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David, John, and Carl,

From: Dale Hammermeister [dhammermeister@co.nye.nv.us]
Sent: Friday, July 30, 2004 11:07 AM
To: Dudley, Sherry
Subject: FW: May Board Meeting Observations

Sherry -

The attached e-mail summarizes Nye's comments regarding DOE presentations at the May 2004 NWRTB meeting in Washington D.C. regarding brine formation and waste package regarding corrosion. Note that Walton sent this e-mail to NWTRB staff members, John Pye and Carl Di Bella.

- Dale

-----Original Message-----
From: John Walton [mailto:walton@utep.edu]
Sent: Friday, May 21, 2004 2:27 PM
To: 'Carl Di Bella'; 'John Pye'; duqued@rpi.edu
Cc: Dale Hammermeister; aa-Switzer, Jennifer
Subject: May Board Meeting Observations

David, John, and Carl,

Sitting at the board meeting this week the following thoughts came up. I believe these observations are critical to understanding the waste package environment and are not being addressed. I felt the issue was too complex to explain in a brief comment at the meeting. We could present this at a future board meeting if you would like.

According to Bo Bodvarsson the main water transport process is in the drift is radial refluxing as vapor moves into the rock and liquid moves toward the drift opening. Meanwhile the moisture is shedding downward through the rock around the drift in a sort of thermally enhanced capillary diversion. The liquid water shedding prevents salts from building up in the area above the drift. Carl Steefel followed up with the correct observation that one has to evaporate a lot of water in order to get concentrated salts & Bo's calculations predict that most water and salts are "shed" rather than evaporated.

The concern is that the modeling work that predicts shedding of water and salts and the related tests are essentially based upon a closed system boundary condition in the drift that prevents axial transport of moisture along the drifts. When one models the system with an open boundary condition in the drift (e.g., as George Danko has) then there is a net transport of water from the hot central portion of the drift out to the cooler edges where it condenses. The transfer of vapor in the open system shuts down the shedding of water and salts in the central (hotter) portions of the drift. Bo's shedding conclusion may actually be a modeling artifact. The net result of open

system modeling is that the center of the drift “attracts” water from a wide area to replace the lost vapor that migrated to colder regions along the drift and condensed.

Now consider the implications for near field chemistry. When the process is modeled as an open system large net amounts of water are potentially evaporated from the central portions of the drift and they leave behind large amounts of salt. At the same time condensate in the cold regions may wash away most salts. Carl Steefel’s observation of only small amounts of salts being present is no longer supported. Some portions of the drift will have a potentially large salt buildup and other portions will have none.

Given the potential for flow separation of salts and the susceptibility of Alloy-22 to localized corrosion in sub boiling NaCl solutions - this observation is potentially important to performance.

John

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