Department of Energy
Washington, DC 20585

April 2, 2012

The Honorable Peter S. Winokur
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, DC 20004

Dear Mr. Chairman:

The Department of Energy (DOE) Office of River Protection Acting Manager submitted a letter dated February 10, 2011, to the Defense Nuclear Facilities Safety Board (Board) Technical Director that described the path forward for improving the Double Shell Tank (DST) primary ventilation systems. The letter included the commitment to direct the Tank Operations Contractor (TOC), Washington River Protection Solutions (WRPS), to designate the existing DST ventilation systems as safety significant and to prepare a safety basis amendment to implement this directed change. This was followed by a letter from the former Assistant Secretary for Environmental Management to the Board on February 25, 2011, affirming the plans to amend the safety basis. WRPS was directed to take this action on March 1, 2011, along with additional direction to perform a gap analysis to identify differences between the functional/performance requirements for the systems to perform their safety function and the existing system designs. The gap analysis was used to identify planned improvements to the DST primary ventilation systems.

The TOC submitted a draft of the proposed safety basis amendment to DOE on July 25, 2011. The planned improvements proposed in the amendment identified some fundamental concerns such as the inability to complete system evaluations to document how the functional/performance design requirements for designating safety significant systems are met, without performing an extensive design basis reconstitution effort. Upgrades are planned for three of the five DST primary tank ventilation systems that will replace or modify all the existing system components. The amendment proposes to complete the system evaluations as part of the upgrade rather than attempt to reconstitute the design basis of the existing systems. For the two newest DST primary tank ventilation systems (systems that had previously been replaced), the system evaluations will need to be completed to identify the critical characteristics of the systems.

Due to the nature of the planned improvements, coupled with the level of effort needed to identify the critical characteristics of replacement system components in the absence of a complete system evaluation, the TOC determined that simply designating the existing DST primary ventilation systems as safety significant would adversely result in extended times when the DST primary tank ventilation systems would not be available.

This would result in prolonged entries into associated Technical Safety Requirement Limiting Condition for Operation (LCO) action statements. The basis for this conclusion is provided as an enclosure to this letter. Thus, the draft safety basis amendment states (and DOE has concurred via its Safety Evaluation Report) that the existing DST primary tank ventilation systems will remain General Service until the planned improvements identified in the amendment are completed.

In the interim, DOE is taking a number of compensatory measures. Specifically, accumulation of flammable gas will be prevented by ensuring that a specified flow is maintained through the headspace of the DST. In early calendar year 2013, the TOC will implement LCOs to verify the flow rate through surveillance requirements. Implementing this LCO will require system modifications to install a second flow measurement port in the ventilation trains to meet the American Society of Heating, Refrigerating and Air-Conditioning Engineers Standard 111-2008, *Testing, Adjusting, and Balancing of Building HVAC Systems*, requirements for flow measurement. These modifications will be completed in January 2013, when the LCO will be fully implemented. If air flow to the in-service DST primary tank ventilation train is interrupted, the LCO action statements to switch to a standby ventilation train will be entered. There are also surveillance requirements associated with that LCO for standby DST primary tank ventilation train to ensure its operability. The surveillance requirements and required actions in the proposed LCOs also ensure safety even when both ventilation trains are inoperable through initiation of flammable gas monitoring and implementation of ignition controls prior to the flammable gas accumulating to hazardous levels.

Furthermore, priorities for maintenance of the DST primary tank ventilation systems will be a Priority 2 [High] (Restore the system to operability in accordance with the LCO Required Action Completion Times) or a Priority 1 [Rapid] (Correct a condition that will result in a permit violation or regulatory compliance violation if not corrected immediately), in accordance with the TOC maintenance priority system.

In addition, the DST ventilation systems will be subject to the full TOC configuration management requirements similar to safety-significant structures, systems, or components, with the exception that the equipment will not be entered into the Safety Equipment Compliance Database until the identified planned improvements are completed. This ensures no changes will be made that could compromise the ability of the systems to be upgraded to safety significant.

The safety basis amendment will result in an enhanced safety posture by improving the availability of the ventilation systems until the longer-term planned improvements are completed. Safety is also enhanced by the requirement to maintain operation of an active ventilation system instead of the current control strategy that relies on flammable gas monitoring. In summary, the LCOs for the DST primary tank ventilation systems will prevent the hazard and will be in place while the existing systems are upgraded to support designation as safety significant by the proposed planned improvements discussed below.

Until January 2013, when the system modifications for measuring tank air flow are complete and the safety basis amendment is implemented, the TOC is continuing to implement the existing special administrative controls written in LCO format for flammable gas control.

The identified long-term planned improvements include replacement of three of the five DST primary ventilation systems. These ventilation upgrades are being managed as an ongoing tank farms project. The existing schedule is for these to be completed in fiscal year (FY) 2014. Specifically, completion of the AY/AZ system is scheduled for FY 2014, the AP system is scheduled for FY 2013, and the SY system is scheduled for FY 2013. As funding profiles become clearer, DOE will reevaluate the schedule and approve any necessary baseline changes for cost and schedule to reflect available funding.

The other planned improvements vary in complexity and duration but all can be completed in less than 3 years upon DOE authorization to proceed. These planned improvements include the installation of safety-significant backup diesel generators, installation of safety-significant instrumentation to measure exhaust airflow, and evaluation of the existing below-grade ductwork. Other planned improvements are specific to the AN and AW primary tank ventilation systems (systems that are not being replaced) such as the replacement of the existing control systems with safety-significant control systems.

If you have further questions, please feel free to contact me or Mr. Matthew Moury, Deputy Assistant Secretary for Safety, Security, and Quality Programs, at (202) 586-5151.

Sincerely,

David Huizenga
Senior Advisor
for Environmental Management

Enclosure

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ENCLOSURE

The Department of Energy (DOE), Office of River Protection (ORP) letter 11-AMD-054, dated March 1, 2011, directed that the double-shell tank (DST) primary tank ventilation systems be designated safety significant (SS) and that a safety basis amendment be prepared to implement this directed change. The resulting safety basis controls include the SS DST primary tank ventilation systems and Technical Safety Requirement Limiting Conditions for Operation (LCO) that ensure their operability and operation. The safety function of the DST primary tank ventilation systems is to maintain the concentration of flammable gases below the lower flammability limit (LFL) in the DST headspace resulting from steady-state releases and induced gas release events due to water additions, chemical additions, and waste transfers into DSTs. A margin of safety is established to maintain the flammable gas concentration ≤ 25 percent of the LFL.

In accordance with the requirements in DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses,* a safety basis amendment was prepared that establishes functional/performance requirements and performs a system evaluation of the DST primary tank ventilation systems to ensure the safety function is met for normal and off-normal conditions and events including design-basis natural phenomena (i.e., process conditions, environmental conditions, and structural design loads). The documentation used to evaluate and qualify the systems must be developed in accordance with the requirements of 10 CFR 830, "Nuclear Safety Management," Subpart A, and American Society of Mechanical Engineers (ASME) NQA-1, *Quality Assurance Requirements for Nuclear Facilities Applications*.

The Tank Operations Contractor (TOC), Washington River Protection Solutions LLC (WRPS) quality assurance program (QAP) was developed to meet the requirements of 10 CFR 830 Subpart A. As identified in TFC-PLN-02, *Quality Assurance Program Description*:

> 10 CFR 830.121 requires the Quality Assurance (QA) Program to be developed by the contractor and applied to nuclear facilities and nuclear-related items and activities.
>
> The QAP is: …Planned, implemented, and maintained in accordance with the quality requirements that are derived from 10 CFR 830 Subpart A and DOE O 414.1C criteria and implemented using NQA-1 2004 with addenda through 2007 national consensus standard.

NQA-1, Requirement 3, Design Control, Section 300, Design Process states:

> The responsible design organization shall prescribe and document the design activities to the level of detail necessary to permit the design process to be carried out in a correct manner, and to permit verification that the design

> meets the requirements. Design documents shall support facility design, construction, and operation....
>
> The design methods, materials, parts, equipment, and processes that are essential to the function of items shall be selected and reviewed for suitability of application.
>
> Identify assemblies and/or components that are part of the item being designed. When such an assembly or component part is a commercial grade item, the critical characteristics of the item to be verified for acceptance and the acceptance criteria for those characteristics shall meet the requirements of Part II, Subpart 2.14, Quality Assurance Requirements for Commercial Grade Items and Services.

NQA-1, Requirement 4, Procurement Document Control, Section 202, Technical Requirements states:

> Technical requirements shall be specified in the procurement documents. These requirements shall be specified, as appropriate by reference to specific drawings, specifications, codes, standards, regulations, procedures, or instructions, including revisions thereto that describe the items or services to be furnished. The procurement documents shall identify appropriate tests, inspections, and acceptance criteria for determining acceptability of items or services.

NQA-1, Requirement 8, Identification and Control of Items, Section 100, General states: "Controls shall be established to assure that only correct and accepted items are used or installed."

Based on the above requirements, the TOC created the Functions and Requirements Evaluation Document (FRED) that captures the functional requirements and the performance criteria. The hazard and accident analyses performed in the development of the Documented Safety Analysis (DSA) identify the safety function and the specific accident conditions for which the structures, systems or components (SSC) is required to meet the safety function. The FRED establishes the specific operating and environmental conditions associated with the accidents. The FRED also establishes the functional requirements and identifies the configuration requirements (critical characteristics) and controls (tests and inspections) required to verify the SSC meets the functional requirements. Each test or inspection is verified to be completed successfully and each critical characteristic of the SSC is verified prior to adding the SSC to the Safety Equipment Compliance Database (SECD).

The SECD is used to identify the Safety Significant (SS) SSCs that are qualified and available for use. Should system components fail after qualification, the system is flagged as inactive and is no longer available for use until replacement components are procured that meet the qualification requirements identified in the FRED. Upon

verification that all critical characteristics and requirements in the FRED are met, the replacement/repaired component can be installed and the SS SSC added back to the SECD and released for use. Thus the FRED fulfills a critical role in ensuring each component of each SSC is capable of meeting its identified functional requirements and performance criteria. As stated above, to meet NQA-1 requirements these critical characteristics and controls must be established and demonstrated prior to installing the SS item.

ORP letter 11-AMD-054 also directed that a gap analysis be performed to identify differences between the functional/performance requirements for the SS DST primary tank ventilation systems to perform their safety function and the existing system designs. The evaluation of the DST primary tank ventilation systems, which includes the results of the gap analysis, is documented in RPP-RPT-49447, *Safety-Significant DST Primary Tank Ventilation Systems – Functions and Requirements Evaluation Document*, and summarized in the draft DSA amendment Section 4.4.4, "DST Primary Tank Ventilation Systems." The evaluation is based on the available design information for the existing General Service DST primary tank ventilation systems and identifies the planned improvements required for the systems to be classified as SS. It should be noted that one of the identified planned improvements was verification of how the functional/ performance requirements are met by the design.

Basis for Maintaining the Existing DST Ventilation Systems as General Service

The TOC reviewed the options to implement the directed change for designating the existing DST ventilation systems as SS. When a component is qualified as SS, a technical evaluation is required to establish the critical characteristics (physical attributes) and controls (test and analyses) that demonstrate the component can perform the safety function for the normal and off-normal conditions and events for which the SSC is credited. The technical evaluation and associated critical characteristics and controls are captured in the FRED. Documents to demonstrate the critical characteristics and controls have been met are then developed and referenced in the Safety Equipment Compliance Database prior to placing the SS equipment into service. The critical characteristics and controls can then be used to procure replacement parts.

The current FRED for the DST Primary Tank Ventilation Systems identifies the loading conditions (including design basis natural phenomena), process conditions, environmental conditions, and other conditions for which the ventilation systems must operate. An adequate technical evaluation for the DST primary tank ventilation system components has not been completed, as reflected in the DSA. This results in a fundamental gap that prevents the identification of the critical characteristics. These technical evaluations will be performed for the new 241-AP, 241-AY/AZ, and 241-SY primary tank ventilation systems.

For the existing 241-AN and 241-AW primary tank ventilation systems, functional requirements were identified after the systems were designed and installed, thus the design records will have to be retrieved and assessed against the identified functional

requirements before the technical evaluations can be completed. It is very likely that some design reconstitution will be necessary to complete the evaluation of these systems. Until the planned improvements are complete and the critical characteristics and controls for the ventilation system SS SSCs are identified, the existing ventilation system cannot be credited as SS. In the interim, LCOs will be implemented in early calendar year 2013 to ensure the required flow to meet the ventilation system safety functionality. Until January 2013 when the safety basis amendment is implemented, the TOC is continuing to implement the existing specific administrative controls written in LCO format for flammable gas control.

ORP considered grandfathering the DST primary tank ventilation systems to classify the existing system as SS (i.e., prior to completion of the planned improvements and identification of critical characteristics). However, the grandfathered systems would not meet any SS requirements). Furthermore, grandfathering would require ORP to accept the risk of crediting the SSCs even though there is no qualification documentation to support SS qualification. Additionally, the Washington River Protection Solutions could not identify a reasonable method to procure the requisite quality pedigree replacement components in the event of a failure of existing SSCs. Using this approach for the DST primary tank ventilation systems would require operating in a LCO action statement (e.g., LCO 3.1.A.2.1: sample/monitor the flammable gas concentration in the headspace of each tank in the affected tank farm within 60 hours and once per 72 hours thereafter) until the technical evaluation could be developed for the specific failed component and the critical characteristics and controls established. This would result in extended times when the DST primary tank ventilation systems are not operable and extended entry into the LCO action statements would be required (i.e., the system would be inoperable until a qualified replacement part could be procured and installed). This is counter to the goal of increasing the availability of the DST primary tank ventilation systems.

Another even less technically defensible option would be to amend the DSA to include the requirement for SS DST primary tank ventilation systems without grandfathering the current SSCs. The existing systems would then be declared non-compliant and a Justification for Continued Operation (JCO) could be processed. The conditions for closure of the JCO would be identified as planned improvements. The resulting JCO would remain open for years while the planned improvements are completed. This option runs counter to the intent of DOE G 424.1-1B, *Implementation Guide for Use in Addressing Unreviewed Safety Question Requirements*. In the meantime, only qualified replacement components could be used, again resulting in extended times when the DST primary ventilation systems are not operable and extended entry into the LCO action statements.

Under the proposed DSA amendment as submitted, the existing DST primary tank ventilation systems will remain categorized as General Service until the identified planned improvements are completed. The required flow rates to maintain the flammable gas concentration within the required safety function (less than or equal to 25 percent of the LFL) will be ensured through the LCO surveillance requirements. Furthermore, DST primary tank ventilation system components will continue to be procured as General

Service until the technical evaluations to establish the critical characteristics and controls are completed for the existing DST 241-AN and 241-AW primary tank ventilation systems and the new 241-AP, 241-AY/AZ, and 241-SY primary tank ventilation systems. Once the technical evaluations are completed, RPP-RPT-49447 will be updated, and the DSA will be revised to identify the SSCs as SS. This will be done on a tank farm basis as identified in the planned improvements.

References

1. 10 CFR 830, February 2002, "Nuclear Safety Management," *Code of Federal Regulations*.
2. ASME NQA-1, *Quality Assurance Requirements for Nuclear Facilities Applications*, American Society of Mechanical Engineers, New York, New York.
3. DOE-STD-3009-94, 2002, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*, Change Notice No. 3, U.S. Department of Energy, Washington, D.C.
4. ORP letter from J. A. Dowell and S. E. Bechtol to C. G. Spencer, WRPS, "Transmittal of Contract Modification 094 and Request for Proposal to Upgrade the Double-Shell Tank Primary Ventilation Systems to Safety-Significant," 11-AMD-054, dated March 01, 2011.
5. RPP-RPT-49447, 2011, *Safety-Significant DST Primary Tank Ventilation Systems – Functions and Requirements Evaluation Document*, Rev. 0, Washington River Protection Solutions, Richland, Washington.
6. TFC-PLN-02, 2011, *Quality Assurance Program Description*, Rev. G-1, Washington River Protection Solutions, Richland, Washington.