DEFENSE NUCLEAR FACILITIES SAFETY BOARD
Washington, DC 20004-2901

November 15, 2024

The Honorable Jennifer M. Granholm
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Granholm:

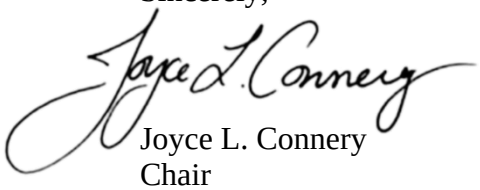
In response to the Board's Recommendation 2020-1, *Nuclear Safety Requirements*, the Department of Energy (DOE) is developing DOE Order 421.1, *Nuclear Safety Basis.* The Board reviewed a draft copy of the new order and finds that this new order represents a major improvement in defining essential nuclear safety requirements. However, the Board has significant safety concerns with a recently proposed change in the draft order regarding the types of controls DOE requires to prevent or mitigate high consequence events.

Current DOE directives require that potential high consequence events be prevented or mitigated through safety structures, systems, or components (SSC), or through specific administrative controls (SAC) when human action is required. DOE has requirements for SACs and safety SSCs to ensure that they will reliably fulfill the needed safety function. However, the proposed change in draft DOE Order 421.1 would permit crediting less reliable types of administrative controls to prevent or mitigate such events. This change is significant and risks undermining safety advances made in response to Board Recommendations 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls*, and 2010-1, *Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers.*

The Board understands that the development of DOE Order 421.1 is in its final stages. The Board advises that DOE revise the order to address the safety concern regarding SACs outlined above before the order is issued. Additionally, the Board has safety concerns regarding the coverage of technical safety requirement violations in the order. These safety concerns are also provided in the enclosure for DOE's consideration. Pursuant to 42 United States Code § 2286b(d), the Board requests a report and briefing from DOE within 60 days from the date of

this correspondence and before the new order is issued regarding DOE's path forward for issuing DOE Order 421.1.

Sincerely,



Joyce L. Connery
Chair

Enclosure

c: Ms. Ingrid Kolb, Director, Office of Management
Mr. Joe Olencz, Director, Office of the Departmental Representative to the Board

ENCLOSURE

Issues with Draft DOE Order 421.1, *Nuclear Safety Basis*

Background. On June 1, 2021, the Board reaffirmed Recommendation 2020-1, *Nuclear Safety Requirements*. In this document, the Board made several sub-recommendations under the topical area "Safety Basis Process and Requirements":

> *Sub-recommendation 5.a: "Establish clear requirements for* [unreviewed safety questions] *USQs and* [justifications for continued operations] *JCOs in an order or invoked standard, including elevation of key concepts and guidance from DOE Guide 424.1-1. While developing these requirements, address issues discussed in the Board's letter dated July 10, 2020."*
>
> *Sub-recommendation 5.b: "Establish clear requirements for* [technical safety requirements] *TSRs in an order or invoked standard, including elevation of key concepts and guidance from DOE Guide 423.1-1. While developing these requirements, address issues discussed in DNFSB Technical Report 45, Violations of the Nuclear Safety Basis."*
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> *Sub-recommendation 5.c: "Establish requirements for* [specific administrative controls] *SACs by invoking DOE Standard 1186 in an appropriate DOE order."*

The Department of Energy accepted Board Recommendation 2020-1 and issued an implementation plan on June 27, 2022. In its implementation plan, DOE committed to developing and issuing a new nuclear safety order that "will create new requirements that cover the topics of USQs, JCOs, TSRs, and SACs to address the Board's safety concerns outlined in Recommendation 2020-1." DOE developed draft DOE Order 421.1, *Nuclear Safety Basis,* and placed it in DOE's review and comment system for internal review in November 2023. Successive draft order revisions have also been provided by DOE.

Discussion. The Board reviewed draft DOE Order 421.1 and considers that the draft order represents a major improvement in defining important nuclear safety requirements. However, the Board has certain safety concerns with the draft order, as documented below.

Specific Administrative Controls—In DOE's hierarchy of controls, engineered controls (also called structures, systems, or components, (SSCs)) are preferred over administrative controls (i.e., human actions) to prevent or mitigate high consequence accident scenarios. This preference is due to "the inherent uncertainty of human performance," as noted in DOE Standard 3009-2014, *Preparation of Nonreactor Nuclear Facility Documented Safety Analysis.* However, there are situations in which the use of administrative controls is necessary or is appropriate to address high consequence events, and the control provides a safety function that would be safety significant or safety class if the function were provided by an SSC. For such cases, DOE

developed the concept of a SAC. SACs are intended to have a high-level of reliability and are specifically defined so it is clear how the control is addressing the accident scenario.

Draft DOE Order 421.1 states:

> *A contractor must develop SACs in the* [documented safety analysis] *DSA where an administrative control (except in the case of a criticality safety management program) is selected to:*
>
> *(a)* ***Provide the sole credited function to*** *prevent or mitigate a postulated hazard or accident scenario and the administrative control has a safety function that would be* [safety significant] *SS or* [safety class] *SC if the function were provided by an SSC"* [emphasis added].

The language "provide the sole credited function to…" represents a significant departure from the existing DOE requirements and guidance provided in DOE safe harbors[1] (e.g., DOE Standard 3009-94 CN3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, DOE Standard 3009-2014) and in DOE Standard 1186-2016, *Specific Administrative Controls*.

For example, in cases where the unmitigated off-site consequences of an accident exceed the DOE's evaluation guideline, DOE Standard 3009-2014 Section 3.2.3 currently requires the use of safety class SSCs and/or SACs to reduce the dose consequences below the evaluation guideline. With DOE's proposed change, that requirement would effectively be replaced by a requirement to simply have at least one safety class SSC or SAC, regardless of how much or how little dose reduction is achieved by that control. The remainder of the dose reduction to below the evaluation guideline could be achieved through administrative controls that are not SACs, including broad programs like an emergency response program. Crediting administrative controls such as the emergency response program to prevent or mitigate high consequence events is inconsistent with DOE Standard 1186, *Specific Administrative Controls*. DOE Standard 1186 states, "Designating the entire SMP [safety management program] as a SAC is also not appropriate because a SMP description does not provide a specific credited safety function."

DOE would likely have to revise its safe harbors before the changed requirement could be implemented in the field. However, given that DOE is planning to issue an order that contradicts those safe harbors, it can reasonably be expected that DOE will make conforming revisions to the safe harbors.

Overall, the Board believes that the language noted above undermines safety advances made in response to Board Recommendations 2002-3, *Requirements for the Design, Implementation, and Maintenance of Administrative Controls* and 2010-1, *Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers.* Accordingly, the Board advises DOE to revise SAC requirements in draft DOE Order 421.1.

[1] A safe harbor is an acceptable methodology for preparing a DSA as described in Table 1 of Appendix A to Subpart B of Title 10, Code of Federal Regulations, Part 830.

Technical Safety Requirement Violation Conditions—Draft DOE Order 421.1 does not adequately address TSR violation issues outlined in DNFSB Technical Report 45 as recommended in Board Recommendation 2020-1. DNFSB Technical Report 45 provided evidence of differing interpretations across the complex regarding what constitutes a violation of TSRs. Violations represent periods of time when a facility is not operating in compliance with its safety basis, and therefore is operating outside of the safety risk envelope and controls approved by DOE. It is important for contractors to declare TSR violations when appropriate, to ensure DOE is informed of operations that took place outside the safety basis, so that DOE and contractor personnel can take steps to understand the cause of the non-compliance and prevent recurrence. DNFSB Technical Report 45 identifies specific conditions that should constitute violations. While draft DOE Order 421.1 addresses some TSR violation conditions, the Board advises DOE to explicitly address all TSR violation conditions outlined in DNFSB Technical Report 45, as noted below.

1. Augment the existing criterion "failure to comply with an LCO [limiting conditions for operation]" to address safety concerns described in DNFSB Technical Report 45 chapter *Completion Times and Time of Declaration*, and concerns related to modes including: (a) failure to complete applicable action statements within the required time limits based on the time elapsed since the LCO statement was declared not met (i.e., 'time of declaration'); (b) failure to declare LCO statements as not met in a timely manner which occurs when the time elapsed between when the LCO statement should have been declared not met and the time of declaration exceeds applicable required action time limits; and (c) performing an activity that is prohibited by the current facility mode and applicable TSR requirements were not satisfied.

2. Include a criterion for modifying a design feature by personnel in such a way that the design feature could not perform its credited safety functions.

3. Include a criterion for failing to perform an in-service inspection specified in the TSR within the required frequency and associated extension.

4. Include a criterion for performing a surveillance requirement specified in the TSR incorrectly such that it does not verify operability of the SSCs.

AFFIRMATION OF BOARD VOTING RECORD

SUBJECT: RFBA by Chair Connery to approve corrspondence - SRPPF Nuclear Criticality Safety

Doc Control#: 2025-100-0001

The Board acted on the above document on 11/13/2024. The document was Approved.

The votes were recorded as:

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIPATING	COMMENT	DATE
Joyce L. Connery	☑					11/13/2024
Thomas Summers	☑					11/13/2024
Patricia Lee	☑					11/13/2024

This Record contains a summary of voting on this matter together with the individual vote sheets, views and comments of the Board Members.

Shelby Qualls
Executive Secretary to the Board

Attachments:

1. Voting Summary
2. Board Member Vote Sheets

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

NOTATIONAL VOTE RESPONSE SHEET

FROM: Joyce L. Connery

SUBJECT: RFBA by Chair Connery to approve corrspondence - SRPPF Nuclear Criticality Safety

Doc Control#: 2025-100-0001

DATE: 11/13/2024

VOTE: Approved

COMMENTS:

None

Joyce L. Connery

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

NOTATIONAL VOTE RESPONSE SHEET

FROM: Thomas Summers

SUBJECT: RFBA by Chair Connery to approve corrspondence - SRPPF Nuclear Criticality Safety

Doc Control#: 2025-100-0001

DATE: 11/13/2024

VOTE: Approved

COMMENTS:

None

Thomas Summers

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

NOTATIONAL VOTE RESPONSE SHEET

FROM: Patricia Lee

SUBJECT: RFBA by Chair Connery to approve corrspondence - SRPPF Nuclear Criticality Safety

Doc Control#: 2025-100-0001

DATE: 11/13/2024

VOTE: Approved

COMMENTS:

None

Patricia Lee