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Department of Energy

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Idaho Operations Office West Valley Project Office P.O. Box 191 West Valley, NY 14171

May 7, 1990

Mr. R. Davis Hurt Nuclear Regulatory Commission Headquarters Washington, DC 20555

SUBJECT: West Valley Demonstration Project (WVDP) Vitrification Off-Gas System

Dear Mr. Hurt:

Several months ago, you provided the West Valley Demonstration Project (WVDP) with a technical paper you had prepared on the Project off-gas system. West Valley Nuclear Services Co. Inc. (WVNS) has reviewed the report and offer the enclosed comments.

Should you have any questions on the comments, please contact me on FTS 473-4314.

Sincerely,

Eli Maesto

E. Maestas, Program Manger Technology Development Branch

NFIJ

Enclosure

cc: J. E. Solecki, DOE-ID

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WVNS COMMENTS TO "REVIEW OF WVDP VITRIFICATION OFF-GASES", by R. D. HURT OF NRC

General Comments:

- The review compared 10 CFR 20 release limits (site boundary concentration limits) to the projected WVDP stack release concentrations. Similarly the design objective for the releases at WVDP also apply site boundary concentration limits to the stack concentrations, but the site boundary concentrations are our requirements.
- 2) The review allowed DF credit of 200 for a DOP-testable HEPA, or a combined DF of 10,000 for a series combination of HEPA's,; one nontestable and one testable. The arrangement at WVDP will have two HEPA's in series located in-cell where DOP-testing is impractical and an additional two HEPA's in series located out of cell where DOPtesting is practical. The particulate removal efficiency for the incell HEPA's will be determined by actual tests in the same manner that SBS and HEME removal efficiencies are determined.

The efficiency used for the out of cell HEPA's for SAR calculations will be the values recommended in ANSI/N46.1 ("American National Standard Guide to Principle Design Criteria for Nuclear Fuel Reprocessing Facilities", 1981). These efficiencies are 99.9% (that is, DF = 1,000) for the first stage HEPA and 99% for the second stage HEPA - the combined DF therefore is 1×10^5 .

The efficiency used for the out of cell HEPA's for emission permitting calculations will be those recommended by 40 CFR 61 ("US EPA National Emission Standards for Hazardous Air Pollutants; Radionuclides", Appendix D, Table 1, 54 CF 51654, December 15, 1989). This efficiency is 100 for each HEPA - the combined DF therefore is 1 x 10⁴.

- 3) Several times the review referenced the 1990 sludge samples analyses as data which will improve the confidence of the radionuclide estimates. We concur.
- 4) It would be helpful in commenting on the review if the references to the review were listed.

Specific Comments:

- 1) H-3
 - a) The review assumes the majority of the tritium in the supernatant is released to Buttermilk Creek. For the design case of supernatant dilution (and the current mode for processing) this will be the case since approximately 21% of the tritium will end up as cement (D. E. Carl calculation, Permanent Record Book No. 162436, page 54, November 7, 1985). For the early supernatant processing campaigns this was not the case because there was only minimal supernatant dilution - for these campaigns essentially all of the tritium ended in cement.

- b) The review assumes the tritium condensed in the SBS will be sent to LWTS instead of being released through the stack. The design is instead that a minimal fraction of the tritium delivered to the Vitrification Facility will be sent to LWTS (liquid condensate from feed Make-up will be sent to LWTS, and this will contain a minor amount of tritium from residual supernatant and essentially none from sludge hydroxides). This clarification does not alter the conclusions of the NRC review.
- 2) C-14

a) This section is accurate.

- 3) Sr-90/Y-90
 - a) The review states that WVDP removal efficiencies are average values for two campaigns. In reality, they represent the preliminary reduction of four samples from two campaigns (SF-10 and SF-10B). With such small samples the statistical uncertainty is large. For example, the 90% confidence limits for these samples are as follows: for the Melter DF, 3 and 169; and for the SBS DF, 297 and 2.02 x 10⁵. We expect that as sufficient samples are reduced to engineering units the confidence limits will become more reasonable, and the performance of the off-gas systems at PNL and WVDP will be shown to be equivalent.
 - b) The experience at PNL with the HEME was somewhat different than described in the review. Their initial design showed poor performance when operated wet as designed, but acceptable performance when operated dry. By redesigning the HEME to lower the gas velocity, the HEME at PNL had acceptable performance in either the wet or the dry mode. The experience at WVDP has supported this conclusion in that preliminary data reduction shows only minor improvement with dry operation.
 - C) The review assumes there are two HEPA's in the WVDP off-gas system: one in-cell which is unavailable for DOP testing; and one out of cell which can be fully DOP tested. The design is instead for four HEPA's: two in cell and two out of cell. Each of these four has a functional back-up, for a total of eight operational HEPA's.
- 4) TC-99
 - a) There is uncertainty regarding the proper cation to use as a simulant in evaluating technetium's removal efficiency, but we concur that it should be no problem with any cation we have considered.
- 5) Ru-106/Rh-106
 - a) This section is accurate

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- 6) I-129
 - a) The review properly identified a concern with the I-129 concentration which was due to limits of detection when the wastes were analyzed. Preliminary analyses of the WVDP wastes with more sensitive techniques resulted in the conclusion that I-129 will not be a problem. When the analyses are reviewed and released, the estimated inventory will be revised.

7) Cs-137/Ba-137m

- As with the strontium DF performance data, the cesium values also are preliminary reduction of a small number of samples. The comparisons between PNL and WVDP must be considered similarly preliminary.
- b) The review discusses the different interpretations on cesium volatility by PNL and SRL. The relative effects of halides and metaborates on cesium volatility will be evaluated at WVDP when the data is available.
- 8) Pu-238
 - a) We expect a small amount of plutonium to go into solution during the sludge wash operations, but this should have essentially no impact on the estimated inventory sent to the Melter. This clarification does not alter the conclusion of the NRC review.
 - b) The review noted an unexpected difference in behavior for cerium and strontium in the WVDP data. The difference between the cerium DF and the strontium DF is almost certainly a reflection of the confidence limits referred to in the strontium discussion above.
- 9) Pu-239

a) See the Pu-238 discussion.

10) Pu-240

a) See the Pu-238 discussion.

11) Pu-241

a) See the Pu-238 discussion.

- 12) Am-241
 - a) See the Pu-238 discussion.