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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

October 17, 1996

Mr. Thomas J. Rowland, Director  
West Valley Project Office  
U.S. Department of Energy  
P.O. Box 191  
West Valley, NY 14171

SUBJECT: LONG-TERM TESTING FOR CEMENT STABILIZATION OF SUPERNATANT AND SLUDGE  
WASH RECIPES (TAC NO. L21412)

Dear Mr. Rowland:

The U.S. Nuclear Regulatory Commission has received the West Valley Demonstration Project, "Final Report on Long-Term Testing of Supernatant Cement-Waste Form," dated January 26, 1996. We have reviewed the test results with assistance from Brookhaven National Laboratory. All tests and data called for in the original test plan have been provided and appear to meet the criteria specified therein. Specifically, the compressive strength of the representative waste forms shows no indication of decreasing over 5 years, which supports the conclusion that the cement solidified supernatant meets the stability requirements of 10 CFR Part 61. Note that concretes made using ordinary Portland cement can be expected to continue increasing in strength for at least 5 years. Although this behavior is not exhibited by the supernatant cement waste form, it must also be remembered that the waste form includes significant quantities of other materials, such as nitrates, that are avoided in structural concretes.

In view of the favorable long-term test results for the supernatant cement waste form, the proposal to shorten the long-term test programs for the PUREX sludge wash Type I and Type V Portland cement solidification recipes, submitted in two letters, dated September 18, 1995, and November 2, 1995, can now be considered. We recognize that shortening the duration of each test plan from 5 years to 3 years will reduce radiation exposure, waste generation, and costs, and appears reasonable in light of the test results to date. However, the NRC recommends a 5-year plan with one test per year as opposed to two tests each year for 3 years. The argument that positive results to date make future testing unnecessary fails to account for the fact that in cement and concrete systems, strength development continues for a number of years, even beyond the 5 years agreed to by West Valley Nuclear Services (WVNS) and the NRC. Hydration reactions in the calcium silicate and the calcium aluminosilicate constituents in the cement are slow, and potentially adverse reactions, such as the formation of calcium aluminosulfate, which causes expansion in the cement when too much sulfate is present, can take years to occur. Because of the potential for the latter reaction, early termination of the long-term test plan is not recommended. The full 5 years of data should be obtained to adequately demonstrate that the compressive strength is not decreasing. Note that if a trend of decreasing strength is observed, even if the last measurement is above a prescribed limit, the waste forms may not be acceptable. If decreases in strength are observed, an extrapolation of the future waste form behavior is advised.

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Reducing test frequency to one test per year and maintaining the full 5-year test plan should be beneficial in the same manner as reducing the duration of the test plan from 5 years to 3 years. That is, annual rather than biannual tests would also be expected to reduce worker exposure, waste generation, and costs. If the current test plans for the PUREX sludge wash Type I and Type V Portland cement waste formulations are altered, either in terms of frequency of testing or duration, formal procedures to restore the full test program should be established to take effect if the test results indicate waste form degradation. In addition, the procedures or test plans governing the abbreviated testing should include a provision for timely notification to the NRC of test results to lessen the potential for missing a test interval if NRC considers the existing data questionable.

Please note that a determination of the stability of approximately 200 to 300 transition drums, processed at the start of the sludge wash solidification campaign, has not yet been made. The ultimate disposition of these drums is questionable and needs to be addressed by WVNS. This remains an outstanding issue.

In summary, it is the understanding of the staff that WVNS will inform the NRC on an annual basis of the remaining long-term test results for the PUREX sludge wash Type I and Type V Portland cement solidifications. The NRC also requests notification of the decision regarding abbreviated testing. In addition, the NRC requested in the Technical Evaluation Report for "Waste Form Qualification Program for Cement Solidification of THOREX Wash Liquid With Type V Portland Cement," that WVNS contact us regarding the development of a long-term test plan for the Type V Portland Cement Solidification of THOREX Wash Liquid. This remains an outstanding item.

When you are available to discuss the long-term test plan development for THOREX wastes, or if you have any questions regarding this letter, please call me on (301) 415-8106. Please reference the above TAC number in future correspondence related to this subject.

Sincerely,

Original signed by: RHogg for  
Gary C. Comfort, Jr.  
Licensing Section 2  
Licensing Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

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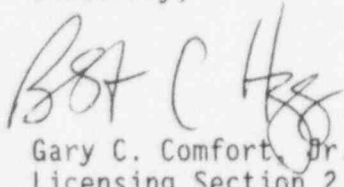
Reducing test frequency to one test per year and maintaining the full 5-year test plan should be beneficial in the same manner as reducing the duration of the test plan from 5 years to 3 years. That is, annual rather than biannual tests would also be expected to reduce worker exposure, waste generation, and costs. If the current test plans for the PUREX sludge wash Type I and Type V Portland cement waste formulations are altered, either in terms of frequency of testing or duration, formal procedures to restore the full test program should be established to take effect if the test results indicate waste form degradation. In addition, the procedures or test plans governing the abbreviated testing should include a provision for timely notification to the NRC of test results to lessen the potential for missing a test interval if NRC considers the existing data questionable.

Please note that a determination of the stability of approximately 200 to 300 transition drums, processed at the start of the sludge wash solidification campaign, has not yet been made. The ultimate disposition of these drums is questionable and needs to be addressed by WVNS. This remains an outstanding issue.

In summary, it is the understanding of the staff that WVNS will inform the NRC on an annual basis of the remaining long-term test results for the PUREX sludge wash Type I and Type V Portland cement solidifications. The NRC also requests notification of the decision regarding abbreviated testing. In addition, the NRC requested in the Technical Evaluation Report for "Waste Form Qualification Program for Cement Solidification of THOREX Wash Liquid With Type V Portland Cement," that WVNS contact us regarding the development of a long-term test plan for the Type V Portland Cement Solidification of THOREX Wash Liquid. This remains an outstanding item.

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Please note that a determination of the stability of approximately 200 to 300 transition drums, processed at the start of the sludge wash solidification campaign, has not yet been made. The ultimate disposition of these drums is questionable and needs to be addressed by WVNS. This remains an outstanding issue.

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