

Center for Nuclear Waste Regulatory Analyses

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February 1, 1995
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U.S. NUCLEAR REGULATORY COMMISSION
ATTN: Mr. Gary Comfort
Office of Nuclear Material Safety & Safeguards
Mail Stop T8A-33
Washington, DC 20555

Subject: Topics needing further clarification in support of the Review of the
Vitrification Operations and High-Level Waste Interim Storage,
WVNS-SAR-003

Dear Mr. Comfort:

In preparation for the February 13-17, 1995, meeting with the U.S. Department of Energy (DOE) and West Valley Nuclear Services, Inc. (WVNS) staff, a preliminary list of topics has been identified. This list, which is the subject of this letter, is intended to support your needs to provide DOE and WVNS sufficient time to prepare for the meeting.

General Concerns

1. A preliminary review of the draft version (Draft D) of the Safety Analysis Report (SAR) indicates that it has been changed significantly from the earlier version issued to the Joint Review Group. However, there is no appropriate documentation to indicate what and how the changes were made in the final draft. It should be noted that there was no closure on over 350 comments out of the original 800 at the time the Joint Review Group was disbanded.
2. The Record of Comment Resolution (RCR), as Center for Nuclear Waste Regulatory Analyses/Nuclear Regulatory Commission (CNWRA/NRC) understands it, is supposed to form part of the supporting documentation for the SAR. The question arises—how can the RCR now be used in this context if a large number of the comments have not had the benefit of closure with the original commenters? This will require that the final WVNS SAR-003 stand by itself and contain the necessary information without referencing the RCR.
3. There continues to be confusion in the degree of implementation of various standards used in the SAR. In trying to minimize the analysis performed for the SAR, differing standards seem to be applied to different parts of the vitrification process. This stems from the fact that part of the facility is new construction while the other parts have existed for a longer period of time. The major impact of this variation is with respect



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to the DOE Orders. Examples of this are the safety classifications and the use of WVNS evaluation guidelines. The CNWRA/NRC review will not dwell on the DOE Orders. However, applying 10 CFR Part 20 and Part 100 to the Vitrification Facility may lead us to identify some inconsistencies.

4. From all the CNWRA/NRC interactions with WVNS staff and the site reviews over the last 2 years, it can be generally concluded that the risks associated with radiological safety issues during the vitrification operations could be small, and probably less than that of the liquid waste tank farm as it exists now. However, the SAR, in its present form, does not provide that picture—many loose ends and unexplained claims exist.

Topics Needing Further Discussions With WVNS Staff

Seismic Analyses

1. Rationales for choice of probabilities of exceedance for the design basis earthquake (DBE) and the before design basis earthquake (BDBE). The WVNS response to Comment 9.0-079 indicates that text has been added to Section C.9.6 to give the annual probability of exceedance for a variety of events. These include 1×10^{-6} for the DBT, 1×10^{-3} for the DBE, and 1×10^{-4} to 1×10^{-6} for the BDBE. It is recommended that the basis for the selection of the 1×10^{-3} value for the DBE be tied back to a DOE requirement in this text rather than simply presenting a value. Based on our understanding, the 1×10^{-3} represents a value for systems classified as "Moderate" using DOE nomenclature and UCRL 15910.

The basis for selection of the BDBE event appears to be the level that the equipment can withstand based on analysis results rather than a value selected beforehand. Discussion of the probability of exceedance for the BDBE event is good as long as it is also tied back to the margin of safety associated with the various pieces of equipment subjected to seismic events.

2. Selection of a maximum ground motion is based on the probability of exceedance and the median fractile hazard curves. Based on a review of the Technical Support Documents (TSD) for SAR-001, it appears that a probabilistic seismic analysis of the site has been performed. A preliminary review indicates that the results are based on accepted engineering practices. To complement this, it is appropriate to provide some comparison of these results to independent results for the Ginna, Fitzpatrick and Nine Mile Point Nuclear power plants. It is important to note that the WV site is closer to a fault than any of these facilities.

Based on WVNS response to Comment 9.0-022, the annual probability of exceedance of the 0.1g ground acceleration is $5E-4$ /year. It is unclear whether the basis for this value is the mean or 0.50 fractile curve given in Figure A.3.6-E-3 or some other source. Care must be taken to ensure

that all values are based on one source or differences explicitly addressed.

Also unclear is the actual peak ground acceleration value used in the analysis of the vitrification facility based on the probability of exceedance addressed in Item 1 and the hazard curve addressed above.

3. Review of analysis. The first step in the review of the analysis will be to ensure that the appropriate earthquake event is defined. In addition to the peak ground acceleration, the site specific shock response spectra used for analysis is important to determine. This includes both the two horizontal directions and the vertical direction. It would be expected that comparable horizontal and vertical accelerations would be used for the east coast region of the United States based on vertical uplift, compared to 2/3 horizontal value used for vertical acceleration. The 2/3 horizontal value for vertical acceleration is based on horizontal slip for the west coast region of the United States.

The results of the detailed soil/structure analysis need review. The intent is to answer questions concerning the damping values used for the soil based on soil properties and excitation and response levels. Development of elevated response spectra for components in the vitrification facility reviewed to date have been based on a lumped mass model with what is considered a high value for soil damping. If the soil/structure analysis has been completed, the results need review.

For some components, it will be appropriate to review the development of the margin of safety in some detail. This will include a review of the analysis performed to develop all aspects of the load combination. Load conditions may include the dead load, live load, thermal load, earthquake, etc., as required.

A specific area is the seismic joint as given in Comments 8-001, 5-017, and 8-029.

4. "Margin of Safety" as defined in the text and explained in response to Comment 5.0-036 are still inconsistent. The text does not accurately portray intent described in the equation. In addition, the margin of safety assessments have not been completed for some equipment (e.g., Comment 5-183 & Table C.5.5.3-2). We need to see at least a sample of margins calculations (e.g., Comments 5-207, 5-208, 5-209, 5-210, 5-211, 5-212, 5-216).

HVAC

1. One subject of importance with respect to HVAC concerns the in-cell prefilters. The survivability of these prefilters under various scenarios deserves discussion (e.g., water capacity when loaded with condensing steam associated with certain failure scenarios). Conditions under which

the filters are relied upon for decontamination factor (DF) value attributed to them to maintain airborne releases (e.g., Cs) within 10 CFR Part 20 limits need identification.

2. Confusion about HVAC Ventilation Zones, including Tunnel Air Ventilation suggests some needed clarification.
3. Sealing of the Vitrification Cell by welding, penetrations of the hot cell wall and their isolation with valves, and gas leakage into the cell may be of concern.
4. A clear delineation of circumstances under which the HVAC is relied upon for meeting release requirements is needed to distinguish such from those under which HVAC functional survivability is not required. It is not clear that there is redundant capacity available for ensuring the negative pressure within the Vitrification Cell for a DBE.
5. A new reference was introduced in one of the late comment responses (November 25, 1994), to Comment 9-005, concerning double HEPA filtration DF of 1×10^5 (1×10^3 for the first and 1×10^2 for the second): Elder, J.C., et al. January 1986. *A Guide to Radiological Accident Considerations for Siting and Design of DOE Non-Reactor Nuclear Facilities*. LA-10294-MS. We need at least a cursory review of this reference and any others introduced in late comment responses.

Radiation Monitoring

A further examination of radiation monitoring appears to be in order, to review the adequacy of planned monitoring instrumentation and procedures for radiological surveys. Such surveys are intended to identify areas in which shielding does not reduce exposure to design radiation dose rates. For such areas, mitigating action, such as requiring personal breathing protection and controlled access in certain areas, can be planned. It is unclear whether surveys other than routine surveys (RC-ADM-4 "Routine Radiation and Contamination Surveys") are planned. Of particular interest are penetrations and the seismic joint.

Specific Comments from Subsequent Evaluations

After the interactions with several parties, including the DOE Technical Review Board, DOE EH-11, EH-12, EH-331, EM-23, EM-30, EM-323 and the Defense Nuclear Facilities Safety Board, clarification to the following comments are sought. Comments are identified in groups by related subject matter.

"Open" Status Comments

Any comments left in "Open" status at end of review by Joint Review Group.

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Seismic Analyses:

2-008, 2-017

5-031, 5-035, 5.0-036, 5-050, 5-183, 5-207, 5-208, 5-209, 5-210, 5-211, 5-212,
5-216

9-022, 9-079

8-001, 5-017, and 8-029

HVAC and HEPA Filtration:

4-041, 4-042

4-032, 4-033, 4-034

2-010, 4-023

5.0-074

5-084, 5-085, 5-086, 5-088, 6-057

5-184, 5-186

9-036, 9-042, 9-080

9-108

7-008, 8-020, 9-005, 9-039, 11-007, 11-008

5-165

5-174, 5-175, 5-177, 5-178, 5-181, 5-182

5-204

Melter:

5-124

6-029, 6-030, 6-031

6-034

6-044

6-062

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6-089, 6-104

6-106

6-025, 6-104

7-009

On-Site Doses:

1-013, 2-016

8-001, 8-009, 8-030

8-012, 8-022

8-023, 8-042, 8-047, 9-104

8-015

8-027, 8-028, 8-029, 8-030, 8-031, 8-032, 8-033, 8-034

4-070, 8-037, 8-038, 8-039, 8-040, 8-041, 8-050

9-029

9-039

Off-Site Doses:

6-042

8-020, 9-039

Criticality:

9-066, 6-017

HLWIS:

4-056, 5-167, 6-004

4-089

Process Flow:

7-001, 7-002

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QA:

12-008

Defense-in-Depth:

GC-008, 4-030, 4-031

ALARA:

8-006, 8-013

In-Cell Coolers:

5-091

Pump Pits:

GC-011

4-036

4-037

Corrosion:

5-190 thru 193

Miscellaneous:

4-019

4-044

4-005, 4-061, 4-066, 4-067, 4-068, 4-070, 4-073, 4-074, 4-077, 4-081

4-076

5-113

5-188

5-198

Diesel Generator:

5-156, 5-172, 5-179

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Comments Without Response:

GC-009, 4-015, 8-046

Reference to Draft Documents or Documents in Revision:

9-022, 9-028

SAR Deletions or Omissions:

5-076, 5-176, 5-213, 4-062, 8-055

Nomenclature:

GC001.1, 4-039

We hope this transmittal will provide the basis for the additional interaction planned in February. Please call Emil "Chuck" Tschoepe at (210) 522-5470, if you need any additional information regarding this transmittal.

Sincerely yours,



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