HLWYM HEmails

From: Roberto Pabalan
Sent: Friday, October 17, 2003 3:28 PM
To: Richard Codell
Cc: English Pearcy; David Brooks
Subject: RE: NWTRB Presentations

Maury Morgenstein admitted during our discussions that they have not done an analysis of the realism of acid gas effects on corrosion in a repository system. He stated that interaction with drift wall rocks, particularly feldspars, would mitigate the problem of acid gases. Nevertheless, Nevada has demonstrated a credible process by which Alloy 22 can be corroded at high rate. From Nevada's perspective, it is DOE's job to prove that the mechanism is not important in a repository setting.

Attached is a Word file with a figure showing results of thermodynamic simulations using the Environmental Simulation Program (OLI Systems, Inc.).
As shown in the figure, condensate pH values close to 1.0 can be attained, due to formation of HCl and HNO3 during evaporation of a YM-type of groundwater. HCl and HNO3 partitions into the vapor phase and with condensate. The figure is part of a poster I presented at the MRS Scientific Basis for Nuclear Waste Management conference held in June. Aqueous solutions with Mg2+ result in higher acidity. We plan to do more thermodynamic simulations of evaporation and acid gas generation.

Another thing I plan to do is back-of-the-envelope calculations to determine how much acid gas can be produced (or how much seepage water is needed to produce a certain amount of HCl/HNO3) by evaporation. It is possible that not enough water will enter the drift and evaporate to generate corrosive brines and acid gases.

bobby

-----Original Message-----
From: Richard Codell [mailto:RBC@nrc.gov]
Sent: Friday, October 17, 2003 1:54 PM
To: rpabalan@cnwra.swri.edu
Subject: NWTRB Presentations

Christianne Ridge got it, but I am not sure from whom. I have the entire CD of the presentations but they are each too long for email. If you cannot find it, I can have a copy made to send to you.

By the way, we were meeting on the Catholic University results yesterday, and I am interested in your appraisal of the situation. When I looked at their experiments with boiling and condensing the pore water, it looked like the only route to a strong acid was through volatile HCl, HNO3 and HF recondensing in the environment of the apparatus. This neglects the presence of the surrounding rock that could interact with the gases and neutralize them, and wouldn't be very similar to their apparatus. I am less sure about the dripping experiments though. How valid do you think is the mechanism to generate protons through the hydrolysis of the Mg? Can this be easily simulated with EQ3/6?
Dick

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