF ENERGY
Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers
Pursuant to 42 U.S.C. § 2286a(a)(5)
Atomic Energy Act of 1954, As Amended

Dated: October 29, 2010

Background

The Department of Energy's (DOE) nuclear safety regulations were developed as a result of a mandate by Congress in the Price Anderson Act Amendments of 1988. These regulations now appear in Parts 820, 830, and 835 of Title 10 in the Code of Federal Regulations (CFR). In this Recommendation, the Defense Nuclear Facilities Safety Board (Board) addresses recent changes in DOE's "interpretation" of certain critical provisions of Title 10 CFR Part 830, *Nuclear Safety Management* (10 CFR Part 830), provisions that are intended to provide adequate protection of public health and safety. As explained below, in the Board's view this revised interpretative posture weakens the safety structure the rule is designed to hold firmly in place.

10 CFR Part 830 imposes a requirement that a documented safety analysis (DSA) is to be prepared for every DOE nuclear facility. This DSA, once approved by DOE, forms the regulatory basis for safety of the facility or operation. 10 CFR Part 830 does more, however: its Appendix A provides "safe harbors" for the preparation and approval of DSAs. These safe harbors are, in the main, references to detailed guidance issued by DOE. A DSA that is prepared following applicable guidance found in safe harbors should be found acceptable, meaning that the facility's safety systems are adequate to protect public health and safety from nuclear hazards.

One of the key safe harbor guides for the preparation of DSAs is DOE Standard 3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*.[1] First issued in July of 1994, this Standard was intended to provide guidance on meeting the requirements imposed by DOE Order 5480.23, *Nuclear Safety Analysis Reports*, a set of nuclear safety requirements that preceded and were supplanted by 10 CFR Part 830. The Standard stated that "Technical Standards, such as this document, support the guides by providing additional guidance into how the requirements [of Orders and Rules] should be met." As such, it did not contain any nuclear safety requirements. Five years after its initial issuance, DOE amended Standard 3009-94 by the addition of Appendix A, currently entitled "Evaluation Guideline." The guideline applies a dose criterion to the results of accident calculations found in DSAs. Stated broadly, the Standard mandates that safety class systems, structures, and components (SSCs) be installed if in a potential accident the unmitigated dose consequence calculations for a release scenario at the site boundary approach the Evaluation Guideline numerical value. The Evaluation Guideline value established in DOE-STD-3009-94 Appendix A is 25 rem Total Effective Dose Equivalent (TEDE). The Standard further states that although

[1] When DOE issued Change Notice 2, the title of this Standard was revised to *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

25 rem is not considered an acceptable public exposure, it is generally accepted as a value indicative of no significant health effects.

When 10 CFR Part 830 was promulgated in final form in early 2001, the version of DOE Standard 3009-94 incorporated into Appendix A of the rule as a safe harbor included the Evaluation Guideline. This combination of the rule's requirement for an approved DSA and the application of the Evaluation Guideline of DOE Standard 3009-94 formed the basis upon which adequate protection of the public health and safety would be gauged. Whenever dose consequence calculations showed that an accident scenario would result in offsite doses approaching 25 rem TEDE, the expectation was that safety related SSCs would function as designed, ensuring that public doses would never exceed a small fraction of the Evaluation Guideline.

Developments Since 2001

As a safe harbor for 10 CFR Part 830, the Evaluation Guideline described in DOE Standard 3009-94 has been enforced and met for the majority of DOE's defense nuclear facilities, assuring adequate protection of the public, workers, and the environment. However, in December 2008, the National Nuclear Security Administration (NNSA) approved a DSA for the Plutonium Facility at Los Alamos National Laboratory that represented a significant departure from the accepted methodology, as discussed in the Board's Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*. The Board followed up its Recommendation with a letter to the Deputy Secretary of Energy on March 15, 2010, that sought to determine whether DOE's current interpretation of 10 CFR Part 830 and DOE Standard 3009-94 still supports the principles of providing adequate protection of the public, workers, and the environment from the hazards of operating DOE's defense nuclear facilities. The Board's letter particularly expressed concern regarding the appearance that DOE's present interpretation is that the nuclear safety Evaluation Guideline established in DOE Standard 3009-94 does not have to be met.

DOE's June 10, 2010, response to the Board's letter states that DOE's utilization and implementation of DOE Standard 3009-94 has not changed since issuance of 10 CFR Part 830. DOE's response observes that DOE Standard 3009-94 "was not written as a prescriptive item-by-item requirements document; rather it provides an overall approach and guidance for preparing a DSA." DOE's response states that the Standard describes steps that the contractor may take if the postulated accident consequences cannot be mitigated below the Evaluation Guideline. DOE's response also cites guidance for DOE approval authorities contained in DOE Standard 1104-2009, *Review and Approval of Nuclear Facility Safety Basis and Safety Design Basis Documents*, and notes that the Safety Basis Approval Authority may prescribe interim controls and planned improvements if the Evaluation Guideline is exceeded. DOE's response closes by stating that its managers "are expected to carefully evaluate situations that fall short of expectations and only provide their approval of documented safety analyses when they are satisfied that operations can be conducted safely..., that options to meet DOE expectations have been evaluated, and that adequate commitments to achieve an appropriate safety posture in a timely manner have been made."

The lack of definitive statements in DOE's June 10, 2010, response illustrates the difficulties inherent in applying a guidance document as a safe harbor for implementing the requirements of a regulation. Furthermore, NNSA's approval of the DSA for the Los Alamos National Laboratory's Plutonium Facility in December 2008 demonstrates that, despite DOE's stated expectations, it is not always true that DOE's managers will ensure safety by imposing conditions of approval that address inadequacies in the safety basis. This is illustrated to a lesser extent at the other NNSA facilities—described in follow-up correspondence NNSA issued to the Board on June 30, 2010—which have not implemented controls or compensatory measures sufficient to reduce accident consequences below the Evaluation Guideline. DOE Standard 1104-2009 serves as a source of guidance for DOE Safety Basis Approval Authorities, but it, too, is a guidance document, unequivocally stating, "This Standard does not add any new requirements for DOE or its contractors."

DOE's standards-based regulatory system needs a clear and unambiguous set of nuclear safety requirements to ensure that adequate protection of the public, workers, and the environment is provided. Further, it is imperative that DOE provide clear direction to its Safety Basis Approval Authorities to ensure that, if nuclear safety requirements cannot be met prior to approval of a DSA, DOE imposes clear conditions of approval for compensatory measures for the short term and facility modifications for the longer term to achieve the required safety posture. This acceptance of risk and commitment to future upgrades must be approved at a level of authority within DOE that is high enough to control both the resources needed to accomplish the upgrades as well as the programmatic decision-making involved in determining that the risk of continuing operations is offset by sufficiently compelling programmatic needs.

Item 4 of the Recommendation below deserves a further word of explanation. The Board does not recommend lightly a change to DOE's nuclear safety regulations. But as explained above, DOE has chosen over the past several years to drift away from the principles that underlay the rule as originally intended. The Board has chosen to recommend a rule change because this action would tend, in the long run, to prevent future shifts in DOE safety policy that would once again have to be challenged and argued against. For these reasons, the Board recommends that the nuclear safety rule, 10 CFR Part 830, be amended as stated below.

Recommendation

Therefore, the Board recommends that DOE:

1. Immediately affirm the requirement that unmitigated, bounding-type accident scenarios will be used at DOE's defense nuclear facilities to estimate dose consequences at the site boundary, and that a sufficient combination of SSCs must be designated safety class to prevent exposures at the site boundary from approaching 25 rem TEDE.

2. For those defense nuclear facilities that have not implemented compensatory measures sufficient to reduce exposures at the site boundary below 25 rem TEDE, direct the responsible program secretarial officer to develop a formal plan to meet this requirement within a reasonable timeframe.

3. Revise DOE Standard 3009-94 to identify clearly and unambiguously the requirements that must be met to demonstrate that an adequate level of protection for the public and workers is provided through a DSA. This should be accomplished, at a minimum, by:

   a. Clearly defining methodologies and providing acceptability criteria for controls, parameters, processes, analytical tools, and other data that should be used in preparation of a DSA,

   b. Delineating the criteria to be met for identification and analyses of an adequate set of Design Basis Accidents (for new facilities), or Evaluation Basis Accidents (for existing facilities),

   c. Providing criteria that must be met by the safety-class SSCs to (i) mitigate the consequences to a fraction of the Evaluation Guideline, or (ii) prevent the events by demonstrating an acceptable reliability for the preventive features, and

   d. Establishing a process and path forward to meeting (a) through (c) above through compensatory measures and planned improvements if the DSA cannot demonstrate compliance.

4. Amend 10 CFR Part 830 by incorporating the revised version of DOE Standard 3009-94 into the text as a requirement, instead of as a safe harbor cited in Table 2.

5. Formally establish the minimum criteria and requirements that govern federal approval of a DSA, by revision to DOE Standard 1104-2009 and other appropriate documents. The criteria and requirements should include:

   a. The authorities that can be delegated, the required training and qualification of the approval authority, and the boundaries and limitations of the approval authority's responsibilities,

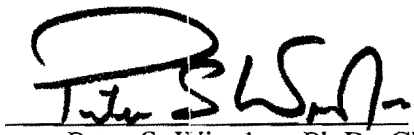
   b. Actions to be taken if conditions are beyond the delegated approval authority's specified boundaries or limitations,

   c. The organization or the individual who can approve a DSA that is beyond the delegated approval authority's specified boundaries or limitations,

   d. The regulatory process that must be followed if conditions are beyond the delegated approval authority's specified boundaries or limitations, and any compensatory actions to be taken, and

   e. The criteria an approval authority must use to quantify the acceptance of risk for continued operations when offsite dose consequences approach the Evaluation Guideline.

6. Formally designate the responsible organization and identify the processes for performing oversight to ensure that the responsibilities identified in Item 5 above are fully implemented.



Peter S. Winokur, Ph.D., Chairman