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**DEFENSE NUCLEAR FACILITIES  
SAFETY BOARD**

Washington, DC 20004-2901



June 4, 2018

The Honorable James Richard Perry  
Secretary of Energy  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-1000

Dear Secretary Perry:

On March 5, 2018, the Savannah River Field Office issued a letter to Savannah River Nuclear Solutions that noted that the revised safety basis for the tritium facilities described multiple credible events that would result in high dose consequences to the co-located worker. The letter requested that Savannah River Nuclear Solutions develop a strategy to reduce those consequences. DOE has delayed discussions with the Defense Nuclear Facilities Safety Board's staff until its safety basis documents are approved and final, which is not expected to occur until the end of 2018 at the earliest. However, the Board is concerned that its timely communication on critical safety matters must occur. Therefore, we are communicating concerns regarding the revised tritium facilities safety basis and analyses identified thus far.

The enclosure describes the Board's current concerns regarding the Savannah River Site revised tritium facilities safety basis and analyses. The Board will review DOE's approved revision to the Savannah River Site tritium facilities safety documentation and provide you with our independent analysis and advice regarding any additional items of concern.

Yours truly,

A handwritten signature in black ink that reads "Bruce Hamilton". The signature is fluid and cursive, with the first name "Bruce" and last name "Hamilton" clearly distinguishable.

Bruce Hamilton  
Acting Chairman

Enclosure

c: Mr. Joe Olencz

## Enclosure

***Evaluation of Dose Consequences***—According to the revised Consolidated Hazard Analysis (CHA) and Documented Safety Analysis (DSA), there are a number of events that have a “high” residual radiological dose consequence to co-located workers (CWs) and facility workers (FWs). The safety basis does not quantitatively analyze the residual dose consequences to the FW, but the residual dose consequences to the CW—assumed to be 100 meters from the event—are often thousands of rem total effective dose. In both cases, the Board is concerned that there is a need to evaluate and implement additional safety controls. These controls may be needed to prevent radiation-induced acute injury or fatality to FWs and CWs, in accordance with the Department of Energy’s (DOE) standards. Furthermore, the revised DSA evaluates several events that, after application of the credited safety-class controls, still have mitigated radiological dose consequences to the maximally-exposed offsite individual that may challenge the evaluation guideline of 25 rem total effective dose; however, the DSA does not evaluate or identify additional safety-class controls.

***Application of Facility Worker Self-Protection***—The revised CHA contains various hazardous events that have a high unmitigated dose consequence to the FW. In many of these events, this high dose to the FW is assumed to be mitigated by the FW promptly evacuating after initiation of the event. The basis for crediting the prompt evacuation of the FW in situations such as rapidly developing events or events that would require personnel to remain in place has not been made available.

***Application of Administrative Controls***—There are multiple instances in the revised DSA where administrative controls are not clearly applied. For example, the revised DSA states that one event that could cause a release of tritium is prevented from occurring by “[f]acility procedures ensur[ing] the available volume in a water trap is sufficient prior to [operation].” The safety basis documentation neither notes the specific actions included in the procedures, nor does it require DOE or the National Nuclear Security Administration to approve them. This water trap is credited as a safety-significant control to protect the FWs and CWs. The operator action needed to ensure the safety function of the water trap may not be adequately protected in the safety basis. Additionally, there are no specific controls for the Critical Lift Program, which prevents critical lifts from occurring within a certain distance of active gas transfers, in the safety basis. It is unclear how that administrative control is protected in the safety basis.

***Various Analytical Assumptions or Conclusions***— There are certain assumptions or conclusions in the revised CHA that are potentially non-conservative in nature or contrary to DOE standards or guidance. For example:

- The CHA states that “[i]n the case of a seismic event, the loss of building confinement does not allow flammable vapors to accumulate due to the diffusion of tritium.” The technical analysis supporting this conclusion has not been available.
- The CHA states that there are “several [explosion] events identified with residual high consequence to the CW. Some of these were determined to be [beyond extremely unlikely] either unmitigated or with the application of controls.” There is a similar

statement regarding events with consequences to the FW. The Board is concerned that further evaluation of these events was omitted based on a low frequency of occurrence even though some are operational accidents (e.g., drop or internally generated impact), and should be addressed as such.

- The CHA states that “[i]t is not physically possible for the 296-H stack to impact Building 217-H due to seismic or tornado events.” The primary calculations that led to this assumption conclude that failure of the stack will not occur below a certain height on the stack. The Board is not aware of any accepted industry approach that follows this methodology.
- The CHA assumes that, in events where multiple tritium containers are at risk of impact damage, only five percent of the containers are subject to release. The quantitative analysis supporting this assumption has not been available.