

Report on the Secretary of Energy’s Final Decision and Supporting Reasoning Regarding Defense Nuclear Facilities Safety Board Recommendation 2019-2, *Safety of the Savannah River Site Tritium Facilities*

SUMMARY: This report, together with its attachments, documents the Secretary of Energy’s final decision and supporting reasoning regarding Defense Nuclear Facilities Safety Board (DNFSB or Board) Recommendation 2019-2, *Safety of the Savannah River Site Tritium Facilities*.

DISCUSSION: The Board issued Recommendation 2019-2 on June 11, 2019. The Recommendation focused on the Department of Energy (DOE) actions to improve the safety of the Tritium Facilities, upgrades to safety management programs, and the implementation of robust controls to prevent very high radiation doses, creating the potential for acute radiation sickness or fatality in a significant number of individuals. The Recommendation identified three specific subrecommendations.

As explained in detail in the Department’s September 10, 2019, response to the Recommendation (the text of which is included as Attachment 1 to this report), the Department of Energy’s National Nuclear Security Administration (DOE/NNSA) Administrator stated that DOE/NNSA’s safety programs and policies, and their effective implementation by our well-trained workforce, provide reasonable assurance of adequate protection of public health and safety. In addition, focused ongoing actions at the Tritium Facilities adequately address DNFSB concerns outlined in Recommendation 2019-2 and make the need for additional actions in response to the DNFSB Recommendation unnecessarily duplicative of that effort, and would, therefore, detract from our continued progress. The Administrator’s response, on behalf of the Secretary of Energy, constituted a full non-acceptance of the Recommendation.

Per *42 United States Code (USC) Section 2286d* paragraph (e), when the Secretary of Energy does not fully accept a Recommendation, the Board must either reaffirm or revise the recommendation, and the Secretary of Energy must then:

* * * consider the Board’s action and make a final decision on whether to implement all or part of the Board’s recommendations. Subject to subsection (i), the Secretary shall publish the final decision and the reasoning for such decision in the *Federal Register* and shall transmit to the Committees on Armed Services, Appropriations, and Energy and Commerce of the House of Representatives and the Committees on Armed Services, Appropriations, and Energy and Natural Resources of the Senate a written report containing that decision and reasoning.

The Board reaffirmed the Recommendation in a letter to the Secretary of Energy on December 5, 2019. In the letter, the Board provided the following context to support the Board’s decision:

“In rejecting Recommendation 2019-2, DOE presented several actions and plans in its September 10, 2019, letter and during the briefing on October 28, 2019, as addressing our concerns. We acknowledge that these ongoing and planned actions are aimed at addressing issues identified in Recommendation 2019-2. However, we are concerned these actions will not,

in the near term or long term, fully address the high consequences to workers. Further, we do not agree that ongoing actions and plans obviate the need for Recommendation 2019-2.”

The Board’s December 5, 2019, letter does not provide any new substantive information and reaffirms its original recommendation without changing it. The Board’s reaffirmation ignores the reasoning and analysis underlying the DOE/NNSA position and incorrectly asserts that the disagreement has to do with Board’s authority rather than the Board’s analysis.

In a letter dated January 3, 2020, the DOE/NNSA Administrator reaffirmed, on behalf of the Secretary, the Department’s September 10, 2019, response as the Secretary’s final decision regarding Recommendation 2019-2 (the text of which is included as Attachment 2 to this report).

The current Tritium Facilities' documented safety analysis contains appropriate safety significant controls, along with continuous improvement efforts and a new documented safety analysis, which is nearing completion, will strengthen that safety posture. The planned Tritium Finishing Facility (TFF), included in the President's Fiscal Year 2020 Budget Request, will fundamentally improve safety at Savannah River Site (SRS), as DOE/NNSA moves from the aging H-Area Old Manufacturing (HAOM) Facility to this new seismically-qualified facility. Furthermore, the SRS Emergency Management Program has demonstrated steady and significant improvement over the past several years and continues to provide adequate protection to the workforce and the public surrounding SRS.

DOE/NNSA has already initiated, and in some cases completed, the actions the DNFSB recommends and SRS tritium operations are providing adequate protection of public and additionally, workforce safety. Many significant long-term projects to enhance safety in SRS tritium operations are nearing completion. Notably, the ongoing major construction project to replace the HAOM Tritium Facilities with new, modern, and robust facilities is being supported by the Department and Congress.

These activities are significant and are the proper implementation of DOE/NNSA safety improvements at SRS. Therefore, DOE/NNSA concludes that the most efficient, effective, and quickest way to improve safety at the SRS Tritium Facilities is to continue with the current approach and path forward. As previously noted, DOE/NNSA actions and plans that would have responded to this recommendation are complete or underway and therefore are considered to have met the issues highlighted in the recommendation.

Attachment 1

Letter to the Honorable Bruce Hamilton from Lisa E. Gordon-Hagerty dated September 10, 2019



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



September 10, 2019

The Honorable Bruce Hamilton
Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

I appreciate the Defense Nuclear Facilities Safety Board's (DNFSB) continued support to the Department of Energy's National Nuclear Security Administration (DOE/NNSA) in the safe operation of our facilities. I am committed to ensuring DOE/NNSA continues to remain fully compliant in the safe operations of our defense nuclear facilities in a manner that provides adequate protection to the public, our workforce, and the environment. Secretary Perry has requested that I respond to DNFSB Recommendation 2019-2, *Safety of the Savannah River Site Tritium Facilities*, dated June 11, 2019. In responding, I first want to assure you that DOE/NNSA remains fully compliant and committed in our duties to the American public in the safe operation of these facilities as outlined in the enclosure to this letter. These actions address the concerns of the DNFSB and reflect how DOE/NNSA is providing adequate protection of the public's health and safety at the Tritium Facilities at the Savannah River Site (SRS). Therefore, I do not accept Recommendation 2019-2.

DOE/NNSA's safety programs and policies, and their effective implementation by our well-trained workforce, provide reasonable assurance that adequate protection of public health and safety is provided. Focused ongoing actions at the Tritium Facilities at SRS adequately address DNFSB concerns outlined in Recommendation 2019-2 and make the need for additional actions in response to a DNFSB Recommendation unnecessarily duplicative of that effort, and would, therefore, detract from our continued progress. Our commitment to safety in the Tritium Facilities remains un-wavering, and there has been no change in the conservative safety philosophy in the operation of the Tritium Facilities.

The Department believes that the current Tritium Facilities' documented safety analysis contains appropriate safety significant controls and the new analysis, which is nearing completion, will strengthen that safety posture. The planned Tritium Finishing Facility (TFF), included in the President's FY 2020 Budget Request, will fundamentally improve safety at SRS, as DOE/NNSA moves from the aging H-Area Old Manufacturing Facility to this new seismically-qualified facility. Furthermore, the SRS Emergency Management Program has demonstrated steady and significant improvement over the past several years and continues to provide adequate protection to the workforce and the public surrounding SRS. A comprehensive explanation of our safety improvement activities is detailed in the enclosure.



DOE/NNSA would be willing to brief DNFSB on our actions outlined in the enclosure and keep the Board updated over time. We appreciate the Board's perspectives and look forward to the continued positive interactions with you and your staff.

If you have any questions, please contact Ms. Nicole Nelson-Jean, Manager of the Savannah River Field Office, at (803) 208-3689.

Sincerely,

A handwritten signature in black ink, appearing to read "Lisa E. Gordon-Hagerty". The signature is stylized and includes a long horizontal flourish above the main text.

Lisa E. Gordon-Hagerty

Enclosure

**Department of Energy (DOE) Response to the June 11, 2019, DNFSB
Recommendation 2019-2, *Safety of the Savannah River Site Tritium Facilities***

Sub-recommendation 1 – Identify and implement near-term compensatory measures at SRS to mitigate the potential for high radiological consequences to individuals who would be impacted by a release from the Tritium Facilities.

Procedural reductions in the Material At Risk (MAR) have been completed in the Tritium Facilities. Each operating facility that makes up the Tritium Facilities has an associated MAR listed in the Documented Safety Analysis (DSA). When it was understood that the new analysis would increase the dose consequences, Savannah River Nuclear Solutions (SRNS) reduced tritium quantities in such facility through the Automated Reservoir Management System. These reductions are reflected in the DSA currently advancing through the approval process by the Department's approval process.

Over the past several years, the Department of Energy's National Nuclear Security Administration (DOE/NNSA) and the Savannah River Site (SRS) Management and Operating partner, SRNS, have taken actions to continue improving the Tritium Facilities safety posture. A new hazards analysis has been conducted along with a revision to the DSA. This new analysis has further emphasized identifying engineered controls over administrative controls. The Board's technical staff was recently provided a draft of the new DSA. The Department notes that even with the extreme conservatism in the analytical parameters, including a postulated simultaneous release of all tritium, from all the multiple facilities within 20 minutes; the postulated consequences to the public remain below the Evaluation Guideline of DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*.

In addition, hypothetical, worst-case modeling does not account for any Emergency Response exposure reduction actions, personnel self-protection actions, nor any subsequent response actions to mitigate the potential consequences. Based on the current DSA, and the new DSA in review, reasonable assurance of adequate protection is ensured and the risk to the public remains very low. It is anticipated that the new DSA will be approved in 2019. The actions taken in completing the DSA aligns with addressing the concerns raised in Recommendation 2019-2.

DOE/NNSA actions and plans that would have responded to this Sub-recommendation are complete or underway and therefore are considered to have met the objectives of this Sub-recommendation. DOE/NNSA is willing to brief the DNFSB on these actions on a recurring basis.

Sub-recommendation 2 – Identify and implement long-term actions and controls to prevent or mitigate the hazards and pose significant radiological consequences to acceptably low values consistent with the requirements of DOE directives.

As noted in the Recommendation, DOE/NNSA committed in 2011 to develop a new analytical model for dose consequences for SRS. In 2011, DOE/NNSA outlined a plan to update the atmospheric dispersion model, which was completed in 2014. Implementation of that new analysis began shortly thereafter and included a review of the safety controls selection and hierarchy. DOE/NNSA decided to combine all the Tritium Facilities' safety bases and to conduct a holistic revision to the DSA. The new analysis placed additional emphasis on engineered controls over administrative controls. After an extensive review, DOE/NNSA directed changes and updates to the draft DSA, including development of a formal strategy that will continue to strengthen the controls to protect co-located workers (CWs) from large energetic events postulated by the safety analysis. The revised DSA was delivered to DOE/NNSA in November 2018. Subject matter experts from across DOE/NNSA have completed a review of the resubmitted DSA and have generated a number of additional items requiring further action. The actions taken in completing the new DSA aligns with addressing the concerns raised in Recommendation 2019-2.

The new DSA includes a number of new credited features, including the 217-H Vault walls and fire damper, new Specific Administrative Controls (SACs) for fire water tank, and other new Fire Suppression Surveillances have been added. In addition, all current Programmatic Controls have been replaced by at least one SAC.

In 2018, recognizing the desire to reduce worker consequences, DOE/NNSA requested and received from SRNS a strategy for risk reduction to CWs (U-ESR-H-00163, Rev.0). This strategy describes the SRNS plans for additional structural analyses and control development, if required for the remaining facilities during a potential seismic event. This analysis will be used to determine suitability for upgrading the functional classification of additional controls. It also includes analysis for dose reduction (e.g. tritium oxidation conversion rates, plume rise phenomena, etc.). In the aggregate, the plan includes 19 commitments that are being pursued and managed (SRNS-T0000-2018-00227, *Transmittal of the Schedule for Implementing the Strategy for Risk Reduction to the Co-Located Worker in Tritium Facilities*).

Longer term plans include the construction of the Tritium Finishing Facility (TFF) capital line item project, to replace the aging HAOM 234-H facility with a seismically-qualified facility with a dedicated fire suppression system. The TFF project will mitigate potential risks to DOE/NNSA's Stockpile Stewardship Program stemming from housing operations in outdated facilities.

A formal Analysis of Alternatives (AoA) was performed and documented for the TFF project. The results of the AoA recommended the construction of new buildings instead of upgrading existing buildings that involve tritium operations. This will promulgate safety in design integration and the new TFF facilities will meet current DOE requirements. It is anticipated the TFF project will meet the Critical Decision-1 project milestone in early FY 2020. The current confinement strategy for TFF is based on the use of multiple physical barriers and active controls to include:

- Robust containers for the MAR.
- Robust Natural Phenomena Hazard Design Category-3 (NDC-3) structures preventing building collapse and impacts to containers.
- Robust NDC-3 fire suppression systems preventing the spread of a fire and mitigating the consequences of a release.
- Exhaust Ventilation with elevated release to mitigate consequences to CWs. Based on application of passive barriers and active controls, the mitigated consequence to both the public and CW from a release of radiological materials is either prevented or maintained at levels well below the Evaluation Guidelines.

As described above, DOE/NNSA is committed to improving the safety posture of the Tritium Facilities. The actions already taken and those in progress meet the requirements of our Directives. No additional actions are required at this time.

DOE/NNSA actions and plans that would have responded to this Sub-recommendation are complete or underway, and therefore, are considered to have met the issues highlighted and meet the intent of the recommendation. DOE/NNSA would be willing to brief the DNFSB on these actions on a recurring basis.

Sub-recommendation 3 – Evaluate the adequacy of the following safety management programs and upgrade them as necessary to ensure that SRS can effectively respond to energetic accidents at the Tritium Facilities, and that it can quickly identify and properly treat potential victims.

Sub-Recommendation #3 discusses the Site's capability to respond to a tritium event. The SRS and Tritium Facilities Emergency Management programs have made significant improvements over the past several years. The Emergency Preparedness (EP) program meets DOE Directives and is adequate to continue protecting the SRS workers and the surrounding public. We have recently evaluated the SRS safety management programs and found them to be adequate.

The current Emergency Management program provides the appropriate training required for individuals to respond to alarms, abnormal operations, and emergencies across SRS. The Tritium Facilities EP program maintains a fully qualified team which performs approximately 50 drills per year to train and validate the organizations ability to respond to various scenarios, from weather induced incidents to large energetic events. SRS EP support organizations, like the SRS Fire Department (FD), are trained and routinely evaluated to ensure that they can properly respond to an event in any facility across the site. For example, during the 2018 Site Exercise, the SRS emergency response team responded to a hypothetical complex multi-facility and multi-contractor event that included H-Area, Tritium, and H-Tank Farm. Site level evaluated exercise responses routinely involve multiple local, county, state, and federal agencies in the response efforts. In a trend to further challenge all response organizations, this latest exercise tested the Site's Emergency Response Organization (ERO) to manage a complex event with potential off-site consequences. There were issues identified in the exercise that SRS has addressed

and continues to address to improve the program, including identifying logistical challenges in the movement of people from impacted areas and then conducting appropriately scoped drills to validate the effectiveness.

DOE-SR, as the landlord at SRS, has overall responsibility of the Emergency Management Program for the site. As a continuous improvement item, DOE-SR, in conjunction with DOE/NNSA, will perform an evaluation of the items listed in Sub-recommendation 3. This evaluation will assess among other things the ability and preparedness of community emergency and medical resources. Results of this evaluation will be shared with the Board. Additionally, DOE-SR will reassess the program if Tritium source documents were to substantially change in the future.

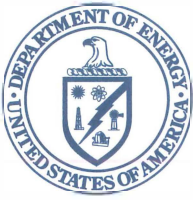
DOE/NNSA actions and plans that would have responded to this Sub-recommendation are complete, underway, or planned and therefore are considered to have met the objectives of this Sub-recommendation. DOE/NNSA is willing to brief the DNFSB on these actions and keep the Board updated on a reoccurring basis.

In summary, DOE/NNSA has already initiated, and in some cases completed, the actions the DNFSB recommends and SRS tritium operations are providing adequate protection of public safety. Many significant long-term projects to enhance safety in SRS tritium operations are nearing completion. Notably, the ongoing major construction project to replace the HAOM Tritium Facilities with new, modern, and robust facilities is underway and is being supported by the Department and Congress.

These activities are significant and are the proper implementation of DOE/NNSA safety improvements at SRS. Therefore, DOE/NNSA concludes that the most efficient, effective, and quickest way to improve safety at the SRS Tritium Facilities is to continue with the current approach and path forward. As previously noted, DOE/NNSA actions and plans that would have responded to this recommendation are complete or underway and therefore are considered to have met the issues highlighted and meet the intent of the recommendation.

Attachment 2

Letter to the Honorable Bruce Hamilton from Lisa E. Gordon-Hagerty dated January 3, 2020



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



January 3, 2020

The Honorable Bruce Hamilton
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

I continue to appreciate the Defense Nuclear Facilities Safety Board's (DNFSB or Board) support to the Department of Energy's National Nuclear Security Administration (DOE/NNSA) in the safe operation of our facilities. I remain committed to ensuring DOE/NNSA continues to conduct our national security mission in a manner that provides adequate protection to the public, our workforce, and the environment.

I am responding on behalf of the Secretary to your letter dated December 5, 2019, in which the Board reaffirmed its Recommendation 2019-2, *Safety of the Savannah River Site Tritium Facilities*. As I noted in my September 10, 2019, letter in response to Recommendation 2019-2, I want to assure you that DOE/NNSA remains fully compliant and committed in our duties to the American public in the safe operation of these facilities as outlined in my enclosure to that letter. In light of the Board's reaffirmation of the Recommendation, the reasoning and analysis underlying DOE/NNSA's position is provided below.

As indicated in my September 10, 2019, letter and reiterated at the Board's October 28, 2019, public meeting, the basis for DOE/NNSA not accepting Recommendation 2019-2 is rooted in our conclusion that the Savannah River Tritium Enterprise (SRTE) provides adequate protection of the public and worker safety. DOE/NNSA action on this Recommendation was not influenced by any considerations related to the purview of the Board's nuclear safety oversight responsibilities. While the Board Recommendation cites high postulated worker consequences in the SRTE safety analysis, these calculations do not represent expected dose consequences to onsite personnel. Instead, these highly conservative theoretical analyses are designed to inform the safety controls selection process and identify quality requirements for selected controls.

The Board's December 5, 2019, letter provides no new substantive information and reaffirms its original recommendation without changing it. Therefore, DOE/NNSA's previous bases for not accepting the Recommendation still apply as summarized below.

SRTE is relatively remote and our conservative analysis of bounding accident scenarios demonstrate that the dose to the public is below the evaluation guideline used to evaluate the need for the highest quality safety controls. DOE/NNSA has established a robust set



of safety management programs and emergency response procedures to augment the specific administrative controls and engineered safety systems identified in the SRTE documented safety analysis. The workforce at SRTE is well trained and has a recognized history of strong performance implementing DOE's defense-in-depth strategy and executing work safely. After considering all these factors, DOE/NNSA is confident that the risk to our workforce is comparable to or less than other normally-accepted industrial risks.

Altogether, DOE/NNSA concludes that we are providing adequate protection to the public and the workers at SRTE. Additionally, focused ongoing actions at the Tritium Facilities at SRS adequately address DNFSB concerns discussed in the Recommendation and make the need for additional response actions unnecessarily duplicative of our effort. Therefore, while I welcome continued productive interactions with the Board on the safety posture of SRTE, I do not accept Board Recommendation 2019-2. This letter constitutes the Secretary's final decision pursuant to 42 U.S.C. § 2286d(e).

If you have any questions, please contact Ms. Nicole Nelson-Jean, Manager, Savannah River Field Office, at (803) 208-3689.

Sincerely,

A handwritten signature in black ink, reading "Lisa E. Gordon-Hagerty". The signature is written in a cursive style with a long horizontal line extending to the right from the end of the name.

Lisa E. Gordon-Hagerty