HLWYM HEmails

From: John Bradbury
Sent: Monday, March 03, 2008 4:21 PM
To: LSNReviews
Subject: Fwd: Re: Cambric Site Question
Attachments: TEXT.htm; Cambric site SZFEP comparison to Jim.doc

>>> John Bradbury 09/18/2007 5:27 PM >>>
Jim: See the attachment discussing the findings at the Cambric site compared to the SZ FEP AMR.

Thanks, John

>>> James Rubenstone 09/17/2007 7:00 PM >>>
John,

I'm looking at the 2005 SZ FEP AMR, specifically pp. 6-100 and onward. The "excluded by regualtion" screening argument hangs on a strict reading of the "natural conditions" aspect of the regulation. Given that 63.305 allows that "Features, events, and processes that describe the reference biosphere must be consistent with present knowledge of the conditions in the region surrounding the Yucca Mountain site" DOE may be taking a chance by drawing such a sharp line between biosphere FEPs and SZ FEPs. That may be why they added the "Supplemental DIscussion" that provides a consequence-based scrrening argument.

As far as I know, we have not engaged DOE at all on the Cambric observations.
What I would put back to you is (1) is there evidence from Cambric that argues against DOE's "only a factor of 1.5" consequence effect? and (2) what would be the best way to present this argument? I don't have straightforward ways of interacting with technical staff here, as opposed to the DOE licensing PMs.
This could be encompassed in a TE on TSPA, but that isn't likely to occur before January 2008. Should we be looking for a FEP-themed Appendix 7, or a specific SZ-based meeting?

Let me know your ideas.

Jim

>>> John Bradbury 9/17/2007 1:59 PM >>>
Have we asked DOE about the evidence from the Cambric site as it might relate to the FEP "Recycling of Accumulated Radionuclides from Soils to Groundwater?"
I note there is no mention of it in the August 2005 AMR on Features, Events, and Processes in SZ Flow and Transport. The FEP was "excluded by regulation."

If we haven't already, I recommend we ask DOE about this one-of-a-kind, long-term experiment that apparently demonstrates the recycling of radionuclides through the unsaturated zone back to the well capture zone.
Could you help me get this information?

Thanks, John

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 294

Mail Envelope Properties (61d66c6a-3471-42fb-bd69-af0f3fb5f0d9)

Subject: Fwd: Re: Cambric Site Question
Sent Date: 3/3/2008 4:21:00 PM
Received Date: 3/3/2008 4:22:30 PM
From: John Bradbury

Created By: John.Bradbury@nrc.gov

Recipients:
"LSNReviews" <LSN.Reviews@nrc.gov>
Tracking Status: None

Post Office:

Files	**Size**	**Date & Time**
MESSAGE	2068	3/3/2008 4:22:30 PM
TEXT.htm	2539	
Cambric site SZFEP comparison to Jim.doc	23104	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

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Jim: I, too, found that section of the SZ FEP AMR to be fascinating reading. Note that the DOE analysis of the situation where an irrigation well pumps at the 18 Km boundary, they assume the plume volume is 8100 acre feet, (the groundwater outflow from Jackass Flats). Consequently, (3000 acre feet)/(8100 acre feet) yields 0.37. The concentration ratio using their equation 6-5 is 1.5. If the volume of the plume were 3000 acre feet, the Fc =1, Fi=0.92 and the concentration ratio would be 12.5. The Fi value is based on the EPA estimate of volumes of water used for different purposes. The DOE assume that 2550 acre feet/yr for agricultural use, 100 acre feet/yr for commercial/industrial use and 120 acre feet/yr for individual/municipal use, totaling 2770 acre feet/yr, all of which contributes to recharge. Consequently, 2770/3000 = 0.92=Fi. I am not sure whether these values are constrained by regulation. It should be noted that as FiFc approaches 1, the concentration ratio blows up (i.e. very sensitive).

You ask whether there is evidence from Cambric that argues against DOE's "only a factor of 1.5" consequence effect? Here are some thoughts. The 2006 paper in Advances in Water Resources by A.F.B. Tompson, G.B. Hudson, D.K. Smith, and J.R. Hunt entitled Analysis of radionuclide migration through a 200-m vadose zone following a 16-year infiltration event, states that 60% of the tritium sampled from the saturated zone in the year 2000 was recycled through the UZ. This result occurred with only 16 years of pumping between 1975 and 1991. The authors surmised that other non-retarded radionuclides mimicked tritium. DOE's FEP analysis derived eq 6-5 that represented steady-state conditions. The Cambric experiment had not reached a steady-state condition. In fact they say it is still evolving. A comparison of the Cambric site with conditions expected in Amargosa Valley reveals some similarities and differences. The Cambric site involved a pumping rate of 968 acre feet/yr instead of 3000 acre feet/yr. Both sites are in alluvium but the depth to the water table is 200 m whereas at the compliance boundary the depth is 100 m. The Cambric site dumped water in a trench that originated at the wellhead and extended 1.6 km radially. Irrigation in Amargosa Valley involves predominantly center pivots where the water is applied over a circular area whose center is the well.

The SZ FEP AMR states that the transport time nonsorbing radionuclides to the water table should take 100 yrs. At the Cambric site, it apparently took 3-5 years. The SZ FEP AMR states that for moderately sorbing radionuclides like Np, the transport to the water table would be 4,100 years. In contrast, a paper in press by R.M. Maxwell, A.F.B. Tompson, S.F. Carle, M. Zavarin, and S.J. Kollet entitled A serendipitous, long-term infiltration experiment: Water and radionuclide circulation beneath the Cambric trench at the Nevada Test Site, states that Np has begun to show up at the monitoring well in the saturated zone. I suggest this evidence is likely incompatible with the modeling results of the SZ FEP AMR.

Since we don't know whether DOE has considered this at all, I suggest we start small. For example, a call to April Gil, to ask whether there has been any work to address the results of the Cambric infiltration experiment as it might apply to recirculation at the compliance boundary south of YM. Where we go from there depends on her response.

Hope this info is useful.

John