Brunell, Sarah (Sarah.Brunell) 579254

From: Wagner, Steve
Sent: Tuesday, February 28, 2023 12:35 PM
To: King, Seth; Brunell, Sarah; Kim, Sungtae; Hansen, Clifford W; Zeitler, Todd; Feng, Michael; Kirkes, G Ross; Bethune, James
Cc: Shoemaker, Paul E; Miller, Chammi Sumudumali
Subject: FW: [EXTERNAL] PBRINE Telecon, Issue 4 (Pu oxidation state), and Issue 19 (Boreholes)

All,

Looks like EPA has agreed to a few things but not everything.... Will discuss at the next Thursday 1pm meeting - March 9th.

Steve

From: Santillan, Jay (he/him/his) <Santillan.Jay@epa.gov>
Date: Friday, Feb 24, 2023 at 8:49 AM
To: Anderson Ward <Anderson.Ward@cbfo.doe.gov>
Cc: Peake, Tom <Peake.Tom@epa.gov>, Lee, Raymond <Lee.Raymond@epa.gov>
Subject: [EXTERNAL] PBRINE Telecon, Issue 4 (Pu oxidation state), and Issue 19 (Boreholes)

Hi Andy,

Please see below regarding the PBRINE telecon, Issue 4 (Pu oxidation state), and Issue 19 (boreholes). We'll be placing this correspondence in the docket for recordkeeping.

PBRINE Telecon
We appreciate the presentation Todd gave us on the PBRINE approach for the RPPCR and CRA-2024 during our telecon on February 10. The approach seems reasonable and we look forward to reviewing the documentation. We noted in our discussion that DOE assumed the TDEM soundings were 1,000 feet apart based on the scale included in a figure showing the sounding locations. As explained in the original TDEM report, the soundings were actually 250 m (or 820 ft) apart. This difference resulted in locating the soundings associated with Panels 11 and 12 too far to the west. We recommend that DOE repeat this analysis with the foregoing corrections (i.e., 250 m/820 ft spacing). We also understand that the approach only applies to the repository with the addition of Panels 11 and 12. An update to the PBRINE parameter for any additional panels will require further discussion between EPA and DOE.

Issue 4 (Pu oxidation state and repository chemical conditions)
Below is a list of questions we'll be asking when we review any new experiments that DOE provides to justify updates to the Pu oxidation state approach. We hope this list will help you understand what we're looking for when we do our review.

1. Provide justification for mineral assemblages and reactions expected to control the redox conditions in the long-term WIPP environment.
    a. Identify the iron minerals that will participate in plutonium redox reactions and demonstrate that these minerals will form in the WIPP environment (magnetite) or remain in the WIPP environment (Fe metal and $Fe(OH)_2(s)$).
    b. Demonstrate that these minerals will remain reactive when contacted by brine and subjected to radiolysis levels consistent with the WIPP environment. This evaluation should include longer-term experiments (years), with post-experimental characterization of mineral surfaces.

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2. Provide support for the assumption that $H_2(g)$ will be relatively unreactive in the WIPP environment, despite partial pressures up to approximately 150 atm, presence of materials in WIPP waste that might catalyze plutonium reduction by $H_2(g)$, and possible stimulation of sulfate-reducing bacteria or other organisms by high $H_2(g)$ pressures.
3. Demonstrate that radiolysis in the long-term WIPP environment will not lead to persistence of the +V oxidation state in brine due to consumption of reduced iron minerals or formation of relatively unreactive coatings.

Issue 19 (Boreholes)
We have received and reviewed the borehole report transmitted on February 21 and believe the response DOE has provided answers our questions. EPA finds DOE's proposed changes to the borehole plugging methodology, specifically the area over which plugging probabilities are calculated, acceptable. We will note this issue as resolved in our issues table. In future reviews, we may have more questions on this topic as we further analyze the borehole database.

Thanks,

Jay

Eugenio-Felipe (Jay) U. Santillan, PhD
Geologist
OAR/ORIA/RPD/CWMR
U.S. Environmental Protection Agency
Work: (202) 343-9343
Cell: (202) 981-4142

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