UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2020

Bryan C. Bower, Director
West Valley Demonstration Project
U.S. Department of Energy
10282 Rock Springs Road
West Valley, NY 14171-9799

SUBJECT: SECOND ROUND OF COMMENTS ON U.S. DEPARTMENT OF ENERGY WEST VALLEY DEMONSTRATION PROJECT'S FINAL "STUDY" DOCUMENT: "VITRIFICATION FACILITY AIR EMISSIONS DURING OPEN-AIR DEMOLITION, MEASURED VS PREDICTED," WVDP-579, Rev. 0 (DOCKET NO. 05000201 (POOM-032))

Dear Mr. Bower:

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the U.S. Department of Energy's (DOE) February 19, 2020, response (Agencywide Document Access and Management System (ADAMS) Accession No. ML20055E049) to NRC's December 4, 2019, comments (ADAMS Accession No. ML19319A293) on the DOE's Vitrification Facility Air Emissions During Open-Air Demolition, Measured vs. Predicted," WVDP-579, Rev. 0 (the Validation Study) (ADAMS Accession No. ML1926A214), dated September 5, 2019).

The intent of our review of the Validation Study and our attached second set of comments is to provide comments with respect to the DOE's proposed use of the results of the validation study to update the AERMOD[1] modeling used to support the Main Plant Process Building (MPPB) demolition. WVDP-586, Revision 3, "West Valley Demonstration Project Main Plant Process Building (MPPB) Decommissioning & Demolition Plan" (ADAMS Accession No. ML19267A215) documents DOE's plan for demolition of the MPPB. The staff requests additional information on the planned use of updated[2] AERMOD modeling to determine when the MPPB is open-air demolition ready. Because AERMOD modeling results will be used to inform health and safety decisions, changes to the AERMOD modeling specific to implementing the MPPB Work Plan should be well understood and supported and should ensure adequate protection of public health and safety. DOE should reexamine the changes to the modeling approach considering the staff's comments provided in the enclosure. DOE could also provide additional information on how its proposed methodology will mitigate modeling uncertainties and ensure adequate protection of public health and safety (e.g., through built-in safety margin, monitoring, and controls during demolition).

In accordance with Title 10 of the *Code of Federal Register* Part 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records

[1] AERMOD stands for American Meteorological Society/Environmental Protection Agency Regulatory Model.
[2] Updates to the model based on the results of the validation study include updates to AERMOD modeling parameters (e.g., release fraction, moisture content, and physical state factor).

component of NRC's ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions or need any additional information regarding our comments, please contact me at 301-415-6822.

Sincerely,

Amy M. Snyder

Digitally signed by Amy M. Snyder
Date: 2020.04.27 14:24:32 -04'00'

Amy M. Snyder, Senior Project Manager
Materials Decommissioning Branch
Division of Decommissioning, Uranium Recovery and Waste Programs
Office of Nuclear Material Safety and Safeguards

Docket: 50-00201, POOM-32

ENCLOSURE: NRC Staff Comments

cc: WVDP List Serv

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NRC STAFF COMMENTS

General Comment

It is the U.S. Nuclear Regulatory Commission (NRC) staff's understanding that AERMOD modeling will be used to support open-air demolition of the MPPB. NRC understands that based on the Main Plant Process Building (MPPB) Work Plan, AERMOD modeling results will be used to inform health and safety decisions such as whether demolition approaches used in a specific area, fixative applications, and misting controls-separate are not resulting in contamination above administrative controls.

Page 60-61 of the MPPB Work Plan, states:

> "The action levels at the WVDP site perimeter will be 0.02 Derived Air Concentration (DAC) which is the maximum weekly average concentration according to the AERMOD calculation and activity on the deposition mats of 20 dpm/100cm^2 alpha and 1000 dpm/100cm^2 beta-gamma. The 0.02 DAC comes from the DAC values provided in 10 CFR 835 that would trigger mandatory personnel monitoring (100 person-mrem/yr) and the contamination levels are the levels for a Contamination Area (CA), which the intent is to remain below in the area outside the CA boundary. AERMOD modeling of residual contamination obtained from radiological surveys will be used to determine if contamination-including the demolition approaches used in a specific area (Cut, Shear, Break, Drop), fixative applications, and misting controls-will ensure that DAC objectives are met (0.02 DAC at the WVDP site perimeter).
>
> Wind speed and stability class limitations will be provided in the demolition WIP."

The approach to use the 0.02 DAC appears reasonable. Could DOE confirm what controls will be in place and at what level action will be taken to address issues associated with greater than expected air concentrations and dose to workers and members of the public during demolition of the MPPB? For example, alerts were established prior to a stop work established at 3 derived air concentration (DAC)-hour per day for the vitrification facility demolition.

Additionally, action levels of 0.02 DAC at the security fence and activity on deposition mats of 20 dpm/100 cm^2 alpha and 1000 dpm/100 cm^2 beta-gamma have also been proposed for the MPPB demolition. How often will the deposition mats be monitored?

The actions levels provide significant safety margin and allow action to be taken in a timely manner to minimize exposure should the expected dose be significantly under-estimated. These controls would help mitigate uncertainty with AERMOD modeling to allow DOE to proceed with open air demolition of the main plant process building

NRC suggests that DOE considers the NRC specific suggestions below specific to the AERMOD model that DOE plans to use for the MPPB demolition.

Specific Comments on the West Valley Demonstration Project Vitrification Facility Validation Study RAI Responses in Relationship to the Main Plant Process Building

Comment #	DOE Response	New Comment
New	N/A	
1.a.2	NRC requested clarification regarding the selection of radionuclides in the model validation study. DOE contractors stated Tc-99 and I-129 were not analyzed because they are not listed in the characterization database; however, DOE has listed these as key radionuclides and provided NESHAPS calculations using the alternative methodology for these key radionuclides. Furthermore, C-14, Tc-99 and I-129 are listed as key radionuclides in the DOE Phase I decommissioning plan.	While the risk from C-14, I-129, and Tc-99 may be low, some form of consideration of dose from these radionuclides appears necessary to make that determination given they are listed as key radionuclides. For the MPPB AERMOD, please address how the dose from C-14, I-29, and Tc-99 were considered if eliminated from the models.
1.b.1 and 1.b.2	In response to NRC's questions about presence of gaseous forms of radionuclides and ability to validate model predictions for these radionuclides, DOE contractors respond that they are unaware of gaseous emissions, but if there were, they would be assumed to be volatilized with an emission factor of 100 percent and so there would be nothing to validate. However, radionuclides are assumed to be volatilized during certain activities (e.g., Cs-137 during hot-cutting) and it is unclear that 100 percent of these radionuclides are assumed to be volatilized making the relevance of this statement unclear.	Clarify if all radionuclides are treated as particulates. Specifically, clarify how Cs-137 and other radionuclides that are assumed to be volatilized during hot cutting activities are treated in the modeling (i.e., as gases and/or particulates). Also, confirm that particle size and deposition are not considered in the modeling and how this influences the results of the validation study (e.g., location of samplers) and estimation of dose in general (e.g., impact on dose estimates for external radiation and inhalation exposure).
2.a 2.d.1	NRC was concerned that only two discrete data points were used to validate the model and recommended additional air sampling data be used to assess the predictive performance of the model. NRC went on to state that results could be comparable at the two discrete points and still not corroborate the model or could be way off at the two discrete points but generally consistent with plume distributions from the model.	Suggest providing figures of modeled plume distributions to support general predictive capability of the model in comparison to measured data. Air monitoring data collected within and outside the 30-m contamination area boundary, as well as data collected from deposition mats could be used for a qualitative comparison to assess the predictive capability of the model to simulate atmospheric transport of

	Response 2.d.1 states that there were several issues with using other air samplers including (i) higher detection limits, and (ii) location in building wake zones.	radioactivity from the demolition sources to downwind locations. AERMOD can consider building wake effects so the relevance of samplers being subject to building wake affects as an argument for not including these samplers does not appear to be compelling. Further, it is unclear if meteorological data that was used to determine the validation study sampling locations are representative of conditions during demolition. For example, if most demolition activities occurred during the day[3] and meteorological data are collected over day and night time hours, then the wind rose data may not be representative of the hours during which most of the demolition activities occur. Additionally, meteorological towers are typically located in areas free of obstructions. Because the wind direction near the demolition site may be influenced by nearby obstructions, the wind rose data from the onsite meteorological tower may not be reflective of conditions at the demolition site. Additionally, particle and gaseous deposition does not appear to be considered in the modeling, although particle size and chemical form are expected to influence atmospheric transport. Information on the physical and chemical form of the radioactivity would have been helpful in siting the validation study samplers. Also depending on the release height of sources, building wake effects, and buoyancy effects (e.g., from hot cutting activities), the locations of the samplers may not have been optimally located. While AERMOD modeling may be conservative with respect to dose, the

[3] Debris pile emissions occur at all times of the day, while other activities generally occur during the day.

		purpose of a validation study that uses actual monitoring data to make parameter adjustments to match the data inherently presumes that the model is realistically simulating atmospheric transport. Additional information would be needed to support the changes to air release fractions for hydraulic hammering and other parameters (moisture content for debris piles and physical state factor for hot cutting) to ensure that the AERMOD estimated air concentrations are reasonably conservative considering the significant uncertainty in the model and limited data provided to support the modeling adjustments. With respect to addressing hydraulic hammering and other parameters noted above for the MPPB demolition, the NRC staff suggest DOE evaluate these aspects for the AERMOD model used for the MPPB demolition. NRC anticipates that DOE will execute its plan, as identified in the MPPB Work Plan on page 60-61 and 57 to ensure that workers and members of the public will be protected during open air demolition due to the large safety margin and controls that will be in place during demolition of the MPPB.
5.a	NRC questioned whether adequate basis was provided to support the changes in hot cutting parameters. For example, limited data were available, and NRC identified several limitations of the validation study. NRC inquired if comparisons of Cs-137 concentrations would be more useful to justify changes in model parameters. The response provided information about detections at offsite samplers, which were compared to model results using updated parameters. While updated model results using updated parameters were like monitoring results at offsite samplers, the adequacy of these changes given uncertainty in the model predictions is unclear.	NRC notes that the changes to the model parameters for hot cutting should be demonstrably conservative if the uncertainty in model predictions is significant and cannot be reduced (the updated modeling results were sometimes slightly lower and slightly higher than positive detections at offsite sampling locations during hot cutting activities and therefore not clearly conservative). For example, it appears that the modeling only considers particulate release (see comment 1.b.1 and 1.b.2 which seeks clarification on treatment of volatile radionuclides) although radionuclides are assumed to be volatilized during hot cutting activities. The degree to which the released fraction is volatilized, the extent to which this

		radioactivity is transported as a gas, and the point at which this material condenses back to form solid particulates are unknown and do not appear to be considered in the modeling. Therefore, comparison of modeling results with particulate measurements at significant downwind distances does not appear to be enough to assess the adequacy of the predictive capability of the model.
General comment 3	When responding to an NRC question about offsite model validation, DOE contractors stated that CAP88 is not used to calculate dose and that offsite monitoring data are used as reported in the Annual Site Environmental Reports (ASER).	In previous documentation, CAP88 was stated to be used to estimate doses to offsite members of the public in determining whether the facility was open air demolition ready. While offsite data may be used to calculate dose for the purpose of the ASER, please clarify the use of CAP88 to estimate offsite doses prior to building demolition for the Vitrification Facility and Main Plant Process Building.