DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Washington, DC 20004-2901

August 21, 2015

Dr. Monica Regalbuto
Assistant Secretary for
Environmental Management
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Dr. Regalbuto:

The Defense Nuclear Facilities Safety Board (Board) is concerned that a Specific Administrative Control (SAC) has been removed from the preliminary design of Phase 1 of the Hanford Sludge Treatment Project, also known as the Engineered Container Retrieval and Transfer System. The SAC was originally included in the design to protect the public by controlling public access to portions of the Columbia River prior to and during slurry transfers of radioactive material. The Department of Energy (DOE) Richland Operations Office approved the removal of the SAC, and currently plans to control access to the River under emergency conditions only. Relying on emergency response would not adequately protect individuals located on the River in the event of a rapidly developing accident, such as a spray release. Such individuals could be exposed to a significant radiological dose. Supporting information is provided in the enclosed report.

Pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 45 days of receipt of this letter that describes 1) DOE's position on controlling River access and protecting public receptors from accidents during slurry transfers, and 2) the technical basis for this position.

Sincerely,

Joyce L. Connery
Chairman

Enclosure

c: Ms. Stacy Charboneau
Mr. Joe Olencz

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

June 10, 2015

MEMORANDUM FOR: S. A. Stokes, Technical Director

COPIES: Board Members

FROM: J. Meszaros, J. Abrefah, F. Bamdad, and P. Migliorini

SUBJECT: Hanford Site Boundary Definition and the Associated Impact on Phase 1 of the Sludge Treatment Project

Summary. This report documents a safety issue identified by members of the Defense Nuclear Facilities Safety Board's (Board) staff during a review of Revision 1 of the Sludge Treatment Project (STP) Engineered Container Retrieval and Transfer System (ECRTS) Preliminary Documented Safety Analysis (PDSA) [1] at the Hanford Site. Revision 1 of the STP ECRTS PDSA was approved by the Department of Energy (DOE) Richland Operations Office (RL) in February 2015 [2]. The staff team conducted its review at Hanford during the week of February 23, 2015, and is concerned about the project's removal of a Specific Administrative Control (SAC) from the PDSA that would have controlled access to the Columbia River during slurry transfers. Additionally, the staff is concerned whether the project's definition of the "site boundary," which is used to determine safety classification of controls, is consistent with that included in DOE Standard (STD) 3009-94, Change Notice 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses* [3]. Finally, some design basis STP accidents rapidly develop and release radioactive materials. Thus, the staff team questions whether members of the public, who may be on the River when an accident occurs, are adequately protected by hazard controls provided in this new revision of the ECRTS PDSA.

Background. Members of the Board's staff closely followed design activities and the safety basis development of the STP, which is a subproject of the K Basins Closure Project at the Hanford Site. The mission of the STP is to dispose of the radioactive sludge currently stored at the 105-K West Basin. The sludge is a combination of metallic spent fuel particulates, associated corrosion products, debris from fuel storage racks and containers, windblown dust, and spallation products from the fuel basin concrete walls and floors. The sludge is stored under water in six engineered containers within the 105-K West Basin. Phase I of the STP, also known as ECRTS, will transfer approximately 27 cubic meters of sludge as slurry in batches through a hose-in-hose transfer system into Sludge Transport and Storage Containers (STSCs) located in an annex that is currently under construction. Once loaded, the STSCs will be transported by truck in Sludge Transport System casks to T-Plant for interim storage.

Per the ECRTS Code of Record, project analysts responsible for the PDSA determined the safety classification for structures, systems, and components (SSCs) using DOE-STD-3009-94. This standard requires that calculations be performed to evaluate the dose to a hypothetical maximally-exposed offsite individual (MOI) at the site boundary and determine whether facility hazards require safety class controls. In the original revision to the PDSA, analysts based classification of SSCs on the radiological dose consequence to a MOI who is over 10,000 meters from the 100-K Area. In a letter dated December 22, 2010, the Board emphasized that public access to the Columbia River, which is approximately 500 meters from the 100-K Area, should be considered in determining the safety classification for SSCs. Rather than consider safety class controls, the project proposed a SAC in the original revision of the PDSA that would have controlled public access to key portions of the Columbia River prior to and during 100-K Area slurry transfers.

Project analysts implemented and DOE-RL personnel approved an initiative related to spray release analyses in a 2015 revision to the ECRTS PDSA. This initiative resulted in reduced calculated dose consequences to all hypothetical receptors. Thus, project analysts removed the SAC controlling access to portions of the Columbia River from this PDSA revision. Although the PDSA revision still considers a MOI located approximately 10,000 meters from the 100-K Area, the 2015 PDSA also includes revised unmitigated accident dose consequences at the near bank of the Columbia River for information only. Consequences from a spray release at the near bank of the Columbia River are 5.8 rem Total Effective Dose; thus, they still challenge the evaluation guideline as described in § A.2.1, Public Protection Criteria, of DOE-STD-1189-2008, *Integration of Safety into the Design Process* [4].

Discussion. The staff team believes that the near bank of the Columbia River, which at certain locations is approximately 500 meters from the 100-K Area, meets the DOE-STD-3009-94 definition of "site boundary." DOE-STD-3009-94 defines the "site boundary" as "a well-marked boundary of the property over which the owner and operator can exercise control without the aid of outside authorities." DOE-RL and its contractor do not control access to the River during normal conditions. Further, control of key portions of the River during emergency conditions is managed by the Benton County Sheriff's Office through a Memorandum of Understanding with DOE-RL. Relying on an outside entity in this manner to control the River during emergency conditions does not meet the language specified in DOE-STD-3009-94 for excluding members of the public on the River from the consequence analysis.

The staff team believes in this case that the use of outside authorities to control key portions of the River during emergency conditions does not protect public receptors located on the River at the time of an accident. Some design basis accidents (e.g., a spray release accident) can occur in a relatively short time frame. As such, offsite emergency personnel likely cannot respond in time to protect the public on the River from associated dose consequences.

Conclusion. The staff team believes that to comply with the cited requirements in DOE-STD-3009-94 and DOE-STD-1189-2008 and to protect the public, DOE-RL must either reconsider a SAC that would control access to key portions of the Columbia River during slurry transfers, or consider implementing safety class controls to prevent or mitigate accident scenarios that impact public receptors on the Columbia River.

References

[1] CH2M HILL Plateau Remediation Company, *Preliminary Documented Safety Analysis for the Sludge Treatment Project Engineered Container Retrieval and Transfer System*, PRC-STP-00718, Rev. 1, March 2015.

[2] Charboneau, S., *Contract No. DE-AC06-08RL14788 – Transmittal of the Preliminary Documented Safety Analysis (PDSA) for the Sludge Treatment Project (STP) Engineered Container Retrieval and Transfer System (ECRTS), and the STP Safety Design Strategy (SDS) for the Richland Operations Office (RL) Approval*, letter to J. A. Ciucci, February 5, 2015.

[3] Department of Energy, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, DOE-STD-3009-94, Change Notice 3, Washington, D.C., March 2006.

[4] Department of Energy, *Integration of Safety into the Design Process*, DOE-STD-1189-2008, Washington, D.C., March 2008.