

January 29, 2014

Mr. Bryan Bower, Director
U.S. Department of Energy
West Valley Demonstration Project
10282 Rock Springs Road
West Valley, NY 14171-9799

SUBJECT: US. NUCLEAR REGULATORY COMMISSION REVIEW OF U.S.
DEPARTMENT OF ENERGY WVNS-DSA-001, *DOCUMENTED SAFETY
ANALYSIS FOR WASTE PROCESSING AND SUPPORT ACTIVITIES*,
REVISION 17, DRAFT B; AND WVDP-146, *WEST VALLEY DEMONSTRATION
PROJECT TECHNICAL SAFETY REQUIREMENTS*, REVISION 10, DRAFT B

Dear Mr. Bower:

The U.S. Nuclear Regulatory Commission (NRC) has completed its review of the U.S. Department of Energy (DOE) West Valley Demonstration Project (WVDP) response to NRC comments on the subject documents. On July 8, 2013, DOE transmitted these documents to NRC for review and comment (ML13190A374). In response to DOE's request, the NRC Division of Spent Fuel Storage and Transportation (SFST) was tasked to conduct a review of these documents and provide comments to DOE (ML13232A316). On October 30, 2013, DOE transmitted responses to NRC comments (ML14016A395). The NRC SFST staff reviewed DOE's responses, and identified no outstanding issues as indicated in the enclosed review summary.

NRC conducted its review in a manner consistent with the West Valley Demonstration Project Act of 1980, which provides authority for NRC to review and consult with DOE informally on matters related to the project.

A copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

B. Bower

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If you have any questions, or need additional information, please contact Chad Glenn at 301-415-6722 or Chad.Glenn@nrc.gov.

Sincerely,

/RA/

Andrew Persinko, Deputy Director
Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Enclosure:
NRC Review Summary

cc:
M. Maloney, DOE/WVDP
P. J. Bemba, NYSERDA

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U.S. NUCLEAR REGULATORY COMMISSION DIVISION OF SPENT FUEL STORAGE AND TRANSPORTATION REVIEW RESULTS OF THE DOCUMENTED SAFETY ANALYSIS FOR WASTE PROCESSING AND SUPPORT ACTIVITIES, REVISION 17, DRAFT B; AND THE WEST VALLEY DEMONSTRATION PROJECT TECHNICAL SAFETY REQUIREMENTS, REVISION 10, DRAFT B

Contained herein are the results of the Spent Fuel Storage and Transportation (SFST) staff's review of the West Valley Demonstration Project Documented Safety Analysis (DSA) Report. No outstanding issues were identified by the SFST staff.

Materials Review

The topics discussed in the materials review section include the materials safety approach and the appropriateness of storage of comingled spent fuel and highly dispersible particulate debris.

It was unclear whether materials safety was assessed based on a design basis approach using consensus codes and standards and/or a risk approach considering probability (frequency) and dose consequences. In the response to Comment 3-C3, DOE provided a list of references used in the hazard analysis. However, the U.S. Department of Energy (DOE) later confirmed that the graded approach is used. The U.S. Nuclear Regulatory Commission (NRC) has found the graded approach acceptable in some instances (e.g., Integrated Safety Analysis (ISA) - 10 CFR Part 70).

Comment 2-C9 expressed staff's concern about the appropriateness of comingled spent nuclear fuel and highly dispersible particulate debris (classified as Resource Conservation and Recovery Act (RCRA) hazardous waste) storage in the cask system. DOE provided additional information that described the contents of the two Head End Cell (HEC) debris drums (HEC-097 and HEC-142). The debris drums contain hulls and transuranic particulate debris (conservatively assumed to be RCRA material (i.e., lead paint chips)). In addition, the information provided described a relatively simple method to segregate the hulls from the transuranic particulate debris using remote manipulators. The NRC staff found reasonable assurance that the separation procedure for the transuranic particulate debris comingled with scrap spent nuclear fuel can be achieved. The transuranic particulate debris will be repackaged into a standard 30-gallon drum and stored in DOE's transuranic waste storage area. The recovered spent nuclear fuel will be stored in one canister and will be loaded inside the cask with four empty canisters.

Structural Review

The staff reviewed DOE's response to the comments raised on the structural design bases and acceptance criteria and found them responsive. Thus, the analysis results as summarized in the DSA demonstrates, with reasonable assurance, adequate performance of the dry cask storage of the vitrified high-level waste on an on-site concrete storage pad.

Enclosure

Thermal Review

The staff reviewed the thermal evaluation as documented in calculation number 630087-3000, Rev. 0, "*Thermal Evaluation for the MPC-WVDP Cask System*" and found that the maximum temperature of the dry storage canisters at the West Valley Demonstration Project will remain well below allowable limits based on the low decay heat load in the borosilicate glass geometry. The staff also verified that the results of the analysis were based on robust, well-known analytical methods and heat transfer models which are applicable to this geometry and environment.

Shielding Design Review

Based on the review, the staff found reasonable assurance that the analyses performed by NAC International satisfy the shielding requirements of 10 CFR Part 72. The staff reviewed the West Valley NAC-MPC vertical storage cask shielding and radiation source term calculation and found it sufficient to provide a basis for evaluation of the storage system against the shielding requirements of 10 CFR Part 72. The staff reviewed the methods used in the shielding evaluation and found reasonable assurance that the methods are described in sufficient detail to permit an independent review, with confirmatory calculations, of the canister shielding design. The staff reviewed the external radiation levels and found reasonable assurance that the external radiation levels satisfy 10 CFR 72.104 and 72.106.

Based on review of the statements and representations in the application, the staff concludes that the shielding design has been adequately described and evaluated and that the canister meets the external radiation requirements of 10 CFR Part 72.

Staff did not review radiation protection (e.g., annual collective (person-rem) dose to surrounding population; annual dose to the maximum exposed individual; and maximum hourly dose rate in unrestricted area) because this assessment is not included in DOE's documented safety analysis. DOE advised staff that radiation protection is handled under 10 CFR Part 835 and by implementation of DOE Order 458.1, "Radiation Protection of the Public and the Environment".

Criticality Review

The staff reviewed the criticality calculation as documented in calculation number 630087-6001, Rev. 1, "*Criticality Analysis for HLW and SNF in the WV-MPC System*" and found that the dry storage canisters at the West Valley Demonstration project will remain subcritical based on the low amount of fissile material in the borosilicate glass geometry. The reactivity of this configuration is very low (i.e., $k_{\text{eff}} \ll 1$). The other content described as "spent nuclear fuel debris" is evaluated as one per canister per cask, and also has a very low reactivity (i.e., $k_{\text{eff}} \ll 1$). The staff was concerned about administrative control of this content however DOE representatives clarified during a meeting with the NRC staff on November 22, 2013, that this loading is controlled because the site only has one of these canisters and will be loading it inside the cask with four empty canisters.

Confinement

The staff reviewed DOE's response to the comments raised on confinement and acceptance criteria and found them responsive. Thus, the analysis results as summarized in the DSA demonstrates, with reasonable assurance, adequate performance of the dry cask storage of the vitrified high-level waste on an on-site concrete storage pad.

Quality Assurance

The review of multiple sections of the of WVNS-DSA-001 and comparison to and review of associated documents (WVDP-111, Revision 16, CH2M Hill – B&W West Valley, LLC Quality Assurance Program and CH2M Hill – B&W West Valley LLC Quality Assurance Program for High Level Waste Relocation and Storage) has provided typical information showing the responsibilities and structure for the control of nuclear quality assurance activities. While some variances in structure from a strictly 10 CFR Part 72 approach exist, they are minor and still appear to be robust enough to control the necessary quality aspect of the program activities. With most quality programs, full implementation will be necessary to achieve adequate control and quality results.

Technical Specifications

DOE Technical Safety Requirements (TSRs) by definition are the limits, controls, and related actions that establish the specific parameters and requisite actions for the safe operation of a nuclear facility and include, as appropriate for the work and the hazards identified in the documented safety analysis for the facility: Safety limits, operating limits, surveillance requirements, administrative and management controls, use and application provisions, and design features, as well as a bases appendix. The documented safety analysis identifies the need for TSRs, but the actual limits are identified in the TSRs.

DOE prepared the TSRs in accordance with 10 CFR 830, Subpart B, Safety Basis Requirements, DOE-STD-3009-94, "*Preparation Guide for U.S Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*", DOE-STD-5506-2007, "*Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities*", and DOE-STD-1186-2004, "*Specific Administrative Controls*". The TSRs were developed using the graded approach guidance of DOE-STD-3009-94:

For Hazard Category 3 facilities, TSRs may consist solely of an inventory limit to maintain the Hazard Category 3 classification and provide appropriate commitments to safety programs in the administrative controls section of TSRs.

DOE concluded that the High Level Waste Storage System (HLWSS) is a below Hazard Category 3 facility and does not require TSRs as derived from Chapter 5, Derivation of Technical Safety Requirements, in the documented safety analysis. However, should licensing under 10 CFR Part 72 of the HLWSS and HLWSS storage pad be pursued, technical specifications for dry cask storage systems will be required as part of the application.

Technical specifications for dry cask storage systems are intended to be a clear and consistent set of procedures that identify: 1) approved contents; 2) limiting conditions for operation and applicability; 3) surveillance requirement and applicability (e.g., fuel integrity; cask integrity, and cask criticality control program); 4) design features (e.g., design features significant to safety; codes and standards; structural performance; and cask handling/canister transfer facility); and 5) administrative controls. These details in the dry cask technical specifications will assure the overall safety goals for dry cask storage are met, including maintaining subcriticality, controlling radiation dose to the workers and the public, and maintaining the confinement barriers.

NUREG-1745 "*Standard Format and Content for Technical Specifications for 10 CFR Part 72 Cask Certificates of Compliance*" provides guidance on the format and level of detail expected in technical specifications.