



**The Secretary of Energy**  
Washington, D.C. 20585

November 3, 2009

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The Honorable John E. Mansfield  
Vice Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, NW, Suite 700  
Washington, DC 20004-2941

Dear Mr. Vice Chairman:

The Department of Energy (DOE) acknowledges receipt of the Defense Nuclear Facilities Safety Board (Board) Recommendation 2009-1, *Risk Assessment Methodologies at Defense Nuclear Facilities*, issued on July 30, 2009, and published in the Federal Register on August 12, 2009.

We appreciate the Board's insights on how DOE can better define and use quantitative risk assessment methodologies to support DOE's primary deterministic approach for ensuring nuclear safety. DOE accepts Board Recommendation 2009-1 and will implement it as described in the enclosed Implementation Plan.

I have assigned Mr. Andrew Wallo, III, Deputy Director, Office of Nuclear Safety, Quality Assurance and Environment, Office of Health, Safety and Security, to be the Department's Responsible Manager for developing the Implementation Plan. He can be reached at (202) 586-4996.

Sincerely,

A handwritten signature in black ink, appearing to read "Steven Chu".

Steven Chu

Enclosure



Enclosure

# U. S. Department of Energy

## **Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2009-1**

### *Risk Assessment Methodologies at Defense Nuclear Facilities*



**Washington, DC 20585**

**September 2009**

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## **1.0 PURPOSE**

The purpose of this Implementation Plan (IP) is to specify Department of Energy (DOE) actions for addressing Defense Nuclear Facilities Safety Board (Board or DNFSB) Recommendation 2009-1, *Risk Assessment Methodologies at Defense Nuclear Facilities*. The plan includes a research effort, the results of which, coupled with ongoing DOE activities will ensure that the Department, where appropriate, takes full advantage of the available risk assessment tools for nuclear safety applications at defense nuclear facilities while continuing to maintain a high quality integrated safety culture and an excellent safety record. The process in the IP will also identify and use DOE lessons learned and industry and government agencies best practices related to use of quantitative risk assessment. The actions in this plan will enhance DOE-wide understanding of DOE's current policy and requirements related to use of quantitative risk assessment in nuclear safety applications for defense nuclear facilities; determine if and what changes should be made regarding the policy, requirements, guidance or oversight; and initiate any necessary changes.

## **2.0 BACKGROUND**

The Board issued Recommendation 2009-1 on July 30, 2009, which identified "the need for adequate policies and associated standards and guidance on the use of quantitative risk assessment methodologies at DOE's defense nuclear facilities."

The Board identified four specific recommendations.

1. Establish a policy on the use of quantitative risk assessment for nuclear safety applications.
2. Consistent with this policy, establish requirements and guidance in a DOE directive or directives that prescribe controls over the quality, use, implementation, and applicability of quantitative risk assessment in the design and operation of defense nuclear facilities.
3. Evaluate current ongoing uses of quantitative risk assessment methodologies at defense nuclear facilities to determine if interim guidance or special oversight is warranted pending the development of formal policy and guidance.
4. Establish a requirement to identify deficiencies and gaps in ongoing applications of quantitative risk assessment along with the additional research necessary to fill those gaps in support of the development and implementation of the final policy and guidance.

The DNFSB issued Recommendation 2009-1 because it believed that without a risk assessment policy and associated requirements and guidance, DOE does not have sufficient basis to accept the validity of the results from any quantitative risk assessments it performs for defense nuclear facilities. The Board stated that this is particularly

important since the managers of DOE's field elements are allowed to accept the safety risks that high-hazard operations may pose toward workers and the public, based on what the Board perceives as widely varying levels of rigor in quantitative risk assessments.

As identified in the Board's letter, the Department, in some cases, does utilize elements of risk assessment techniques as part of the development of safety bases for nuclear facilities and in support of decisions related to the upgrade of its facilities. However, as observed by the Board, DOE's predominant approach to managing safety relies on hazard-based deterministic analyses that are required by DOE nuclear safety directives and rules. Although DOE does not have a policy or requirements specifically focused on the use of quantitative risk assessment for nuclear safety applications, DOE does have a policy, requirements and standards that permit DOE to appropriately manage and control risk assessments used by the Department.

The requirements in DOE nuclear safety-related directives are guided by DOE's existing *Nuclear Safety Policy*, Secretary of Energy Notice (SEN) 35-91, and provide a deterministic approach for performing hazards analysis at DOE's nuclear facilities and selecting hazards controls to provide reasonable assurance of adequate protection of the public. The SEN establishes the Department's high-level nuclear safety policies and, although it contains risk goals and permits the use of risk analyses to support DOE decisions, it clearly states that they are not substitutes for compliance with DOE requirements. DOE-Standard (STD)-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis*, (the "safe harbor" for compliance with Code of Federal Regulations (CFR) Title 10, Part 830, *Nuclear Safety Management*, Subpart B, provides clear direction on the analyses that are required to support safety basis decisions and plainly states that the Department's approach does not require or expect the level of detail analysis necessary for a quantitative or probabilistic risk assessment. Furthermore, as identified in the Board's Recommendation, when quantitative risk assessment techniques are used to support nuclear safety applications, they are subject to the quality assurance requirements specified in CFR Title 10, Part 830, *Nuclear Safety Management*, Subpart A. This is also the case for all engineering analysis tools used in nuclear safety applications. In practice, DOE utilizes standard methodologies developed by the commercial nuclear and chemical industries to perform its risk assessments.

### **3.0 UNDERLYING CAUSES**

Although use of quantitative risk assessment in nuclear safety applications are subject to the directives discussed above, DOE directives and standards emphasize use of a deterministic approach, and there is a lack of common understanding among DOE staff and managers of the definition of "risk assessment," the use and limitations of risk assessments for nuclear safety applications, and how quality assurance controls are applied when risk assessments are utilized in nuclear safety applications. However, DOE is not aware of any instances where risk assessment tools were inappropriately utilized (and the results subsequently reviewed and approved by DOE) in a manner that resulted in failure to identify an adequate set of hazard controls as part of the nuclear safety basis

for a defense nuclear facility. That notwithstanding, DOE understands the Board's concern that there may be inconsistent use of risk assessment tools within the complex.

The underlying cause of the inconsistent application of risk assessment under DOE's existing system is primarily due to inadequate communication and training on the Department's expectations related to the use of risk assessment methodologies in nuclear safety analysis that are derived from its policy, requirements and standards. Furthermore, the fact that the SEN-35-91 has not been updated and reissued as a formal Policy statement under the current Directives system has contributed to the lack of understanding among DOE staff and managers. DOE has initiated steps to address these concerns as discussed in Section 4.0 of this Plan.

In addition, as recognized by the Board, there have been significant developments with regard to the use of risk assessment and risk informed decision making as it applies to nuclear and other safety areas since DOE developed its approach to managing nuclear safety that may be of use to DOE in its efforts to continually improve safety performance at its defense nuclear facilities. As described in Section 5.0, DOE agrees that these methods and approaches warrant its consideration of certain nuclear safety applications at defense nuclear facilities.

#### **4.0 NEAR-TERM ACTIONS and RELATED ACTIVITIES**

DOE will take the following near-term actions to address the underlying causes for the DNFSB concerns:

1. Issue a complex-wide Information Notice that 1) discusses risk assessment and its permitted uses under existing policies and requirements, and 2) emphasizes the need to effectively implement DOE quality assurance requirements for nuclear safety analyses;
2. Charter a working group of risk assessment experts that will be available to assist in the review or development of methodologies for risk assessments to be used in nuclear safety applications at defense nuclear facilities, thereby enhancing the consistency and quality of such assessments and their use. To support this IP, the expert group's responsibilities will also include support for the research and evaluation efforts discussed in Section 5.0. A DOE Senior Technical Safety Manager will lead this group;
3. Update the Nuclear Executive Leadership Training by revising the risk assessment module to enhance senior managers' understanding of existing DOE policy and requirements that apply to the use of risk assessment for nuclear safety applications at defense nuclear facilities; and
4. Develop a new course on Risk Assessment for staff and managers who perform or review such activities at defense nuclear facilities.

The Office of Health Safety and Security (HSS), in coordination with DOE's Program Secretarial Offices (PSOs), plans to issue the Information Notice, develop the charter and initiate establishment of the technical expert group, and the update the Nuclear Executive Leadership Training in calendar year 2009. HSS has also initiated development of the new risk assessment course to be available through DOE's National Training Center in fiscal year 2010.

In addition, DOE is assessing the status of and need for revision of SEN-35-91. As noted previously, this SEN establishes the Department's high-level nuclear safety policies. Although it contains risk goals and permits the use of risk analyses to support DOE decisions, it clearly states that they are not substitutes for compliance with DOE requirements. Consistent with DOE's directives management process set forth in DOE Order 251.1C, *Departmental Directives Program*, a recommendation to update this policy will be presented to the Directives Review Board for consideration. The decision regarding the revision of the SEN is expected to be made this year.

As noted, the activities in this section are ongoing DOE activities. Although related to subject matter of Recommendation 2009-1, they are not commitments under this IP; however, DOE intends to keep the Board and/or Board staff aware of their status.

## **5.0 ISSUE RESOLUTION**

The Department agrees that it may be appropriate to provide additional standards, guidance or policy expectations to guide the use of quantitative risk assessment methodologies for nuclear safety applications at defense nuclear facilities. DOE believes that study of the risk assessment-related polices, standards, guides, and other controls used by other government organizations, as well as by industry, is useful to ensure that the Department can take full advantage of the available risk assessment tools, best practices, and lessons learned from across the spectrum of experienced practitioners. Therefore, DOE will take the following actions:

1. Perform a study of the use of quantitative risk assessment methodologies at DOE and other government agencies and industry to identify opportunities to improve the management of nuclear safety through application of such methodologies within the Department,
2. As part of this study, evaluate DOE's present use of risk assessment tools in nuclear safety-related decision-making and identify any opportunities for improvement, and
3. Following the completion of this study, determine the appropriate Department-specific guidance, standards or policy expectations that are necessary to ensure the appropriate and consistent use of quantitative risk assessment in nuclear safety analysis and related decision making to support the design and operation of defense nuclear facilities.

Following completion of the risk assessment study (September 2010), HSS, in coordination with affected Program Secretarial Offices and the Directives Review Board, will make a determination on the need for any additional (or revisions to existing) policies, requirements, guidance, and infrastructure needs (e.g., organization, procedures, staffing) supporting the use of risk assessment at DOE defense nuclear facilities. The determination will include the schedule for completing the development of directives, standards, or other associated changes deemed necessary and appropriate.

## **6.0 SUMMARY**

The Department believes that these actions are appropriate for implementing the overall intent of DNFSB Recommendation 2009-1 in a measured and prudent fashion and will achieve the overall objective of ensuring proper and effective use of quantitative risk assessment methodologies at DOE defense nuclear facilities in a graded approach. The results of the research study, coupled with the ongoing near-term and related activities discussed in Section 4.0 of the IP will address all aspects of the Board's four specific recommendations. While the Department does not commit to the issuance of a specific quantitative risk assessment policy for nuclear safety at defense nuclear facilities at this time, it believes the process in this IP will address the overall goal of the Recommendation. The issuance of the Information Notice and the planned training will enhance DOE-wide communication of the existing policy and requirements. Evaluation of the results of the planned research study will help DOE determine what directive changes are necessary and appropriate, including the issuance of a specific policy on the use of quantitative risk assessment to allow or control its use in nuclear safety applications at defense nuclear facilities. Furthermore, the steps described in this IP will permit DOE to better integrate its decisions regarding use of quantitative risk assessment in nuclear safety at defense nuclear facilities with the outcomes of the ongoing review of DOE safety strategies and directives, including SEN 35-91, with a goal to have a more cohesive and effective system of regulation.

### **Deliverables:**

1. Periodic briefings to Board or Board staff, as appropriate, (nominally planned to occur every 4 months until closure of the Recommendation) addressing:
  - a. Status of plan implementation, and
  - b. Related activities.
2. Letter to the Board on the Department's determination of the necessity or desirability of developing a policy or other directives on the use of quantitative risk assessment at defense nuclear facilities based on the results of the risk assessment study by December 31, 2010.

## **7.0 ORGANIZATION AND MANAGEMENT**

Overall execution of this IP is the responsibility of the Deputy Director of the Office of Nuclear Safety, Quality Assurance, and Environment within HSS, who is assigned as Responsible Manager. An IP Core Team of staff and managers assigned by the Offices

of HSS; Environmental Management; Nuclear Energy; and Science; and the National Nuclear Security Administration, including representatives from the Chief of Defense Nuclear Safety and Chief Nuclear Safety will be established to develop the technical products committed to in the Plan. This Core Team will be supported by Federal staff and contractors from DOE Sites and National Laboratories.

To ensure the various Department implementing elements and the Board remain informed of the status of Plan implementation, the Department will provide progress reports to the Board and/or Board staff approximately every four months.