

LSNReviews

From: Darrell Dunn [ddunn@cnwra.swri.edu]
Sent: Tuesday, August 17, 2004 9:23 AM
To: CSPE_Group; Aladar Csontos; Tae Ahn; Dennis Galvin; Roberto Pabalan
Subject: Revised NWTRB Presentation
Attachments: NWTRB YM 081804 rev02.ppt

Attached is the revised presentation. I thank everyone for their contributions and comments. Below is a list of changes and/or comments:

1. I have added a slide on the hydrology and thermohydrology issues. I did not add slides addressing Seismic Update or Transportation Planning because they are not significant for corrosion issues which is the focus of this summary. These items can be mentioned if necessary.
2. The text in italics are not quotes from the NWTRB but paraphrased text. Therefore, quotes were not used.
3. I did not add a reference to the statement or press release by John Kerry. Although there is little doubt that the press release was based on the 2003 NWTRB letters and the 2003 NWTRB report, I think that introducing this information at the YM team meeting will serve as a distraction.
4. I have not stated which if any specific presentations led to the change in the NWTRB position. I am certain that it was the consistent conclusions reached by DOE, EPRI, and NRC/CNWRA but the NWTRB letter does not specifically mention any single presentation or combination of presentations that led to the position change.
5. I am not clear on the significance of the recent NWTRB resignations with respect to the position change. Duquette has a strong background in corrosion and has raised concerns on the effect of temperature prior to the October 2003 letter.
6. Editorial corrections were also included.

If there are additional comments we can discuss at the CLST Team Meeting

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Nuclear Waste Technical Review Board Position on Waste Package Corrosion During the Thermal Pulse

Yucca Mountain Team Meeting

August 18, 2004

NWTRB October 21, 2003 and November 25, 2003 letters and report

Deliquescence-induced crevice corrosion likely to initiate during the thermal pulse

- Conclusion based on information presented at NWTRB meetings in January 2003 and May 2003
- Corrosion tests conducted in calcium chloride solutions
- Corrosion possible at temperatures ranging from 140°C to 160°C
- Mitigating effect of nitrate ions might not be sufficient to inhibit corrosion

Revised NWTRB Position

July 28, 2004 Letter to Dr. M. Chu

Deliquescence-induced localized corrosion during the thermal pulse is unlikely

- Based on information from the May 2004 NWTRB meeting
- Significant amounts of calcium chloride not expected in dusts on the waste package surfaces during the preclosure period
- Significant amounts of calcium chloride not expected on waste package surfaces during the thermal pulse
- Calcium chloride corrosion tests are not representative of the conditions expected on waste packages at Yucca Mountain
- Unlikely to have high temperature deliquescence [and corrosion] without calcium chloride [or another hygroscopic chloride salt (i.e. magnesium chloride)]

Revised NWTRB Position

July 28, 2004 Letter to Dr. M. Chu

NWTRB Statement on Corrosion Tests

- Tests should be conducted in environments that closely approximate various conditions to which the waste package alloy will be exposed
- Environments that reasonably bound those conditions
- Unclear if DOE has accurately characterized the likely waste package environments including temperature, relative humidity, and chemical species present
- Accurate characterization of probable waste package environments and waste package corrosion will continue to be a major focus of the NWTRB's technical and scientific review

Revised NWTRB Position

July 28, 2004 Letter to Dr. M. Chu

Corrosion Issues that Require Additional Analysis

- Localized corrosion in sodium chloride solutions with low inhibitor concentrations when temperatures fall below boiling
- Possible mechanisms that may create environments that promote localized corrosion and the likelihood that such environments could exist
- Presence of ammonium ion and the implications for corrosion
- Possible aggressive effects of nitrates in some circumstances
- Review existing corrosion data to determine whether they bound nitrate containing environments that reasonably could be anticipated at Yucca Mountain

Revised NWTRB Position

July 28, 2004 Letter to Dr. M. Chu

Integration Among Technical Disciplines

- High temperature corrosion tests in highly concentrated chloride-containing solutions conducted by the DOE presumably to test conditions that might occur or tests to bound actual conditions
- Geochemical considerations preclude high-temperature, high-chloride brine conditions at Yucca Mountain, rendering the corrosion tests in high chloride solutions of limited relevance
- Integration is necessary among diverse technical disciplines, particularly when "coupled" processes are involved
- Integration among geochemists and corrosion scientists/engineers was evident at the meeting and helped bring clarity to an extremely important corrosion issue

Revised NWTRB Position

July 28, 2004 Letter to Dr. M. Chu

Hydrology and Thermohydrology Issues

- NWTRB questions the pervasiveness of vaporization and capillary barriers because of persistent uncertainties related to the expected repository environments
 - Basis for the drift-scale thermohydrologic seepage analysis, including the axial convective transport of water vapor, air, and thermal energy in drifts
 - Source of liquid water in the bulkheaded part of the cross drift
 - Effects of drift degradation on the waste package environment
 - Potentially unrealistic combinations of parameters used in the performance-assessment calculations of seepage

Impressions from the NWTRB Meetings and Letters to the DOE

- The NWTRB is looking for a defensible evaluation of the expected conditions within the potential repository
- Emphasis on the effects of environmental conditions on waste package performance
- Integrated presentations from technical staff led to change in the NWTRB position
- Although the presentations by the State of Nevada were not convincing, the NWTRB will continue to hear the State's arguments