Department of Energy
Washington, DC 20585

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DNF SAFETY BOARD

The Honorable Jessie H. Roberson
Vice Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue NW, Suite 700
Washington, DC 20004

Dear Ms. Vice Chairman:

Enclosed is the Department of Energy's (DOE) Office of Environmental Management (EM) evaluation in response to the Defense Nuclear Facilities Safety Board's February 2 letter identifying confinement ventilation system ("CV5") concerns associated with the Safety Design Strategy (SDS) for the High-Level Waste (HLW) Facility at the Hanford Waste Treatment and Immobilization Plant. Your letter requested a written report documenting DOE's plan to develop a nuclear safety control strategy such that the C5V system will be able to perform its intended safety functions effectively in the event of a seismic design basis accident.

The HLW SDS serves as the strategic approach document for use during development of design changes necessary to align the SDS, design, and preliminary documented safety analysis (PDSA). EM intends to have both the SDS and the PDSA revised. The resolution of technical and design issues contributing to risk will influence the final selected HLW control strategy. The hazards analysis process is expected to start in the summer of 2015, with completion projected by the end of 2017 to support a revised PDSA. This revised PDSA will ensure all credited safety related systems will be able to perform their intended safety functions.

In response to the Board's letter, ORP prepared the enclosed document, *Evaluation to Support Development of the U.S. Department of Energy Response to Defense Nuclear Facilities Safety Board Letter Issued Regarding the Plan to Develop a Nuclear Safety Strategy to Ensure the High-Level Waste Facility Ventilation System Will Effectively Perform its Intended Safety Functions Following a Seismic Design Basis Accident.*

If you have any further questions, please contact me or Mr. James Hutton, Deputy Assistant Secretary for Safety, Security, and Quality Programs, at (202) 586-5151.

Sincerely,

Mark Whitney
Acting Assistant Secretary
for Environmental Management

Enclosure

Attachment
to
15-NSD-0018

Evaluation to Support Development of the U.S. Department of Energy Response to Defense Nuclear Facilities Board Letter Issued Regarding the Plan to Develop a Nuclear Safety Strategy to Ensure the High-Level Waste Facility Ventilation System Will Effectively Perform its Intended Safety Functions Following a Seismic Design Basis Accident

(total number of pages, 3)

John P. Harris
Nuclear Safety Division

Evaluation to Support Development of the U.S. Department of Energy Response to Defense Nuclear Facilities Safety Board Letter Regarding the Plan to Develop a Nuclear Safety Strategy to Ensure the High-Level Waste Facility Ventilation System Will Effectively Perform its Intended Safety Functions Following a Seismic Design Basis Accident

The purpose of this evaluation is to document a response to the Defense Nuclear Facilities Safety Board, referred to hereafter as the Board, concerns provided in a letter issued on February 2, 2015, regarding High-Level Waste (HLW) Facility equipment classification based upon seismically initiated offgas/ventilation system events as it relates to the Hanford Waste Treatment and Immobilization Plant document 24590-HLW-PL-ENS-13-0001, *Safety Design Strategy for the High-Level Waste Facility*. As documented in 24590-HLW-PL-ENS-12-0001, *Safety Basis Development Project Execution Plan for the High-Level Waste Facility*, all HLW design basis accident scenarios will be addressed to support development of a compliant 10 CFR 830, "Nuclear Safety Management," Subpart B, "Safety Basis Requirements," safety basis for the HLW Facility thus providing an assurance of adequate protection of the public and workers.

Implementation and management of the safety design strategy (SDS) is described in procedure 24590-WTP-3DP-G04B-00022, *Licensing Documents*, which defines project responsibilities and processes for SDS use and maintenance. The HLW SDS "... serves as the strategic approach document for [BNI] Engineering and Nuclear Safety Engineering to use during the development of design changes necessary to align the SDS, design, and the [preliminary documented safety analysis]" (24590-HLW-PL-ENS-13-0001). The SDS also states that the resolution of technical and design issues will influence the selected HLW control strategy. Incorporation of the SDS into the preliminary documented safety analysis (PDSA) will change PDSA credited controls thus requiring the U.S. Department of Energy (DOE) approval. The Board is correct in stating that the SDS safety control strategy for a seismic event could result in potential unfiltered flowpaths to nonfacility receptors. The understanding of how such an event(s) progresses is vital to establishing the necessary control set for adequately protecting the public and workers, as discussed in this document.

The associated Staff Issue Report, provided with the Board's letter, discussed impacts of SDS control strategies relating to submerged bed scrubbers and the HLW melter offgas treatment system (HOP) high-efficiency particulate air (HEPA) filters. The unmitigated public consequence for the bounding seismic event is assumed to be ***High*** in the SDS (see footnote **a** in Table B-2, "Facility NPH Events" of the SDS). Note that the seismic release is a combination of multiple releases with the offgas release being a less significant contributor. More specifically, the seismic classification of the HOP components in the SDS was based on the unmitigated dose consequences of the bounding melter offgas release event (i.e., the simultaneous loss of both melter offgas systems) where the facility ventilation system provides the safety control for this filtered offgas release. Given that this event was considered to have ***Moderate*** consequence to the public, the HOP components, including the HEPA filters and ducting downstream of the HEPA filters, were classified as SC-III in the SDS. The change in seismic classification from that in the HLW PDSA for the HEPA filters and ducting was not perceived by the Safety Design Implementation Team as a confinement integrity issue during the SDS development, but rather as a consequence of the melter offgas release. Acknowledging that confinement integrity can be

an issue, breaches of the C5V boundary (i.e., piping breaks occurring before and after a robust boundary penetration) are not expected to result in a major loss of confinement by virtue of the operating C5V exhaust limiting the contamination spread to the area adjacent to the breach (e.g., filter cave). This issue will be addressed during the hazards analysis process.

With respect to the air amplifiers and hydrogen mitigation, as discussed in Table 1 of the Staff Issue Report, the SDS does not explicitly credit them, but does require that the HLW Melter Feed Process system vessels are provided with a safety class flow path "sufficient to vent generated hydrogen and purge from the vessel headspace upon loss of HOP/Process Vessel Vent (PVV)" (SDS Section 3.4.5, "Vessel Hydrogen Explosion Control Strategy"). Whether this vent path can be met via current overflow or whether the air amplifiers will be required will be determined once the vessel purge requirements are established as part hazards analysis and control selection. The HLW PDSA has not been revised to eliminate the air amplifiers as a credited control system, and they have not been removed from the HLW Facility design. To assume that the HLW Melter Feed Process system will be above atmospheric pressure following a bounding seismic event may be premature prior to completion of these activities.

To validate the HLW SDS seismic categorization of the melter offgas and C5V ventilation systems, the seismic events involving these systems must be confirmed including the release path and system/facility interactions. Confirmation must also be performed for the consequences (i.e., significance level) of these same seismic events. In addition, the SDS control strategies to these seismic events will be mapped and paired to the event mitigation results. This confirmation and mapping will be part of the hazards analysis to be initiated in the summer of 2015, with a completion forecast in the first quarter of calendar year 2017. For a design basis event, engineered offgas/ventilation preventive controls can reduce the frequency no more than extremely unlikely. An acceptable and appropriate set of SDS seismic controls will be demonstrated with consideration of the seismic risk reduction constraint. This SDS control strategy for melter off-gas and C5V ventilation system seismic events will be validated (or revised) during the process hazards analysis and culminating in control selection with the deliverable being the revised PDSA (completion forecast by the end of calendar year 2017).

References:

10 CFR 830, "Nuclear Safety Management," Subpart B, "Safety Basis Requirements," *Code of Federal Regulations*, as amended.

24590-HLW-PL-ENS-12-0001, 2012, *Safety Basis Development Project Execution Plan for the High-Level Waste Facility*, Bechtel National, Inc., Richland, Washington.

24590-HLW-PL-ENS-13-0001, 2014, *Safety Design Strategy for the High-Level Waste Facility*, Bechtel National, Inc., Richland, Washington.

24590-WTP-3DP-G04B-0022, 2015, *Licensing Documents*, Bechtel National, Inc., Richland, Washington.

DNFSB, 2015, (external letter to M. Whitney, U.S. Department of Energy Headquarters, Washington, D.C.), from J.H. Roberson, Defense Nuclear Facilities Safety Board, Washington, D.C., February.

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