DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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Carole

September 21, 1994

Mr. Mark Whitaker, EH-6
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585

Dear Mr. Whitaker:

Enclosed for your information and distribution are fifteen (15) Defense Nuclear Facilities Safety Board (DNFSB) staff reports. The reports have been placed in the DNFSB Public Reading Room.

Sincerely,

George W. Cunningham
Technical Director

Enclosures (15)

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

May 13, 1994

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: Mark T. Sautman

SUBJECT: West Valley Demonstration Project (WVDP) - Chemical Processing and Vitrification Plant Review Trip Report (May 3-4, 1994)

1. **Purpose:** This report documents a visit by Defense Nuclear Facilities Safety Board (DNFSB) staff to the West Valley Demonstration Project (WVDP) to review the chemical processing and vitrification systems. The review was conducted May 3-4, 1994 and included David Lowe, Daniel Ogg, and Mark Sautman.

2. **Summary:** The WVDP is progressing towards processing its high-level waste into a vitrified form. The vitrification plant safety analysis report is available and DNFSB staff review is warranted to ensure that sufficient defense in-depth is provided by the installed safety systems. The West Valley Area Office only has one facility representative, although the DNFSB staff believes that enough information is available to estimate the total number of facility representatives that will be required once the vitrification plant starts hot operations. In addition, West Valley is not planning to conduct integrated water runs as the initial phase of the cold chemical runs. Similar facilities, like the Defense Waste Processing Facility, have performed these tests.

3. **Background:** The WVDP is operated by West Valley Nuclear Services (WVNS) for the Department of Energy (DOE) to process high-level nuclear waste that was created by the reprocessing of commercial and defense reactor fuels from 1966 to 1972. The waste is contained in two tanks, one originally containing 2.1 million liters of PUREX waste, and the second containing 31,000 liters of THOREX waste. The pretreatment of over 450,000 gallons of liquid waste to remove cesium and transuranic radionuclides was completed in 1990 and, in 1991, waste sludge pretreatment was started to remove salts and sulfates from the waste tank. Seventeen thousand drums of cement stabilized waste have been produced so far with a 99.9% acceptance rate. The acidic THOREX and basic PUREX waste will be blended later this year to produce a single waste type for vitrification.

   A five-year test program of the full-scale vitrification system was completed in 1989. The current project focus is on the conversion of the test facility for remote, shielded operation.

This conversion is 85% complete and non-radioactive testing is scheduled to begin later this year. Current plans indicate that hot vitrification will begin in January 1996.

4. **Discussion:** Meetings were held with both WVNS and DOE West Valley Area Office (DOE-WV) personnel. The following observations are provided.

   a. Safety Envelope: The vitrification system safety analysis report (SAR) has been approved by WVNS and will be reviewed by DOE-Headquarters and the U. S. Nuclear Regulatory Commission. A draft copy of the SAR has been requested by DNFSB staff. The DNFSB staff will investigate whether the safety envelope establishes the defense in-depth required to ensure that accidents are sufficiently improbable. In particular, the process hazard analyses performed in support of the SAR will be reviewed to ensure that the acceptance criteria to determine if additional controls are needed were sufficiently conservative. Currently, no systems are classified as safety systems. The design also appears to rely on redundant components, that must be manually brought on-line, for accident mitigation.

   b. DOE Oversight: The WVDP is under transition from the Idaho Field Office to the new Ohio Field Office (DOE-OFO), which will also include the Fernald Environmental Management Project and the Mound plant. The three area offices will officially report to the DOE-OFO in October 1994.

      DOE-WV currently has one DOE facility representative, who is undergoing training. DOE-WV is postponing hiring or training any additional facility representatives because they claim the vitrification system needs to be more clearly defined. DOE-STD-1063-93, *Establishing and Maintaining a Facility Representative Program at DOE Nuclear Facilities*, provides guidance on determining the number of facility representatives required based on the facility's hazard classification and activity level. The staff believes that since the demonstration plant operated for five years and the test facility conversion is 85% complete, DOE-WV has enough information to estimate the number of facility representatives required.

   c. Operator Training: Control room operators are not required to have oral board reviews as part of their qualification process. Although this is not explicitly required by DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Facilities*, comparable training programs for control room operators at similar facilities (e.g. canyon batch chemical processes), include oral boards. The staff intends to follow this issue with a future training/conduct of operations review.

   d. Laboratory Support: The turnaround for chemical analysis of feed preparation samples is 60 - 80 hours. Since the entire batch process takes about 200 hours, it is important to receive sample results in a timely manner so that adjustments to the glass recipe, if needed, can be made. This step has the potential to be a bottleneck.

e. Vitrification System Testing: Testing of the vitrification system will not be as extensive as that performed for similar DOE facilities because the testing will emphasize equipment performance verification. Most of the developmental testing was performed during the demonstration phase. West Valley plans to run performance tests of the individual systems with water and air. Later, integrated tests are planned using waste simulants.

A recommendation from the DOE Operational Readiness Review (ORR) Senior Advisors for the Defense Waste Processing Facility (DWPF) cold chemical run (CCR) was that the DWPF conduct integrated water runs (IWRs) immediately prior to CCRs. Their justification was that IWRs are necessary to perform an integrated check of the process, system configuration, standard operating procedures, and to verify operator performance. The situation at WVDP is not identical, but the staff believes that several similarities exist.

5. **Future Staff Actions:** Further reviews are warranted for the vitrification system safety envelope and safety analysis report, and for training and conduct of operations. Additionally, a radiation protection review trip is currently scheduled for September 1994.