DEFENSE NUCLEAR FACILITIES SAFETY BOARD
Washington, DC 20004-2901

November 27, 2023

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

Dear Secretary Granholm:

The Defense Nuclear Facilities Safety Board (Board) reaffirmed Recommendation 2020-1, *Nuclear Safety Requirements*, on June 1, 2021, and received the Department of Energy's (DOE) implementation plan for the recommendation on June 27, 2022. Overall, DOE's actions in response to Recommendation 2020-1 have been positive and are poised to improve critical aspects of its regulatory framework governing nuclear safety. Despite this progress, DOE's response to elements of the recommendation related to aging infrastructure management require continued leadership attention.

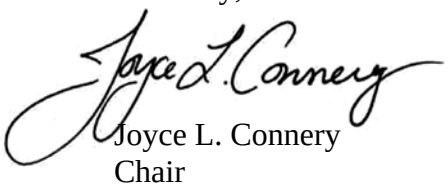
The age and condition of DOE's nuclear facilities and supporting infrastructure are well-recognized challenges. While DOE is making progress in modernizing and refurbishing its infrastructure, safely managing the effects of age-related degradation and technical obsolescence will remain an operational imperative for decades to come.

The Board appreciates DOE's acceptance of the portion of Recommendation 2020-1 centered on strengthening DOE's approach to aging infrastructure management. However, as detailed in the enclosure, the Board is concerned that DOE's planned and completed actions will not be sufficient to drive necessary safety improvements to the requirements and processes that ensure safe and effective management of aging defense nuclear facilities.

Considering the mutually recognized importance of safely managing aging infrastructure, the Board will continue to work along several fronts to better define existing safety weaknesses

and to identify potential improvements. To that end, the Board intends to conduct a series of public hearings focused on aging infrastructure management in 2024 to develop further analysis, advice, and/or recommendations addressing this vital issue.

Sincerely,



Joyce L. Connery
Chair

Enclosure

c: Mr. Garrett Smith
Mr. Joe Olencz

ENCLOSURE

Analysis of Aging Infrastructure Benchmarking Report

On September 26, 2023, the Department of Energy (DOE) transmitted to the Defense Nuclear Facilities Safety Board (Board) its report, *Benchmark Review Final Report for Aging Infrastructure Management* ("benchmarking report"). The benchmarking report satisfied milestone 5.1.2 of DOE's implementation plan for Recommendation 2020-1, *Nuclear Safety Requirements*. Due to concerns with the scope, content, and proposed DOE-wide process enhancements, the benchmarking report in its current form does not adequately address the aging infrastructure management safety concerns underpinning Recommendation 2020-1.

Background. In Recommendation 2020-1, the Board addressed aging infrastructure management in sub-recommendation 1a: "Develop and implement an integrated approach—including requirements—for the management of aging infrastructure that includes formal processes to identify and perform infrastructure upgrades necessary to ensure facilities and structures, systems, and components [SSC] can perform their safety functions."

DOE partially accepted sub-recommendation 1a. In DOE's approved implementation plan, commitments related to aging infrastructure management center on performing a benchmarking review to characterize and compare National Nuclear Security Administration (NNSA), DOE Office of Environmental Management (EM), and DOE Office of Science approaches to managing aging facilities and assets. Per DOE's implementation plan, the benchmarking report will be the basis for a final report issued by the Secretary "that highlights process enhancements and recommends adoption of best practices." Program secretarial office implementation of best practices and process enhancements will follow the final report.

DOE's benchmarking review effort consisted of two key elements. First, representatives from NNSA, EM, and Office of Science independently documented existing aging infrastructure management processes, best practices, and process enhancements. Second, results from the individual program office reviews were compiled into a single DOE benchmarking report with separate appendices documenting the respective aging infrastructure management practices of NNSA, EM, and the Office of Science.

Concerns with Scope. The scope of DOE's benchmarking effort was limited in several critical respects. First, the benchmarking effort did not evaluate the adequacy of current DOE directives related to aging infrastructure management. Inadequacies in DOE's existing regulatory framework were the primary safety concern underpinning the Board's sub-recommendation on aging infrastructure management in Rec. 2020-1. Second, the EM and NNSA portions of the effort did not assess field implementation of existing processes and requirements. This lack of self-critical analysis constrained opportunities to identify gaps or deficiencies in existing requirements. Finally, DOE did not benchmark against the aging infrastructure management practices of external organizations; instead, it documented existing program secretarial office approaches and ongoing improvement efforts. As noted in early feedback from the Board's staff, restricting the review's scope to focus on existing internal DOE

processes misses an opportunity to find best safety practices successfully implemented elsewhere in government or industry.

Concerns with Characterization of Requirements and Implementing Processes. The benchmarking report discusses current DOE requirements and processes for management of aging infrastructure.

DOE Order 430.1C—DOE Order 430.1C, *Real Property Asset Management*, contains requirements for life-cycle management of real property assets, including provisions related to planning, budgeting, acquisition, sustainment, disposition, performance measurement, and reporting. The benchmarking report cites DOE Order 430.1C as a key mechanism for understanding the state of DOE's infrastructure. Relevant requirements include performing condition assessments to determine the need for preventive or remedial action, performing functionality assessments to determine an asset's current physical condition and its capability to meet mission requirements, and collecting and reporting data on asset condition to support decisions on infrastructure upgrades or replacement.

The benchmarking report describes five-year condition assessments as building blocks that define and prioritize infrastructure needs. In practice, the value of these assessments is sometimes limited by factors including the high ratio of assets to inspectors, variable inspector expertise, heavy reliance on visual inspections, infrequency of assessments regardless of operative aging mechanisms, and lack of connectivity to other available sources of inspection data. The benchmarking report also notes the importance of functionality assessments; however, there is a lack of adequate guidance on how these assessments should be performed and what they are intended to measure. Since 2016, when performance of functionality assessments became a requirement, sites have developed varying implementation approaches in the absence of guidance from headquarters program elements.

Finally, safety SSCs are a critical element of safe operations at DOE's defense nuclear facilities, yet not all safety SSCs are considered real property assets or installed equipment; therefore, condition and functionality assessments are not performed for these safety SSCs. As a result, the condition of these safety SSCs is not reflected in real property tracking systems. Taken together, processes described in DOE Order 430.1C, as implemented in the field, may not provide an adequate picture of infrastructure conditions to enable informed strategic decision making.

DOE Orders 420.1C and 433.1B—The report cites DOE Order 420.1C, *Facility Safety*, and DOE Order 433.1B, *Maintenance Management Program for DOE Nuclear Facilities*, as providing requirements for conducting aging degradation and technical obsolescence reviews of safety SSCs. DOE Order 420.1C identifies aging degradation and technical obsolescence as considerations to be evaluated under the cognizant system engineer (CSE) program, but the order does not require CSE coverage for passive design features that are identified as safety SSCs. DOE Order 433.1B requires performance of aging degradation and technical obsolescence inspections. However, staff review of maintenance management programs found that some sites do not have defined processes to conduct aging degradation and technical obsolescence inspections, and instead assume that information from other activities (e.g., CSE system health

reporting, surveillances required by facility safety bases) will satisfy the intent of this requirement. In practice, the requirements of DOE Orders 420.1C and 433.1B and their implementation do not ensure comprehensive and effective monitoring of aging degradation and technical obsolescence of all safety SSCs.

Collectively, the report's characterization of these requirements and their implementation does not provide an accurate picture of the effectiveness of DOE's current aging infrastructure management framework.

Concerns with DOE-wide Process Enhancements. The overall benchmarking effort identified only two DOE-wide process enhancements. One proposed enhancement creates no new requirements, and the other proposed enhancement is vague and could lead to a variety of interpretations.

The first proposed DOE-wide process enhancement is to develop a new DOE handbook to expand guidance for aging degradation and technical obsolescence inspections. This handbook would support existing DOE Guide 433.1-1A, *Nuclear Facility Maintenance Management Program Guide for Use with DOE O 433.1B.* The benchmarking report cited ANSI/ANS-3.14-2021, *Process for Infrastructure Aging Management and Life Extension of Nonreactor Nuclear Facilities*, as an appropriate reference for the new handbook. Developing a new guidance document for inspections with a reference to ANSI/ANS-3.14 is not a strong enough regulatory driver to produce meaningful change.

The second proposed DOE-wide process enhancement is "continuing and expanding the use of technology advancements to perform aging infrastructure checks, assessments, and surveys." The benchmarking report does not clearly specify what technology advancements are being proposed; what required checks, assessments, or surveys would be improved; and how safety improvements would be achieved.

Conclusion. In DOE's approved implementation plan for Recommendation 2020-1, commitments related to aging infrastructure management center around producing a benchmarking report that characterizes and compares different program secretarial offices' approaches to managing aging facilities and assets. The results of the benchmarking report are intended to aid the Secretary in identifying best practices and process enhancements to implement DOE-wide. Based on issues with scope, content, and proposed enhancements, the benchmarking report in its current form does not provide a sufficient basis to develop effective DOE actions to address safety weaknesses in requirements and implemented processes related to aging infrastructure management across the defense nuclear facilities complex.