Defense Nuclear Facilities Safety Board

Washington, DC 20004

Policy Statement

PS-5

Date: August 15, 2013

Subject

Policy Statement on assessing risk.

Summary

This policy statement establishes the approach the Defense Nuclear Facilities Safety Board will take to assess risk when making recommendations to the Secretary of Energy.

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I. Background

The National Defense Authorization Act (NDAA) for Fiscal Year 2013 [Pub. L. No. 112-239] revised the enabling statute for the Defense Nuclear Facilities Safety Board (Board). The statute now requires the Board to "specifically assess risk (whenever sufficient data exists)" in making recommendations to the Secretary of Energy [42 U.S.C. § 2286(a)(5)]. The revised statute reads as follows, with changes in bold italics:

> (5) Recommendations.
> The Board shall make such recommendations to the Secretary of Energy with respect to Department of Energy defense nuclear facilities, including operations of such facilities, standards, and research needs, as the Board determines are necessary to ensure adequate protection of public health and safety. In making its recommendations, the Board shall consider, ***and specifically assess risk (whenever sufficient data exists),*** the technical and economic feasibility of implementing the recommended measures.

The Joint Explanatory Statement of the Committee of Conference on the NDAA [H.R. Rep. No. 112-705 (2012) (Conf. Rep.)] provided a brief explanation for the change to the Board's enabling statute. The pertinent sentences are excerpted below:

> The Senate recedes with an amendment that would require the sharing of draft recommendations between the DNFSB and the Department of Energy before a final recommendation is published. The provision would also require the DNFSB, where feasible, to account for risk in its recommendations. The conferees believe accounting for risk does not replace the adequate protection standard outlined in section 182 of the Atomic Energy Act (AEA) of 1954 (42 United States Code, section 2011), but to supplement it consistent with the findings of Union of Concerned Scientists v. NRC, 824 F. 2d 108, 120 (D.C. Circuit, 1987).[1]

The 1987 decision of the United States Court of Appeals for the District of Columbia Circuit that is referenced in the Joint Explanatory Statement vacated a final rule promulgated by the U.S. Nuclear Regulatory Commission (NRC). The rule specified when the NRC could require a nuclear facility that had been previously licensed for construction or operations to be "backfitted" to incorporate a new safety feature. The court's opinion states that the Atomic Energy Act of 1954, as amended, "prohibits the [U.S. Nuclear Regulatory] Commission from considering costs in setting the level of adequate protection and requires the Commission to impose backfits, regardless of cost, on any plant that fails to meet this level." The court vacated the rule on the grounds that "the Commission's own construction of the backfitting rule conflicts with the Act by injecting cost considerations into the very core of the adequate-protection standard."

The Joint Explanatory Statement makes it clear that the standard for adequate protection of the health and safety of the public cannot be influenced by considerations of cost or

[1] H.R. Rep. No. 112-705, at 1000 (2012) (Conf. Rep.).

assessments of risk. Therefore, the Board's mandate to issue recommendations necessary to ensure adequate protection of the health and safety of the workers and the public is not contingent upon its ability to conduct a risk assessment or consideration of cost.

II. Technical Interpretation of "Risk" in the Revised Enabling Statute

In the provisions of the Atomic Energy Act of 1954, as amended, that apply to the NRC, "risk" is defined as a "risk to the health and safety of the public," a "risk to the common defense and security," or explained in context for specific risks. However, the NDAA did not define "risk" in its revision to the Board's enabling statute, and the term appears nowhere else in the statute. The NDAA also revised the Board's enabling statute to state that the Board's mission is "to provide independent analysis, advice, and recommendations to the Secretary of Energy to inform the Secretary, in the role of the Secretary as operator and regulator of the Department of Energy's (DOE) defense nuclear facilities, in providing adequate protection of public health and safety." Given that context, the Board concludes that the NDAA is using the term "risk" to mean the risk to the health and safety of the workers and the public.

The meaning generally accepted in both the defense industry and commercial nuclear industry is that safety-related risk embodies both the likelihood of an event occurring and the consequences of that event. DOE Standard 3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, defines "risk" as "[t]he quantitative or qualitative expression of possible loss that considers both the probability that an event will occur and the consequences of that event." Likewise, the NRC Glossary defines "risk" as "the combined answer to three questions that consider (1) what can go wrong, (2) how likely it is, and (3) what its consequences might be."[2]

Factors that influence the risk to the health and safety of the workers and the public from a facility or operation are listed below:

- Location. Proximity to collocated workers and the offsite public.

- Nuclear Materials. Quantity, chemical composition (i.e., pure elements, stable compounds, reactive compounds), physical form, and radiological characteristics of material stored or handled in the facility.

- Release Mechanisms and Energetic Events. Mechanisms for release of materials (e.g., earthquakes, tornados, chemical reactions, fires, explosions, and other potential energy sources), nuclear criticality, highly energetic violent reactions involving nuclear explosives, and nuclear detonations.

- Safety Control Set. Complexity of safety controls and the degree of reliance on active safety systems or administrative controls instead of passive design features.

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[2] *Glossary: Risk*, U.S. NRC, http://www.nrc.gov/reading-rm/basic-ref/glossary/risk.html (last updated December 10, 2012).

- Unproven or Unique Applications. Degree of application of new or one-of-a-kind materials, processes, and technologies with limited operational experience; application of materials, processes, and technologies in new areas where existing experience is not applicable.

- New Circumstances. Changes in facility configuration, facility conditions (e.g., degradation of aging systems and structures), facility operations, and facility personnel (e.g., transition to a new operating contractor).

III. Implementation of Revised Enabling Statute

The Board issues recommendations when it has determined that there is a threat to adequate protection of the health and safety of the workers and the public. Risk assessments performed in accordance with the Board's revised enabling statute will aid the Secretary of Energy in the development of implementation plans focused on the safety improvements that are needed to address the Board's recommendations. The Board's assessment of risk may involve quantitative information showing that the order of magnitude of the risk is inconsistent with adequate protection of the health and safety of the workers and the public. Such quantitative information is provided by DOE in many cases. For example, the Board issued Recommendation 2009-2, *Los Alamos National Laboratory Plutonium Facility Seismic Safety*, based on a documented safety analysis prepared by DOE's contractor showing that the consequences of a design basis earthquake exceeded DOE's guideline for the health and safety of the public by more than two orders of magnitude. In other cases, no quantitative data may exist.

To comply with the revised statute, the Board will explicitly document its assessment of risk when drafting recommendations to the Secretary of Energy in those cases where sufficient data exist to perform a quantitative risk assessment. This process will be formalized in the Board's internal operating procedures.

For recommendations that address specific safety hazards, and for which adequate quantitative data exist, the risk assessment will apply the risk factors listed above to specifically answer the following questions:

- Initiating Events. Are there credible events, including failures in human performance, that could lead to unacceptably high consequences to the health and safety of the workers and the public? How likely is the initiating event?

- Preventive and Mitigative Controls. Are controls in place to prevent the events or mitigate their consequences? How reliable are the controls? Do specific problems render the controls unreliable?

- Consequences. What are the magnitudes of the potential unmitigated and mitigated consequences to the health and safety of the workers and the public in the event of an accident?