HLWYM HEmails

From: Darrell Dunn [ddunn@cnwra.swri.edu]
Sent: Friday, January 07, 2005 1:58 PM
To: David Pickett
Subject: RE: tbd8 review draft

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1. Yes, what he says makes sense.

2. The timing of evolution of iron phases to more crystalline forms is correct also but I don't have a good feel for sorption. Certainly the evolution of the iron corrosion products will occur faster than stainless steel corrosion or cladding degradation. The type of iron corrosion product formed will depend on environmental conditions including temperature, water, redox potential, and chloride concentration.

3. If the Alloy 22 waste package is penetrated by passive uniform corrosion, then penetration will not occur until after many thousands of years. Under conditions where the ground water is dilute (low [Cl]) and the temperature is low, passive corrosion rates of stainless steels are very slow.

-----Original Message-----
From: David Pickett [mailto:dpickett@cnwra.swri.edu]
Sent: Friday, January 07, 2005 11:47 AM
To: Darrell Dunn
Subject: FW: tbd8 review draft

Darrell,

I need an opinion or two on points made below by Dick Codell. Does what he says make sense? What about the timing of evolution of iron phases to more crystalline forms? And what about the slowness of stainless steel corrosion?

Thanks,

David

-----Original Message-----
From: Richard Codell [mailto:RBC@nrc.gov]
Sent: Wednesday, January 05, 2005 2:37 PM
To: DPICKETT@cnwra.swri.edu; David Brooks; John Bradbury
Cc: Gregory Hatchett
Subject: tbd8 review draft

David:
I have one comment concerning GEN 1.01 comment 38 response and elsewhere on the discussion of the new DOE approach to sorption onto corroding iron products inside the waste package. I read DOE's description in "Waste form indrift colloids-associated radionuclide concentrations: abstraction and summary". While I feel the phenomenon is real, I think it efficacy would depend on the timing of the sequence of WP failure and steel corrosion. For example, given that the WP fails and water gets

inside, the non-stainless steel would certainly start to corrode, first to ferrihydrite, but then progress to more crystalline forms like goethite and hard flaky rust. The surface area and sorption of ferrihydrite is well known to be large, but the crystalline forms much less so. Its possible that the ferrihydrite would sorb a lot of Pu and Am, but I am not so sure that it would do the job in the rust form. The whole rusting process is likely to occur quickly, hundreds of years, but its likely that the Pu and Am would not be available before all the soft steel has corroded to hard rust. Cladding is likely to protect most of the spent fuel for many years following WP failure, and even when the cladding has failed, the low solubility and long half life of the Pu would assure a supply of dissolving radionuclides long past the period of steel corrosion. Corrosion of the stainless steel in the WP is another matter, but I don't think it would corrode fast enough to supply iron colloids of any consequence. What do you think? Dick

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Sent Date: 1/7/2005 1:58:08 PM
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From: Darrell Dunn

Created By: ddunn@cnwra.swri.edu

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"David Pickett" <dpickett@cnwra.swri.edu>
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