

Joyce L. Connery, Chair
Thomas A. Summers, Vice Chair
Jessie H. Roberson

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901



October 4, 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 National Nuclear Security Administration's (NNSA) mission of safely conducting tritium operations is essential to national security and relies upon continued operation of the Savannah River Tritium Enterprise (SRTE), including the H-Area New Manufacturing facility, the Tritium Extraction Facility, and the H-Area Old Manufacturing (HAOM) facility at the Savannah River Site (SRS).

Analyses of accident scenarios and establishment of controls to protect workers and the public are essential to safely operating these facilities. NNSA's Savannah River Field Office (NNSA-SRFO) has not applied adequate controls to several possible accident scenarios at SRTE with the potential to release large quantities of tritium, resulting in high consequences to workers and the public.

These safety issues have been a topic of discussion and correspondence between the Defense Nuclear Facilities Safety Board (Board) and the Department of Energy (DOE) for more than a decade. As a result of its analysis, the Board issued Recommendation 2019-2, *Safety at the Savannah River Tritium Facilities*, to the Secretary of Energy on June 11, 2019, and reaffirmed it on December 5, 2019, recommending that DOE implement both short-term and long-term measures to prevent or mitigate the potential for high radiological consequences. The Board also recommended evaluation and consideration of upgrades to safety management programs for identifying and treating personnel exposed to a significant tritium release.

The NNSA Administrator's final rejection of the Board's Recommendation 2019-2 on January 3, 2020, stated that "focused ongoing actions at the Tritium Facilities at SRS adequately address [Board] concerns discussed in the Recommendation and make the need for additional response actions unnecessarily duplicative of our effort." The Board recognizes the challenges NNSA faces regarding reducing the risk to workers and the public following several significant release events detailed in the SRTE safety bases. These challenges include: the acute dose from tritium oxide, the ineffectiveness of mitigating a tritium release using typical mechanical filtration systems, and the flammability of tritium gas and other hydrogen isotopes processed at

SRTE. In addition to these challenges, portions of the tritium processing mission are conducted in facilities with outdated designs and inadequate safety controls for the existing hazards.

When considered collectively, these challenges result in the absence of a simple or universal solution that would reduce risk to workers and the public, short of constructing a new tritium complex. The Board also recognizes that these challenges may preclude reduction of calculated dose consequences for workers to below a 100-rem total effective dose (TED) threshold. Thus, the Board concludes that NNSA should continue to pursue a multi-pronged approach to incrementally reduce safety risk to workers and the public.

NNSA, in coordination with its management and operating contractor, has initiated several efforts to reduce risk and improve safety of the tritium facilities in terms of physical facility changes, analytical changes, and improvements to safety management programs such as emergency preparedness and response. The Board reviewed NNSA's safety improvements during its site visit in May 2023, when NNSA provided an update on many of the initiatives discussed in this letter. While these plans and actions are encouraging, NNSA only has accomplished limited improvements to date, and a significant amount of work remains to reduce the safety risk to an acceptable level.

Subsequent to the Board's site visit, the NNSA Associate Administrator for Environment, Safety, and Health traveled with a team to SRS to discuss nuclear activities and issues and identified several safety basis topics for further evaluation. The Board is encouraged by this recent effort and looks forward to working toward resolution of the issues listed below.

SRTE Safety Basis—NNSA plans to implement a safety basis revision in 2024 that partially addresses issues that the Board has previously raised, including using updated dispersion modeling parameters and ceasing to credit the emergency preparedness program as a substitute for safety controls for mitigating worker dose consequences. The new safety basis also upgrades elements of safety management programs to specific administrative controls and upgrades the 217-H tritium storage vault fire barriers to safety class.

The Board encourages implementation of the new safety basis but notes that more improvements remain to be made, such as upgrades to the 233-1H corridor fire barriers and mitigation or prevention of the 296-H stack collapse event as described in the Board's July 26, 2022, letter to NNSA. The mitigated dose consequences for several credible events still approach DOE's evaluation guideline for the offsite public and exceed 100 rem TED to the co-located worker.

Co-located Worker Dose Reduction Strategy—In the five years since NNSA-SRFO directed the contractor to propose strategies to reduce the calculated dose consequences to the co-located worker, SRTE has performed and continues to perform evaluations on systems, structures, and components to narrow down which potential upgrades would be feasible and beneficial. SRTE has identified six potential physical upgrades: two new or upgraded fire suppression systems, three new or upgraded seismic tritium confinement systems, and a new exhaust stack. If implemented, these systems have the potential to reduce calculated dose consequences to the co-located worker in many accident scenarios.

However, the Board is concerned with the pace of this effort given that four years have passed since it transmitted Recommendation 2019-2 to DOE. The Board believes NNSA should prioritize evaluations and upgrades to engineered safety controls. SRTE is nearing the decision to proceed for one potential upgrade—the upgrade of an existing seismic tritium confinement system. For three of the five other potential upgrades discussed during the Board’s May 2023 visit to SRS, SRTE has not started feasibility analyses. SRTE’s current schedule shows upgrades being completed between 2031 and 2043. The Board believes it would be beneficial for NNSA to direct a more rapid pace and be prepared to commit resources to the safety initiatives it decides to implement.

Tritium Finishing Facility—NNSA has stated that its long-term plan to address the safety vulnerabilities at HAOM is to replace it with the Tritium Finishing Facility (TFF). However, NNSA has since placed the TFF project on hold. The contractor developed a bridging strategy focused on maintaining infrastructure at HAOM extending out to 2040. The strategy includes efforts such as replacing existing tritium air monitors and fire sprinklers as well as adding new fire suppression systems to the ventilated hoods. However, existing vulnerabilities for natural phenomena events remain at HAOM, and the bridging strategy provides only limited safety improvements in the interim.

SRTE Emergency Preparedness Program—While it is not appropriate to credit emergency response in mitigated dose consequence calculations in a safety basis, a robust emergency preparedness program can provide an additional safety layer of defense against significant radiological uptakes.

SRTE has self-identified several weaknesses in its drills, training, and program administration. These include a lack of full-time emergency management staff and concerns regarding the quality of training for facility responders. In response, SRTE developed and began executing a program improvement plan in August 2022. The actions completed thus far have demonstrated limited effectiveness. SRTE has filled some staffing vacancies, but the new team members lack relevant SRTE experience and staffing turnover and retention continue to pose a challenge. Prior to August 2023, SRTE had approved and executed a single drill scenario. More recently, SRTE has approved and executed several additional drill scenarios leading up to the annual emergency exercise, but neither the drills nor the recently completed annual exercise encompassed a high-consequence event.

The SRTE emergency preparedness program is not currently capable of preparing the SRTE workforce for major events analyzed in the safety basis. Based on the importance of this program in relation to worker protection, the Board believes NNSA should consider accelerating and prioritizing its improvement efforts.

Given the continuing risks at SRTE, the Board requests, pursuant to 42 United States Code 2286b(d), that DOE provide a report and briefing within six months of receipt of this letter on DOE’s progress on safety improvements at SRTE. The report and briefing should include a prioritized list of safety risk reduction efforts, allocated resources, and a schedule for completion.

Additionally, the Board requests a report and briefing every 12 months thereafter on progress of the facility and system upgrades, decisions made for proposed upgrades and analytical initiatives, and the impacts of safety risk reduction efforts. The annual report and briefing should include any changes and justification for those changes regarding prioritization, resource allocation, and schedule for safety risk reduction efforts since the previous report and briefing.

Sincerely,

A handwritten signature in black ink, reading "Joyce L. Connery". The signature is written in a cursive style with a large, looping initial "J".

Joyce L. Connery
Chair

c: Ms. Jill Hruby
Mr. Joe Olencz