May 10, 2011

Mr. Frank Marcinowski
Deputy Assistant Secretary for
Technical and Regulatory Support
Office of Environmental Management
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE DRAFT WASTE INCIDENTAL TO REPROCESSING EVALUATION FOR THE VITRIFICATION MELTER

Dear Mr. Marcinowski:

By letter dated March 8, 2011, the U.S. Department of Energy (DOE) submitted the "Draft Waste Incidental to Reprocessing Evaluation for the Vitrification Melter" to the U.S. Nuclear Regulatory Commission (NRC) for review. The submitted document evaluates whether the Vitrification Melter at the West Valley Demonstration Project (WVDP) in New York meets the waste incidental to reprocessing (WIR) criteria of DOE-Manual 435.1-1, Radioactive Waste Management. Demonstration that the criteria in DOE-Manual 435.1-1 are met allows DOE to dispose of the used Vitrification Melter offsite as low-level radioactive waste. The NRC staff has performed a technical review to assess whether the draft evaluation is technically sufficient to demonstrate that the Melter meets the criteria in Section II.B (2) (a) of DOE-M 435.1-1 accompanying DOE-O 435.1-1. The NRC has conducted this consultative review per request of the DOE in accordance with Interagency Agreement DE EM0000284.

We have enclosed a Request for Additional Information (RAI), which is a list of comments for which the NRC staff needs responses from the DOE before the NRC can complete its review. To meet the current schedule and complete our review by July 15, 2011, we request responses to the RAI on or before June 15, 2011. The NRC staff would be happy to meet with your staff and your contractors to clarify the RAI, or discuss proposed responses, as soon as you have had a chance to review the enclosed RAI comments.

NRC is conducting its review according to the Interagency Agreement (IA) dated June 30, 2010, and as such is focusing its review on waste characterization, waste form stability, waste classification, and removal of radionuclides to the maximum extent practical; operational radiation protection at the West Valley site; and applicable quality assurance program elements. As outlined in the IA, this review does not include the sufficiency of the waste acceptance criteria or the sufficiency of the performance assessment for the potential disposal facility being considered to receive the waste. This review also does not include consideration of operational radiation protection at the disposal facility.

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 Accession Number ML111151406). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions, please contact Nishka Devaser, Project Manager in the Division of Waste Management and Environmental Protection, by email at Nishka.Devaser@nrc.gov, or by phone at (301) 415-5196.

Sincerely,

/RA/ D Persinko for LCamper

Larry W. Camper, Director
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No. P00M-032

Enclosure:
Request for Additional Information

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If you have any questions, please contact Nishka Devaser, Project Manager in the Division of Waste Management and Environmental Protection, by email at Nishka.Devaser@nrc.gov, or by phone at (301) 415-5196.

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ML111151406

OFC	DWMEP:PM	DWMEP:TR	DWMEP:LA	DWMEP:BC	DWMEP:BC	DWMEP:DD
NAME	NDevaser	LSpradley	AWalker-Smith	GSuber	CGrossman for CMcKenney	APersinko
DATE	04/26/11	04/26/11	04/26/11	04/29/11	04/29/11	05/10/11

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Request for Additional Information

U.S. Nuclear Regulatory Commission Consultative Review of the West Valley Demonstration Project: Draft Waste Incidental to Reprocessing Evaluation

May 2011

Acronyms

Ci	Curie(s)
DOE	U.S. Department of Energy
DQO	Data Quality Objectives
HLW	High-Level Radioactive Waste
IN	Inventory
KR	Key Radionuclide
LLW	Low-Level Radioactive Waste
MEP	Maximum Extent Practical
NRC	U.S. Nuclear Regulatory Commission
PA	Performance Assessment
RAI	Request for Additional Information
WC	Waste Classification
WCS	Waste Control Specialists, LLC
WD	Waste Determination
WIR	Waste Incidental to Reprocessing
WVDP	West Valley Demonstration Project

Inventory (IN)

IN-1 **Comment**: The draft WIR evaluation does not provide sufficient technical information to support homogeneity of the waste form.

Basis: NUREG-1854, Section 3.1, advises that the NRC determine whether the waste samples adequately represent heterogeneity of the waste (NRC, 2007). The draft WIR evaluation states on page 24, "The characterization for residual activity inside the Vitrification Melter was based on measured gamma dose rates and analytical data from two samples of residual glass" (DOE, 2011). DOE provides the following basis to support homogeneity of the waste on page 39 of the draft WIR evaluation: (1) that the waste form was made homogeneous through the mixing in the Melter Feed Hold Tank and, (2) that the molten state of the glass achieved through the high process heats contributed to homogeneity. These reasons do not sufficiently address the potential for hardened glass in the Melter.

DOE suggests the potential for hardened glass in the Melter over time that plugged small spaces such as joints around nozzles, pipes used for airlifting, and in the discharge port (Brooks, 1993). Depending on the variability in the waste streams being fed into the Melter over time, there is potential for pockets of hardened glass to contribute variability to the glass content remaining in the Melter. For example, residual, hardened glass deposited in Melter might vary over space and time (e.g., glass that hardens in refractory material joints over time). Also, residual contamination on the roof of the Melter that accumulated due to vaporization of radioactivity is expected to have a different radionuclide mix compared to the contamination in the Melter. Contamination deposited in piping may also have accumulated over time. If this variability exists within the Melter, the glass samples taken from the evacuated canisters may not be representative of the glass remaining in the Melter because the glass remaining may represent a stagnant portion of glass that is more difficult to retrieve through normal operations.

Path Forward: DOE should provide basis for why glass sample analytical data scaling factors are representative of all of the contamination remaining within the Melter. Provide any additional technical information to support homogeneity of the glass (e.g., samples with low variability, gamma readings that are fairly consistent after taking into account differences in geometry). Data that could potentially support the homogeneity assumption include periodic samples from the concentrator feed make-up tank or Melter Feed Hold Tank, or additional description of the chemical processes taking place and their effects on homogeneity – (e.g., studies on the waste form itself).

IN-2 **Comment**: The radionuclides included in the inventory estimate from 1987 differ from those in the inventory from 2004.

Basis: NUREG-1854, Section 3.1, advises that the NRC evaluate previous inventory estimates and verify the technical bases for any differences between historical and current estimates (NRC, 2007). The 1987 characterization of the sludge and supernatant contains many radionuclides that were screened out in the 2004 inventory in Table 2-2 (e.g. Pu-240, Pu-242, Cm-244, and Cm-245, Cm-246). Additionally, there are a few radionuclides that do appear in the 2004 list, but do not appear in the 1987 list (K-40, Mn-54, Zr-95, Eu-154, Th-228, Th-230, and U-232).

Path Forward: Describe if different screening criteria were used for the 1987 inventory (Eisenstatt, 1986) vs. the 2004 (WMG, 2004a) inventory and how the different screening criteria account for the differences in inventories.

IN-3 **Comment**: It is unclear if DQOs were established for the analysis supporting waste characterization (WMG, 2004a).

Basis: NUREG-1854, Section 3, guides the NRC to review data quality assessments and verify if applicable data quality objectives were met.

Path Forward: DOE should indicate if DQOs were established for the characterization of the inventory. If they were not, DOE should discuss the data quality assurances that took place.

IN-4 **Comment**: Uncertainty accounted for in the calculation of the waste inventory scaling factors is difficult to interpret.

Basis: NUREG-1854, Section 3.1, states that NRC should verify that analytical uncertainties are either propagated into calculations of waste inventory or have been adequately bounded (NRC, 2007). A prior waste characterization states that the analytical uncertainty for the measurements of Cs-137 is about 3-5%, the uncertainty around thorium is about 20%, and the uncertainty for the remaining actinides is 50% (Eisenstatt, 1986). These estimates match up with the uncertainty ranges provided for the glass samples (WMG, 2004a).

Path Forward: Describe if uncertainty was taken into account in determining the scaling factors, or provide a basis for why it is not important to take into account the uncertainties. Describe the technical basis for using the average of the samples instead of a lower confidence limit (for Cs-137) or upper confidence limit (for Th-232 or actinides) for determining scaling factors.

IN-5 **Comment**: There is not sufficient technical basis for the volume of residual material remaining in the Melter, and the draft WIR evaluation provides conflicting assumptions regarding the amount of residual material.

Basis: NUREG-1854, Section 3.1, states that NRC staff should confirm that DOE has adequate technical basis for estimating the volume of the waste, and that the reviewer should compare the results of calculated estimates with sampled values to assess the reliability of the estimated values (NRC, 2007).

Page 23 of the draft WIR evaluation states, "…approximately 300 kg of glass remained in the Melter cavity, a heel of approximately eight inches. This estimate was based on a combination of level detector responses, preliminary canister weights, and thermocouple responses during the evacuation evolution (Lachapelle, 2003)". Page 24 of the draft WIR evaluation states, "A model prepared…to represent the complex geometry of the Vitrification Melter cavity. This model accounted for a layer of contamination 0.125-inch thick on the cavity surfaces to its full height of 28 inches, as well as the eight inches of solidified glass in the bottom of the cavity. The basis for the thickness of the contamination layer is previous WVDP experience in Vitrification Melter testing described in the Slurry Fed Ceramic Melter Disassembly Report (Brooks, 1993)." However, it is unclear how a value of 8 inches was determined from the information contained in Lachapelle and Brooks references.

Furthermore, the assumption of 8 inches and 300 kg does not seem to match the activity removal estimates and concentrations (WMG, 2004a). The gamma measurements indicated there are 4,120 Ci in the Melter (page 38), then simply dividing this amount by 300 kg, and adjusting units gives you a Cs-137 concentration of 1.37E4 μCi/g, which is larger than the 2.0E3 μCi/g concentration that was measured in the glass in the evacuated canisters. Similarly, if 300 kg is assumed with a density of 2.5 g/cm^3 and a Cs-137 concentration of 5.0E3 μCi/cm^3 (page 38), then this suggests only 600 Ci of Cs-137 remains in the tank.

Path Forward: Provide an explanation as to why the assumption provided about the mass and volume of remaining material do not seem to match the activity content that was measured using the gamma surveys. Provide any additional information supporting the technical basis for the amount of residual waste in the Melter. Provide the references L. L. Petkus, Senior Engineer, High-Level Waste Completion Project, to Distribution, "Glass in Melter," dated September 9, 2002 and "Application of the Evacuated Canister System for Removing Residual

Molten Glass from the West Valley Demonstration Project High-Level Waste Melter," J. J. May et al., Waste Management 2003 Conference.

Key Radionuclides (KR)

KR-1 **Comment**: The basis for the different radionuclides listed in the Melter inventory in Table 2-2 and the list of key radionuclides in Table 4-3 are not explained.

Basis: NUREG-1854, Section 3.2, states that the list of key radionuclides is expected to be specific to a particular waste determination, and that DOE may start with the radionuclide inventories and eliminate radionuclides from the list of potentially key radionuclides based on screening criteria (NRC, 2007). The reviewer should assess the reasonableness of any screening criteria used to remove radionuclides from the list of potential key radionuclides. The 2004 inventory of the waste provided in Table 2-2 of the draft WIR evaluation contains many radionuclides that were not included as key radionuclides in Table 4-3. For example the following transuranics with half-lives greater than five years are listed in the inventory of the sludge and supernatant predicted for 1987 (Eisenstatt, 1986), but they are not listed in Table 2-2 (derived from reference (WMG, 2004a)) nor are they listed in Table 4-3 of the draft WIR evaluation (half-lives in parenthesis): Am-242m (152 yr), Cm-245 (8,500 yr), Cm-246 (4,730 year). Cm-245 and Cm-246 are listed in the Waste Profile Sheet as "reportable" radionuclides, but do not appear in the list of key radionuclides (WVES, 2010). If these radionuclides are unimportant to risk, DOE should describe the screening criteria used to make this determination.

Path Forward: Please provide any screening criteria (e.g., short half-life, low activity level) used to eliminate the radionuclides that appear on the inventories provided for the Melter, but do not appear in the key radionuclides list in Table 4-3 of the draft WIR evaluation?

KR-2 **Comment**: The list of key radionuclides does not appear to be based on those radionuclides from the Melter inventory that contribute most significantly to risk to the public, workers, and the environment.

Basis: NUREG-1854, Section 3.2.2, states that the reviewer should ensure that the list of key radionuclides does not omit radionuclides that may be predicted to cause a significant contribution to risk. The reviewer should also evaluate the process DOE used to identify those radionuclides that contribute most to dose, and identify the uncertainties that are expected to have the most significant effect on predicted dose (NRC, 2007). The key radionuclides identified in the draft WIR evaluation for the Melter appear to be primarily based on the radionuclides listed in 10 CFR 61.55 and the performance assessments for the disposal facilities as opposed to identifying radionuclides from the actual Melter inventory that most significantly contribute to risk. Because the residual Melter waste is derived from HLW, it is possible that the Melter inventory contains radionuclides in quantities (i.e., activity and concentration) that exceed (1) those estimated for commercial low-level radioactive waste streams in the technical basis to develop the Section 61.55 waste classification tables (NRC, 1982) and/or (2) the performance assessments for the potential LLW disposal facilities.

Path Forward: Indicate those radionuclides contributing most significantly to risk to members of the public, including inadvertent intruders, workers, and the environment based on the radionuclide inventory derived specifically for the West Valley Melter considering uncertainty in the timing and magnitude of peak dose at a potential disposal facility. Indicate why DOE is confident that no risk-significant radionuclides were omitted from the list of key radionuclides provided in Table 4-3.

Removal of Radionuclides to the Maximum Extent Practical (MEP)

MEP-1 **Comment**: Additional technical basis should be provided to support the assumption regarding removal of radionuclides being completed in equal proportions.

Basis: NUREG-1854, Section 3.1, states that the reviewer should consider whether the results of a comparison made for one radionuclide can provide information about the expected accuracy of the estimated inventory of other radionuclides (NRC, 2007). Page 39 of the draft WIR evaluation states that, “other key radionuclides were removed from the Vitrification Melter with approximately the same efficiency as Cs-137.” The reasons provided are that the waste was generally homogeneous, but there is not a discussion about chemistry involved in the flushing process, and whether or not the nitric acid or demineralized water would be expected to chemically remove Cs-137 or other key radionuclides to a greater extent than others.

Path Forward: DOE should provide additional technical basis for why flushing would be expected to remove radionuclides in equal proportions.

MEP-2 **Comment**: The assessment of the amount of radioactivity present prior to the flushing of the Melter is unclear.

Basis: NUREG-1854, Section 3.3.2, states that the reviewer should verify that reported removal efficiencies are reasonably reliable. Page 38 of the draft WIR evaluation states a typical Cs-137 concentration of 3.0e4 $\mu Ci/cm^3$ was assumed in the glass prior to the first flushing. The draft WIR evaluation also assumes a typical level in the Melter of 26 inches. However, a technical basis for the typical values is not provided. The report provides a typical estimate for a glass canister in 1990, which, decayed to 2004, is 2.5E4 $\mu Ci/cm^3$, but this value does not match the typical value assumed (Eisenstatt, 1986). Also, on page 37 of the draft WIR evaluation, it is stated that towards the end of the campaign, the liquids being retrieved from the tanks were increasingly dilute. This would imply that a typical concentration may not adequately represent the Cs-137 concentration in the glass formed towards the end of the campaign.

Path Forward: Provide additional technical basis for the assumptions regarding the starting activity of 30,000 Ci of Cs-137 in the Melter prior to flushing. Clarify if the 30,000 Ci includes the activity in the plugged discharge port or not.

MEP-3 **Comment**: The values provided for the remaining radioactivity are inconsistent.

Basis: The draft WIR evaluation, page 25, states that there were 4,062 Ci of Cs-137 in the cavity and 252 Ci of Cs-137 in the plugged discharge tube, for a total of 4,314 Ci of Cs-137 (WMG, 2004a). This value does not match the value presented on page 38, which states that after the first three flushes and use of evacuated canisters, the Melter contained approximately 4120 Ci of Cs-137 in the cavity and approximately 540 Ci "ex-cavity", for a total of 4,660 Ci of Cs-137 It seems like this number is from Revision 1 (WMG, 2004a), not Revision 3. Revision 1 was not provided, but it is cited (Purdue, 2004).

Path Forward: DOE should explain the reason for this inconsistency.

MEP-4 **Comment**: The basis for the calculation of the remaining Melter inventory after flushing and the remaining inventory after evacuated canisters is unclear.

Basis: NUREG-1854, Section 3.3.2, states that the reviewer should verify that reported removal efficiencies are reasonably reliable (NRC, 2007). The basis for the 4,460 Ci remaining after the third flush is provided (WMG, 2004a), but it is unclear how the other numbers were derived. Page 38 of the draft WIR evaluation states that, "…8,600 curies were remaining in the Melter after flushing but before Evacuated Canister System removal." This number is derived by assuming a 30,000 Ci starting point, and a 4,120 Ci ending point to calculate that 25,900 Ci were removed by both efforts. Knowing the volume and concentration of the glass removed by the evacuated canisters, it is determined that 4,500 Ci were removed by the canisters, and 21,400 Ci were removed by the flushing alone. Thus, 30,000 – 21,400 or 8,600 Ci remained in the Melter after flushing alone. However, Table 4-4 lists 8,668.91 Ci remaining in the Melter after the second flush. It appears the way the values are presented in Table 4-4 is in disagreement with the logic presented on the page. Also, if 8,600 Ci remained after flushing, the volume in the Melter remaining after flushing can be derived by dividing by the concentration assumed to be in the glass after flushing and use of the canisters of 5.0e3 $\mu Ci/cm^3$, which equates to 1,720 Liters. Since this volume is larger than the 1,000 Liters assumed at the start, it might suggest that glass was added to the Melter cavity as a result of flushing the rest of the system. However, the possibility of adding glass to the Melter cavity during flushing, and how this impacts the removal efficiency calculations for flushing is not discussed.

Path Forward: Provide a description of how the values of 16,126.60 Ci and 8,668.91 Ci were in Table 4-4 were determined, and if these values include the activity assumed to be only in the cavity, or also include activity remaining in the plugged discharge port. Clarify if 8,668 Ci remained after the second or third flush (prior to evacuated canisters). Describe if any measurements were taken between flushes to support assumptions regarding the efficiency of each individual flush. Describe the volume of decontamination fluids used to flush material through the system. Describe if any volume of glass was expected to be added to the cavity during the flushing process from the process lines, or tanks associated with the Vitrification Facility process. Describe if there is a portion of the cavity that cannot be readily discharged via flushing (e.g., stagnant portion on the bottom). Describe the uncertainty around the estimated 4,460 Ci remaining (e.g., from the uncertainty in the detection instrument used, or the uncertainty in the assumptions about remaining geometry).

MEP-5 **Comment**: The draft WIR evaluation lacks a technical basis for the decision to use the evacuated canister after exactly three flushes.

Basis: NUREG-1854, Section 3.3.2, states that the reviewer should identify any removal goals DOE established before radionuclide removal began, and also to consider whether DOE considered modifications to the removal process to improve removal if termination is based on declining removal efficiency (NRC, 2007). The efficiencies of the removal technologies are estimated, but specific removal goals for each technology are not indicated. It is not clear why DOE initially decided to use the evacuated canisters after the first three flushes, instead of implementing additional flushes prior to using the evacuated canisters. Also, it is not clear that a portion of glass was expected to remain which would not be easily evacuated using the canisters. In other words, it is not clear if the evacuated canisters performed to reasonable expectations/goals of the removal technology.

Path Forward: Provide technical basis for why the evacuated canisters were used after exactly three flushes. One reference does not provide this basis (Purdue, 2004); because the study was completed after the decision to use the evacuated canisters subsequent to three flushes had been implemented. If the decision to use the evacuated canisters after only three flushes was based on declining removal efficiency, please specify if DOE considered modification of the flushing method to improve removal efficiency prior to using the evacuated canisters. Also describe if there is a basis for the portion of material that was expected to remain at the bottom of the Melter that could not be readily evacuated using the canisters, and if this basis is consistent with the amount that remained. If the evacuated canisters were expected to be capable of removing all glass, then discuss why additional evacuated canisters were not used.

MEP-6 **Comment**: The cost benefit analysis used in the evaluation does not sufficiently discuss potential benefits associated with averted long-term dose to members of the public, including inadvertent intruders.

Basis: NUREG-1854, Section 3.4.1, states that the primary benefit of additional removal activities is expected to be decreases in potential doses to workers, and members of the public (including inadvertent intruders) (NRC, 2007). The cost benefit analysis states that accounting for the social benefit from avoided public exposure was not necessary because of the negligible differences between alternatives (Purdue, 2004). The public exposure that would occur from one Curie of activity removed from the Melter and then sent to a LLW disposal facility is assumed to be practically similar as that which would result if the same activity is disposed in a HLW canister at a HLW facility. DOE bases this assumption on the premise that both LLW and HLW disposal facilities are designed to meet performance objectives, which ensure that public health impacts would be small. Since both disposal options would be small, "accounting for differentials in public exposure is assumed not to be necessary." However, DOE does not provide a technical basis for this assumption. Also, this discussion does not consider the potential differences with regard to the inadvertent intruder.

It is significant to note that the sum of fractions calculations to determine if the Melter is greater than or less than Class C are close to unity, suggesting that the intruder dose for the Melter might be significant. While it is acknowledged that problem/site-specific considerations may preclude significant risk to a potential inadvertent intruder due to Melter disposal, this type of discussion is not provided in the draft WIR evaluation. The sum of fractions calculations for waste class indicates that Pu-238, Am-241, and Cm-244 are the primary dose contributors. If the inventory of these radionuclides were to be significantly reduced further, presumably intruder dose would also be significantly reduced.

Path Forward: Provide a discussion of the potential benefits in terms of reduction in dose to a member of the public, including to a potential inadvertent intruder from additional removal technologies. If DOE considers the reduction in doses resulting from additional removal to be negligible, DOE should provide a discussion of why they are negligible, which may include a comparison to the costs of removal.

MEP-7 **Comment**: The basis for applying fixative coating to the outside of the Melter versus removal of key radionuclides to the maximum extent practical is not sufficient.

Basis: The draft WIR evaluation describes the use of a fixative coating on page 24, in the "Data Used in Characterization" section, last sentence, "Both types of contamination are now considered to be fixed because Polymeric Barrier System, a latex fixative coating, was applied to the outside of the Vitrification Melter before it was placed in the shipping container." A fixative coating helps to prevent spread of contamination, but it does not remove contamination.

Path forward: DOE should explain how fixing contamination on the outside of the Melter coincides with removal to the MEP. DOE should summarize any efforts that were made to decontaminate the Melter prior to fixing the contamination with the coating.

MEP-8 **Comment**: The equation for Melter activity removed by the i^{th} flush does not appear to incorporate data from the first three flushes.

Basis: NUREG-1854, Section 3.4, states that the reviewer should verify that the extent of radionuclide removal that could be achieved is not underestimated. The additional activity removed by the i^{th} flush are estimated using an equation that assumes a log-reciprocal relationship between the j^{th} month of Vitrification Facility operation and the reduction factor (Purdue, 2004). With each additional flush the amount of activity removed per unit time will decrease. It is reasonable to expect diminishing returns with additional application of additional flushes, but there exists a difference between the removal efficiency of the first three flushes and the next hypothetical twelve flushes. DOE does not describe a change in the flushing process for the hypothetical flushes, so one would not expect such a stark contrast in the removal efficiency.

Path Forward: Explain if the analysis to predict removal efficiency of additional flushes applied knowledge gained from the actual removal efficiencies of the first three flushes, and if it did not why it did not. Provide the amount of time it took to complete each of the first three flushes, as well as cost information for the first three flushes to the extent that it is available. Explain the difference in the removal efficiency of the first three flushes (determined to have removed 46% of the remaining activity), with that of the fourth flush, which was only predicted to remove 0.5% of the remaining activity, or 22 Ci. (e.g., explain if there was a difference in the assumptions regarding the flushing process or the amount of glass formers that would be used with each flush).

Waste Classification (WC)

WC-1 **Comment**: The explanation of how averaging over void volumes was applied for purposes of defining waste classification is not clear.

Basis: Page 8 of the draft WIR evaluation, 1st paragraph states, "This grout will not increase the waste disposal volume and was not considered in the classification of the waste." The statement is misleading with respect to the classification of the waste, because internal void volume within the Melter that will be filled with grout was considered in the classification of waste. Page 65 of the draft WIR states that the weight used in the calculation was 106,000 lbs and the volume used was 750 ft^3 (21 m^3). A reference describes how this volume is derived from the outer dimensions, which would include any void spaces on the inside of the Melter (WSMS, 2008).

Path Forward: DOE should discuss whether large void volumes remain in the Vitrification Melter that must be filled with grout, and the void spaces that are expected to remain after the Melter is grouted. If there are large void spaces, DOE should indicate why it is acceptable to average over these large void volumes or justify why the averaging volume is not important to the sum of fractions (e.g., based on its sensitivity analysis or the fact that transuranics dominate the waste classification calculations since transuranics are based on concentration limits that average over the mass, not the volume of waste).

WC-2 **Comment**: The bases for the list of radionuclides considered in the waste classification are not clear.

Basis: Table 1 of 10 CFR 61.55 contains concentration limits for long-lived radionuclides including a specific class of radionuclides, alpha-emitting transuranic radionuclides with half-lives greater than 5 years. The following transuranic radionuclides with half-lives greater than five years are listed in the 1987 inventory of the sludge and supernatant but are neither carried forward to the inventory of the residual glass in Table 2-2, the inventory in the Melter characterization reference (WMG, 2004a), nor are they included as part of the waste classification in Table 6-1: Pu-242, Am-242m, Cm-245, and Cm-246.

Path Forward: DOE should address why the transuranics with half-lives greater than 5 years that were listed in the sludge/supernatant inventory, were not considered in the waste classification.

References

Brooks 1993, *Slurry Fed Ceramic Melter Disassembly Report*, Brooks, R., West Valley Nuclear Services, West Valley, New York, April 23, 1993. ML110800515.

DOE 2010b, *Letter from DOE-Nevada Site Office to DOE-West Valley on Special Performance Assessment (PA) Results Summary of Impacts of the Disposal of the West Valley Glass Melter in Area 5 Radioactive Waste Management Site (RWMS)*, WMP:6655:JC, dated July 29, 2010. ML110800413.

DOE 2011, *West Valley Demonstration Project - Draft Waste Incidental to Reprocessing Evaluation for the Vitrification Melter*, March 2011. ML110730801.

Eisenstatt 1986, *Description of the West Valley Demonstration Project Reference High-Level Waste Form and Canister*, DOE/NE/44139-26. Eisenstatt, L. R., U.S. Department of Energy, West Valley, New York, 1986. ML110800186.

Lachapelle 2003, *Vitrification Facility (VF) Radioisotope Inventory Report, RIR-403-010, Revision 1*. Lachapelle, E., West Valley Nuclear Services Company, West Valley, New York, June 17, 2003. ML110810639.

NRC 1982, *Final Environmental Impact Statement on 10 CFR Part 61 Licensing Requirements for Land Disposal of Radioactive Waste (NUREG-0945), Volumes 1 and 2*, U.S. Nuclear Regulatory Commission, Washington, D.C., November 1982. ML052590184 (Vol. 1), ML052920727 (Vol. 2).

NRC 2007, *NRC Staff Guidance for Activities Related to U.S. Department of Energy Waste Determinations, NUREG-1854. Draft Final Report for Interim Use*, U.S. Nuclear Regulatory Commission, Washington, D.C., August 2007. ML072360184.

Purdue 2004, *Economic Practicality Analysis for the West Valley Demonstration Project's Vitrification Facility Melter*. Purdue, R.K., Westinghouse Electric Company Science and Technology Department, Pittsburgh, Pennsylvania, November 8, 2004. ML110800249.

WMG 2004a, *West Valley Nuclear Services Company (WVNSCO) Melter Characterization Results, Report 4005-RE-024, Revision 3*. WMG, Inc. Peekskill, New York, May 2004. ML110810641.

WVES 2010, *Waste Profile Sheet for WVDP Vitrification Melter, WVDP-000000021, Revision 1* (and associated documentation). West Valley Environmental Services LLC, West Valley, New York, May 24, 2010. ML110810725.