Department of Energy
Under Secretary for Nuclear Security
Administrator, National Nuclear Security Administration
Washington, DC 20585

October 06, 2022

The Honorable Joyce L. Connery
Chair, Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, DC 20004

Dear Chair Connery:

This letter on behalf of the Secretary of Energy is in response to the Defense Nuclear Facilities Safety Board's (Board) June 16, 2022, letter regarding the nuclear criticality safety program at the National Criticality Experiments Research Center (NCERC) at the Department of Energy's National Nuclear Security Administration (DOE/NNSA) Nevada National Security Site (NNSS).

In that letter, the Board identified weaknesses in the NCERC criticality safety program that it believed would increase the potential for improper implementation of safety controls and decrease the likelihood that safety deficiencies would be detected by local safety oversight. The Board noted a general weakness and common theme with respect to inconsistencies between the integrated criticality safety program used at NCERC and the applicable Los Alamos National Laboratory corporate program.

DOE/NNSA assessed the issues associated with the Board's questions and concluded that activities and operations at NCERC are safe. The enclosed report discusses DOE/NNSA's evaluation of NCERC safety and oversight presently, including actions DOE/NNSA is currently undertaking as opportunities for improvement. DOE/NNSA will coordinate a briefing to the Board to discuss this evaluation in greater detail.

Thank you for your work and observations, and for providing DOE/NNSA the opportunity to improve its mission critical work at NCERC. The Department will use the Board's input to make continuous improvements in NCERC's operations.

If you have any questions, please contact Mr. Daniel Sigg, Acting Associate Administrator for the Office of Environment, Safety, and Health, at (202) 586-4096.

Sincerely,

Jill Hruby

Enclosure

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Enclosure: Response to DNFSB/NCERC Criticality Safety Program

Background

The Nevada National Security Site (NNSS) is managed and operated by Mission Support Test Services, LLC (MSTS), under contract to the Department of Energy's National Nuclear Security Administration (DOE/NNSA). The National Criticality Experiments Research Center (NCERC) is located at NNSS within the Device Assembly Facility (DAF). NCERC maintains a substantial special nuclear material inventory and requisite expertise to support a variety of nuclear security missions, including nuclear criticality safety research and training, nuclear emergency response, nuclear nonproliferation, and support for other government agencies. Operations conducted at the NCERC include both subcritical and critical experiments with the ability to measure a wide variety of nuclear properties to meet sponsor needs. While MSTS is the primary operator of NNSS and the DAF, the Los Alamos National Laboratory (LANL) operates the NCERC under a secondary real estate operation's permit with MSTS. The Nevada Field Office (NA-NV) provides DOE/NNSA oversight for NNSS and the NCERC. DOE/NNSA's Los Alamos Field Office (NA-LA) also provides some oversight for NCERC activities under a memorandum of agreement between NA-NV and NA-LA. This unique relationship between several federal and non-federal entities creates a confluence of coordination challenges that are adequately managed, but which offer opportunities for improvement to enhance NCERC's safety posture.

DOE/NNSA examined the DNFSB's concerns, including:

- Inconsistencies between the NCERC and LANL corporate criticality safety program;
- Inadequate consideration of seismic hazards in criticality safety evaluations;
- Insufficient metrics for federal safety oversight; and
- Insufficient staffing (e.g., criticality safety analyst).

DOE/NNSA determined that NCERC operations are safe. DOE/NNSA evaluated DNFSB's insights and concerns and: 1) has determined that actions have either been taken or are in process to address these concerns, and 2) recognizes that DNFSB has provided data to support opportunities to further improve criticality safety at NCERC, which DOE/NNSA will further evaluate.

In this enclosure, DOE/NNSA responds to the three questions raised by DNFSB's June 16, 2022, letter to DOE:

- In light of the identified safety concerns and inconsistencies between the integrated criticality safety program used at NCERC and the applicable LANL corporate program, what is NNSA's evaluation of the criticality safety program implemented at NCERC?
- Considering the safety concerns identified in the attached report regarding federal safety oversight of NCERC operations, what is NNSA's evaluation of the effectiveness of federal safety oversight of the criticality safety program at NCERC?
- Based on these evaluations, what safety corrective actions, if any, are being taken by NNSA?

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Responses to Questions

Question 1: *In light of the identified safety concerns and inconsistencies between the integrated criticality safety program used at NCERC and the applicable LANL corporate program, what is NNSA's evaluation of the criticality safety program implemented at NCERC?*

DOE/NNSA concludes that while NCERC operates under a sound criticality safety program, DOE/NNSA recognizes the goal of continuous improvement to enhance safe and efficient work practices within DOE/NNSA's facilities. DOE/NNSA evaluated DNFSB's input and determined there are opportunities for improving NCERC criticality safety. Many of the issues that the DNFSB identified in the report have been, or are being addressed, such as procedural enhancements/revisions to reconcile inconsistencies with procedure writing. In addition to administrative improvements, we are making programmatic improvements, including the development of NCERC-specific metrics that will augment the LANL and NNSS criticality safety metrics as a mechanism to measure the health of the integrated NCERC Nuclear Criticality Safety program. Furthermore, NA-LA has scheduled an independent assessment of the LANL Nuclear Criticality Safety Program at NCERC, *Nuclear Criticality Safety Program Implementation at NCERC*, in fiscal year (FY) 2023, which will be used by LANL, NA-NV, and NA-LA to improve the LANL Nuclear Criticality Safety Program at NCERC.

DOE/NNSA evaluated the Board's concerns with respect to inadequate consideration of impacts of the calculated increase in seismic hazard. Although the DNFSB review team asserts that LANL personnel at NCERC failed to consider the impact of a calculated increased seismic hazard on its criticality safety evaluations, the LANL 2020 qualitative analysis and its crosswalk evaluated the Device Assembly Facility Documented Safety Analysis (DSA) and the LANL Criticality Safety Evaluation Documents (CSEDs) to ensure such scenarios were addressed appropriately. The scenarios in these analyses considered full flooding and/or upsets involving water from various sources, including the Fire Suppression System. No controls were identified in the CSEDs as being necessary to prevent criticality from flooding/full water reflection. Based upon the LANL 2020 qualitative analysis and its crosswalk, which was recently revalidated in September 2022, a reevaluation of active NCERC operations to consider seismic vulnerabilities due to a calculated increase in seismic hazards is not necessary. This revalidated LANL 2022 technical evaluation will be formally included as part of the nuclear criticality safety technical basis for NCERC operations.

DOE/NNSA will assess and evaluate the need for further criticality safety program improvements at NCERC as the programmatic improvements take effect, with sufficient time to allow for adequate feedback for continuous improvement.

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Question 2: *Considering the safety concerns identified in the attached report regarding federal safety oversight of NCERC operations, what is NNSA's evaluation of the effectiveness of federal safety oversight of the criticality safety program at NCERC?*

In the past two DOE/NNSA Chief of Defense Nuclear Safety Biennial Reviews (BR), the Criticality Safety Program was evaluated and graded as "Meets Expectations" to signify that NA-NV oversight ensures that the field office responsibilities to implement the requirements of DOE O 420.1C, *Facility Safety*, are being met and that an effective and compliant nuclear criticality safety program has been established.

Though DOE/NNSA safety oversight of the criticality safety program at NCERC is adequate, there is a recognized need for improving the coordination of DOE/NNSA's oversight of the contractor's performance at NCERC, with NA-LA and DOE/NNSA Headquarters (HQ) augmenting NA-NV's routine oversight activities. An example of enhanced coordination is through the DOE/NNSA Site Integrated Assessment Planning (SIAP) process for FY 2023. DOE/NNSA HQ recommended, and NA-LA has scheduled, an independent assessment of the LANL nuclear criticality safety program at NCERC. NA-LA will coordinate and integrate this activity into NA-NV's routine operational awareness oversight of all operations at the DAF. DOE/NNSA HQ monitors the health and performance of safety programs as well as the federal oversight of such programs through the use of institutional tools and BRs. Tools like the checkerboard, when informed by strengths or weaknesses identified during BRs, help inform the SIAP process to allow field offices and HQ to better coordinate oversight where the performance, risk, or consequence warrants it.

Oversight at NCERC is not without its own staffing challenges, an ongoing issue that is shared in some capacity across the entire DOE/NNSA enterprise and continues to be actively addressed. In both the 2018 BR and the recent DNFSB report, staffing challenges associated with insufficient oversight at DAF were identified. Specifically, in 2018, the BR team noted that the Facility Representative (FR) and the criticality safety subject matter expert (SME) maintain awareness of activities; however, the number of qualified FRs assigned to the DAF is inadequate to meet the current and future operational tempo. In the 2021 BR, the team noted improvement in this area and determined there was sufficient FR and criticality safety SME coverage to fulfill the oversight functions. Presently, DOE/NNSA recognizes DNFSB's concern for insufficient Criticality Safety Analyst Support at NCERC. LANL and the NA-LA Criticality Safety Program Oversight staff are evaluating options for increasing the onsite presence of LANL oversight at NCERC, which will provide more timely updates of processes and procedures affecting nuclear criticality safety.

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Question 3: *Based on these evaluations, what safety corrective actions, if any, are being taken by NNSA?*

As described in Questions 1 and 2, DOE/NNSA has evaluated all issues raised in the DNFSB report on NCERC and is taking appropriate actions for continuous improvement for the execution and federal oversight of the NCERC nuclear criticality safety program. Below is a summary of specific actions associated with the identified issues.

Inconsistencies between the integrated criticality safety program used at NCERC and the applicable LANL corporate program

Action: LANL will revise CEF-ADM-004, Joint Laboratory Office – *Nevada, NCERC Document Processing and Use*, used at NCERC for developing technical procedures, to more closely reflect LANL FSD-315-16-001, *Technical Procedure Writer's Manual*, guidance. An example of revising the technical procedures includes ensuring action steps related to nuclear criticality safety limits are explicitly highlighted for operator awareness.

DOE/NNSA will verify that this revised guidance is incorporated (as appropriate) into the technical procedures during the SIAP review.

LANL and NA-LA are evaluating the need for other revisions to CEF-ADM-004 to improve clarity between the integrated criticality safety program used at NCERC and the LANL corporate program (e.g., revising and/or clarifying NCERC procedures for constructing inspection objects or radiation test objects to include steps to implement administrative requirements identified in the Criticality Safety Limit Approval.

Through NNSA's SIAP process for FY 2023, NNSA HQ recommended, and NA-LA has scheduled, an independent assessment of the LANL nuclear criticality safety program at NCERC. NA-LA will coordinate and integrate this activity into NA-NV's routine operational awareness oversight of all operations at the DAF. Based on the results of the SIAP assessment, additional corrective actions may be considered to t consistency of criticality safety implementation.

Inadequate consideration of the impact of changes in the site-specific seismic hazard on NCERC's criticality safety evaluations

Action: NNSA evaluated (by qualitative analysis and crosswalk) the DNFSB's concern with respect to inadequate consideration of impacts of increased seismic hazard and revised the technical document, NCS-TECH-19-014, *Criticality Safety Review of the Fire Suppression System and Seismic Events in the Device Assembly Facility at the Nevada National Security Site*, Revision 0, dated May 12, 2020, to address most of the DNFSB concerns.

The DNFSB concern regarding container configuration survivability (i.e., package tipping that induces a criticality hazard) did not need to be addressed in this technical document revision because the safety analysis assumed that the container (ICC DPP-2) can tip and remain safe. The container, therefore, is not credited in the safety analysis to remain upright. Furthermore, the criticality scenario in this instance analyzed the container in all configurations. NNSA determined no controls are identified to be necessary to prevent criticality from a seismic event and/or toppling regardless of the calculated 7 percent increased peak ground acceleration seismic hazard.

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During the update to NCS-TECH-19-014, NNSA reviewed all of the active criticality safety evaluation documents (CSEDs) at NCERC and verified that each analysis considered full flooding and/or upsets involving water from various sources (including Fire Suppression System (FSS)), and no controls were identified to be necessary to prevent criticality from flooding/full water reflection. This description is explicitly stated in Rev. 1 to NCS-TECH-19-014. It should be known that none of the CSEDs take credit for the FSS, its operability, nor seismic qualifications; the FSS is assumed to fail. For clarity in the new revision to NCS-TECH-19-014, all of the discussion about the FSS, its operability and its seismic qualifications were removed because neither the FSS' operability nor its seismic qualifications are needed to support the CSED analyses. The updated NCS-TECH-29-014 is expected to be approved soon.

Progress on the DAF 10-year seismic hazard analysis update continued throughout FY 2022. The final soil-structure interaction analyses and generation of in-structure response spectra were completed. Development of documentation to support procurement of a subcontract to perform follow-on activities, including structural analysis and structure, system, and component (SSC) evaluation, is underway, and the subcontract is expected to be awarded soon. The DAF safety SSCs, including the FSS, will be evaluated to determine the effects of any increase in seismic hazard parameters.

The LANL 2020 technical evaluation will be formally reviewed and the findings of the review will be included as part of the nuclear criticality safety technical basis for NCERC operations, pending a revision to the DAF DSA.

Insufficient metrics for federal safety oversight to measure health of the integrated criticality safety program

Action: NA-NV and NA-LA are in process of establishing a performance baseline for the LANL Nuclear Criticality Safety Program at NCERC and NNSS, and the LANL Nuclear Criticality Safety Division will introduce additional Nuclear Criticality Safety Program metrics tailored towards NCERC and NNSS operations. These "NCERC Nuclear Criticality Safety Metrics" will be reported as an addendum to LANL's existing quarterly program metrics for improving DOE/NNSA leadership's awareness. The new metrics will track such information as Nuclear Criticality Safety analyst (CSA) onsite availability and LANL Nuclear Criticality Safety staff qualification at NCERC, in addition to the existing metrics that relay information on topics such as the criticality safety infraction index (e.g., control process deviations, infraction severity).

Insufficient CSA support at NCERC

Action: LANL and the NA-LA Criticality Safety Program Oversight staff are evaluating options for increasing the onsite presence of LANL oversight at NCERC. Increasing on-site availability will provide more timely updates of processes and procedures affecting nuclear criticality safety (and associated CSEDs) as well as improved oversight and awareness of Nuclear Engineering and Non-Proliferation (NEN)-2 planned and ongoing operations, including field observed Fissionable Material Operational Reviews. Furthermore, the LANL Nuclear Criticality Safety Division will continue to qualify three (3) CSAs for NCERC to meet Nuclear Criticality Safety programmatic requirements in the technical aspects associated with NEN activities.

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