M-32

Department of Energy
Ohio Field Office
West Valley Area Office
P.O. Box 191
West Valley, NY 14171

December 5, 1996

Mr. Gary C. Comfort
U.S. Nuclear Regulatory Commission
MS T8D14
Washington, DC 20555

SUBJECT: Response to U.S. Nuclear Regulatory Commission (NRC) Comments on WVNS-SAR-012, Rev. 0, Draft C (TAC NO. L30924)

REFERENCES: 1) Letter 0554:95:08, G. C. Comfort to T. J. Rowland, "Comments on the Safety Analysis Report (SAR) for Fuel Receiving and Storage Facility, WVNS-SAR-012, Revision 0, Draft C," dated November 5, 1996

2) Letter WD:96:0915 (0554:95:08), T. G. Weiss to T. J. Rowland, "Responses to NRC Comments on WVNS-SAR-012, Rev. 0, Draft C," dated December 4, 1996

Dear Mr. Comfort:

In Reference 1, the NRC provided the DOE West Valley Demonstration Project (DOE-WV) with NRC's comments on WVNS-SAR-012, Rev. 0, Draft C, entitled "Safety Analysis Report for Fuel Receiving and Storage Facility." Draft responses to your comments were previously provided to you. Based upon follow-up discussions with you, the West Valley Demonstration Project has finalized our responses. The responses are provided in Reference 2, which is enclosed.

As previously discussed with you, DOE-WV anticipated receiving a letter report from the NRC documenting your safety evaluation. This letter will be used as supporting documentation in the DOE Safety Evaluation Report.

If you have any questions regarding this matter, please contact Bryan Bower at (716) 942-4368.

Sincerely

Richard B. Provencher for
T. J. Rowland, Director
West Valley Demonstration Project

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NF08

Enclosure: Reference 2

cc: N. Sridhar, SRI, w/enc.
T. G. Weiss, WVNS, WV-AA9, w/o enc.

BCB:080:96 - 0554:95:08
BCB/jam

Bryan

West Valley Nuclear Services Company, Inc.

P.O. Box 191 - 10282 Rock Springs Road
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T. J. Rowland, Director
DOE West Valley Demonstration Project
P.O. Box 191
West Valley, New York 14171-0191

WV-AA9
WD:96:0915
December 4, 1996

ATTENTION: T. J. Jackson

RESPONSE:
DW:7057

Dear Mr. Rowland:

SUBJECT: Responses to NRC comments on WVNS-SAR-012, Rev.0, Draft C

REFERENCES:
1) DW:96:0958 (BCB:076:96-0554:95:08), R.B. Provencher to W.G. Poulson, "U.S. Nuclear Regulatory Commission (NRC) Comments on WVNS SAR-012", dated November 15, 1996.

2) NRC letter, Gary Comfort, Jr. to T.J. Rowland, "Comments on the Safety Analysis Report (SAR) for the Fuel Receiving and Storage Facility, WVNS-SAR-012, Revision 0, Draft C", dated November 5, 1996.

Attached, as requested in Reference 1, are responses to NRC comments on WVNS-SAR-012, Rev.0, Draft C, which were transmitted to DOE-WV by Reference 2.

If there are any questions, please contact the undersigned at extension 4668. This transmittal completes action DW:7057.

Very truly yours,
West Valley Nuclear Services Co., Inc.

Thomas G. Weiss, Jr., Manager,
Site Projects

EN:96:0075

TGW:klm

Attachment: Responses to NRC Comments on WVNS-SAR-012

cc: B. C. Bower, DOE-WV Area Office, WV-DOE
H. E. Moore, DOE-WV Area Office, WV-DOE

3127klm

0554:95:08

West Valley Demonstration Project
Response to NRC Comments on WVNS-SAR-012

Comment #1

Section 2, Page 2-4 (Lines 18-20 and Table 2.5-1

The text mentions that the dose to the maximally exposed individual off-site following a criticality event would be 399 millirem (mrem). This is inconsistent with the value given in Table 2.5-1 which indicates a dose of 967 mrem. It appears that the offsite and onsite doses have been reversed in this table. Please review this table to ensure its correctness.

Response

The values corresponding to the on-site and off-site doses due to a criticality in the FRS have been transposed in both Table 2.5-1 and Table 9.2-4. The values as stated in the text are correct. Tables 2.5-1 and 9.2-4 have been corrected to reflect the values given in the text.

Comment #2

Sections 4.0 and 5.0, Pages 4-1 and 5-3

The text states that although the Fuel Receiving and Storage (FRS) facility does not meet all of the current design criteria, they are nonetheless judged to meet the West Valley Project's current needs. Please provide a copy of the Bixby (1989) reference that supports this assertion.

Response

A copy of Bixby, 1989 has been provided to the reviewer.

Comment #3

Section 5.2.3, Pages 5-4 to 5-5

The text states that masonry blocks from the 8-inch masonry block interface wall between the FRS building and the Main Plant building may become dislodged during certain seismic conditions. Please provide a copy of the Dames & Moore (1995) reference evaluating this issue.

Response

A copy of the Dames & Moore, 1995 report has been provided to the reviewer.

Comment #4

Page 6.8, Line 19

The meaning of water quality in this section is unclear. It may refer to the decontamination factor of the demineralizer system or to different water properties such as pH, conductivity, etc. It appears that the measurement of Beta activity or Cs-137 gamma activity is the method used for detection of fuel failures, but this is not clear from the text. Please describe the water quality requirements that are evaluated and clarify the method(s) of fuel-failure detection.

Response

The first two sentences beginning at line 17 on page 6-8 has been replaced by the following: "Water samples from the fuel storage pool or CUP are collected weekly and analyzed for the water quality parameters of pH, conductivity, Cs-137 gamma activity, and gross beta activity. Quarterly samples are analyzed for these parameters as well as chlorides, nitrates, nitrites, sulfates, and gross alpha activity. The purpose of this sampling and analysis is to verify the performance of the fuel pool Submerged Water Filtration System in maintaining water quality parameters within desired ranges. Additionally, possible fuel failures can be detected by Cs-137 gamma activity and gross beta activity measurements."

Comment #5

Table 7.2-1

Some of the information presented in this table does not appear to be internally consistent. Examples include: (1) the total Pu in HIC "C" is less than the sum of the Pu isotopes in the same HIC, and (2) the total Pu-238 inventory assuming the indicated sludge mass for all HICs is 0.0116 rather than 0.0193 Ci. Please review these tables to ensure their correctness.

Response

As indicated in the note at the bottom of Table 7.2-1, concentration values given in the table are an average of concentrations of activities in samples collected from the top, middle, and bottom of the respective HIC's. The Pu-239/240 activity concentration given in the table for HIC "C", however, is the total activity for these samples. The correct average value of 1.74E-2 μCi/g will replace the value of 5.22E-2 μCi/g stated in the table.

The concentration of Co-60 activity was not determined for HIC "A" and isotopic measurements of Pu-238 and Pu-239/240 were not made for HICs "A" and "B". For the purposes of calculating the total activity in resin waste, estimates of these values were made based on the ratio of the unmeasured parameter to other measured isotopes. The following text has been added to Note #6 of Table 7.2-1: "Total Co-60 activity based on an estimated concentration of Co-60 in HIC 'A'. Estimate determined from Cs-137 concentration in HIC 'A' and average of Co-60:Cs-137 ratios in HICs 'B' through 'E'. Total Pu-238 and Pu-239/240 activities based on estimated concentrations of Pu-238 and Pu-239/240 in HICs 'A' and 'B'. Estimates determined from Total Pu concentration in respective HIC (A or B) and average of Pu isotopic:Total Pu ratios in HICs 'C' through 'E'."

Comment #6

Tables 8.2-3 and 8.2-4 on Pages 8-28 and 8-29, respectively

The 21-yr PWR and BWR fuel inventories for Am-241 are less than their respective initial inventories. Due to ingrowth from the decay of Pu-241, the inventory of Am-241 is expected to increase with time (for short times). This discrepancy may be a result of the initial inventories being calculated with an old version of ORIGEN and then calculating the 21-year inventories without accounting for ingrowth resulting from the decay chain. Also, the basis for choosing the presented radionuclides as the "key radionuclides" for this exercise has not been referenced nor explained.

An independent analysis using ORIGEN Version 2.1 found that for the PWR fuel with the listed characteristics, the initial inventory for Am-241 was 133 Ci/MTU (a 50% increase form the 86 Ci/MTU listed in Table 8.2-4). The 21-yr inventory of Am-241 was found to be 2,673 Ci/MTU (a factor of 32 increase from the 83 Ci/MTU listed in the table). For all other nuclides, independent analysis using ORIGEN Version 2.1 roughly agreed with the results listed in the table. It appears that the authors of the report are relying on ORIGEN runs that were performed for the initial fuel inventories and then are calculating the 21-year inventories by correcting for only the decay of the nuclide. This process is incorrect for nuclides that appear in a decay chain, such as Am-241.

For the BWR fuel, the transuranic listed in Table 8.3-3, with the exception of Pu-238, were a factor of 3 to 5 lower than predicted by the independent analysis. Specifically for Am-241, the initial inventory was found to be 25 Ci/MTU (a factor of 5 increase from the 5 Ci/MTU listed in Table 8.2-3) for a fuel with an initial enrichment of 2.75% U-235 exposed to a specific power of 25.9 kw/kg with a burnup of 12,423 Mwd/MTU. The initial enrichment was assumed since none was listed in the table. The 21-yr inventory of Am-241 was found to be 85 Ci/MTU (a factor of 18 increase from the 4.83 Ci/MTU value listed in the table). Again, it appears that the authors of the report are relying on ORIGEN runs that were performed for the initial fuel inventories and then are calculating the 21-yr inventories by correcting for only the decay of the nuclide.

The differences in the inventory may affect subsequent calculations, especially any critically calculations, that use Tables 8.2-3 and 8.2-4 as a basis for the radionuclide content of the fuel.

Response

The values for Am-241 activity in Tables 8.2-3 and 8.2-4 of SAR-012, Draft C, were incorrectly calculated. Correct values have been calculated for both BWR and PWR fuel using ORIGEN2 and these values are included in the appropriate tables in SAR-012. The revised Am-241 activities to be included in the SAR are based on the more realistic decay times of 22 years and 24 years for the BWR and PWR fuel, respectively.

Comment #7

Tables 8.7-1 and 8.7-2 on Pages 8-30 and 8-31, respectively

The text nor the subject tables state whether burnup credit was considered when calculating the listed values of k_{eff}. If the uranium and plutonium inventories shown in Tables 8.2-1 and 8.2-2 were used for the criticality calculations, that should also be stated.

Response

All criticality analyses referenced in the SAR have assumed unirradiated fuel, unless explicitly stated otherwise.

The following text has been added after the sentence ending on Line 1 of page 8-12: "All calculations were performed assuming unirradiated fuel."

The sentence beginning in Line 10 on page 8-12 has been reworded as follows: "This analysis evaluated the reactivity of unirradiated PWR and BWR assemblies, ..."

Comment #8

Section 9, Page 9-3, Line 25 and Section 9.1.2.3.2

The text states that "....gravitational potential energy represents the most significant source of energy..." Have the consequence of combustion (i.e., Fire Hazards) been considered in making this evaluation? It would seem that fire would have the potential for significant radiological and non-radiological impacts.

Response

The consequences of a fire in the FRS were evaluated in the process hazards analysis and have been documented in Table 9.1-1. A fire in the FRS is not considered to pose a significant risk because the FRS contains only minor amounts of flammable materials. Furthermore, hazards located in the FRS (i.e., spent nuclear fuel, pool water filtration cartridges, and loaded ion exchange resin) are stored either underwater or in large concrete shield containers, which would provide protection for the hazards from a fire, should one occur.

Comment #9

Section 9, Page 9-24, Table 9.2-1

Due to discrepancies found in the inventory calculations, the on-site dose calculation for Am-241 for a class D atmosphere was checked. The listed Chi/Q value were reasonably well reproduced (1.5E-06 s/m^3 versus 1.6E-06 listed in the SAR) but because of the difference in the calculated inventory of Am-241 used in the SAR, the on-site dose value in the table was calculated to be 5.8E-05 rem (the same factor of 32 increase found in Comment #6). These results make Am-241 the top ranking nuclide in terms of dose in the list.

Response

A reanalysis of the consequences of the failure of the fuel assemblies in the FRS has been performed using the corrected values of Am-241. Results of this analysis are documented in Table 9.2-1 of SAR-012, Draft D. The dose to the maximally exposed off-site individual from the drop of a single fuel assembly is 6.14E-03 rem while the dose due to the failure of all 125 fuel assemblies has been calculated to be 7.68E-01 rem.

Comment #10

Section 9, Page 9-13, Lines 30 and 31

Due to possible errors in the radionuclide inventories listed in Tables 8.2-3 and 8.2-4, these analyses should be redone with correct inventories (if the original inventories are determined to be incorrect).

Response

A reanalysis of the consequences of an inadvertent criticality in the FRS has been performed using the activities presented in Table 8.2-4. Results of this analysis are documented in Table 9.2-3 of SAR-012, Draft D. The dose to the maximally exposed off-site individual from this event is calculated as 3.53E-01 rem.