

## HLWYM HEmails

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**From:** David Pickett  
**Sent:** Wednesday, March 28, 2007 11:40 AM  
**To:** Christopher Grossman; James Winterle  
**Cc:** 'Rob Rice'; Budhi Sagar; Gordon Wittmeyer; Olufemi Osidele; Osvaldo Pensado; Sitakanta Mohanty; Scott Painter; Richard Codell; Timothy McCartin  
**Subject:** RE: Follow-up from validation presentation

**Follow Up Flag:** Follow up  
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Let me throw out a few thoughts here. (My knowledge of this new issue comes only from these emails.)

Keep in mind that UZ colloid filtration is not very effective, anyway. I think the most the UZ can reduce J species concentrations by matrix filtration is something like a factor of three. (Someone can correct me if I'm wrong...Femi?) Also, remember that permanent colloid removal by filtration is not invoked in the SZ...only retardation.

So it looks to me, in the absence of more info, as though the main contributing factor could be a simultaneous sampling of very low values for ColloidRetardationFactor\_SAV and ColloidRetardationFactor\_STFF. We have extended these distributions down to one because we know that it is possible for a very small fraction of colloid mass to be transported unretarded. The DOE approach is different: they define this unretarded fraction and don't extend their Rd distributions down to one for the other colloids.

I don't quite understand Chris's comment about the competition model. We do know that the release model is conservative, though we've moved in the direction of realism. As usual, the difficulty in being more realistic is in quantification.

David

-----Original Message-----

**From:** Christopher Grossman [mailto:CJG2@nrc.gov]  
**Sent:** Wednesday, March 28, 2007 8:27 AM  
**To:** James Winterle  
**Cc:** 'Rob Rice'; Budhi Sagar; David Pickett; Gordon Wittmeyer; Femi Osidele; Osvaldo Pensado; Sitakanta Mohanty; Scott Painter; Richard Codell; Timothy McCartin  
**Subject:** RE: Follow-up from validation presentation

Jim-

I think that would be appropriate to discuss this issue as time permits today. In regards to your alternatives, I agree with Tim's comments. It may be simpler to specify a filtration fraction for the entire UZ/SZ. My question would be developing a range for this and the basis for that range. David could probably shed some light on that issue. This issue is somewhat related to the issue discussed below in terms of what is expected physically and what are we simulating.

In a related issue, I think it would be prudent to discuss the competition issue for colloid generation today as time permits. While the model accounts for competition amongst the various actinides, we're not sure this is the most appropriate way to represent this for TPA. Specifically, if a user decides not to simulate the transport of a radionuclide doesn't equate to the lack of existence of that nuclide in the waste form. We want to ensure that our release calculations are consistent with our source term (regardless of what is actually simulated for transport). We may be missing some unforeseen considerations, so we should discuss to make sure everyone is on the same page. In the meantime, if you could arrive at an idea of the impacts of potential changes in this area would be helpful to our decision.

Chris

>>> James Winterle <jwinterle@cnwra.swri.edu> 03/28/2007 9:34 AM >>>

Tim and others:

Perhaps we can take some time at the meetings today and tomorrow to discuss what other factors appear to be contributing to the relatively few realizations that seem to be dominating the mean. Below are two factors that seem to be important in at least some of the realizations that produce large peak dose estimates.

1. As already discussed, when CH<sub>nv</sub> is not present, majority of source term bypasses UZ and no filtration of colloids occurs.
2. When item 1 occurs, and low values are sampled for ColloidRetardationFactor\_SAV\_[] (ranges from 1.0 to 5188) and ColloidRetardationFactor\_SAV (1.0 to 800), then colloids basically are transported straight from the EBS to the receptor within only a few hundred years. The difference between a colloid retardation factor of 1.0 versus 5,000, when multiplied by groundwater travel time, determine whether Am and Pu colloids get to the receptor within 100 years or 100,000 years. Since Am-243 and Pu 240 have a half lives on the order of ~7 and 6ky, respectively, the amount of retardation will have a huge effect on dose.

The schedule calls for initiating any SCRs by April 13, so we have a week or so to think of ways to improve this abstraction or to consider whether we can reduce the range of uncertainty in colloid retardation.

--Jim

-----Original Message-----

**From:** Timothy McCartin [mailto:TJM3@nrc.gov]

**Sent:** Wednesday, March 28, 2007 6:01 AM

**To:** James Winterle; Christopher Grossman

**Cc:** 'Rob Rice'; David Pickett; Femi Osidele; Osvaldo Pensado; Richard Codell

**Subject:** Re: Follow-up from validation presentation

Jim's item 4 seems the best of the alternatives given, however, another approach could be to just set the colloid concentration to that which represents the colloids that make it through the UZ and not use a filtration term at all - this would result in not sequestering the colloids that get filtered (i.e., they would end up as dissolved species) but I believe given retardation in the alluvium this would not lead to any significant issue of conservatism. Regardless what is done this still leaves a single vector with a very large contribution and I am still wondering what the explanation is? as noted by Jim in the input file CH<sub>v</sub> is not present 80% of the time how come all the other times the unit is bypassed the dose is significantly lower - there is something very unique going on that does not occur in the other 399 realizations where CH<sub>v</sub> is bypassed (80% of 500). On the plus side this is exactly the kind of issue that affords us an opportunity to better understand the representation of this phenomenon - if the code didn't make us pause and think once in awhile it would not be very good. Kudos to Rob for examining the results and pointing out this type of behaviour - this (in my opinion) is why we do the PA.

>>> James Winterle <jwinterle@cnwra.swri.edu> 03/27/2007 6:58 PM >>>

Chris:

We did some follow-up on the realization with the high dose that we discussed at today's presentation. As I suspected, the CH<sub>nv</sub> layer had a zero thickness sampled for this realization; because the next most permeable layer was the CH<sub>nz</sub>, which has quite a low permeability, 96 percent of source was directly bypassed to SZ without any colloid filtration or retardation.

This basically works exactly the way we programmed it. I'm thinking, though, that it doesn't make sense to completely throw out colloid filtration for the fraction that doesn't go into a UZ matrix layer just because NEFTRAN cannot handle thin layers. Although the colloid filtration factors are layer specific, what they really represent is all of the total permanent loss that would occur along the entire UZ and SZ transport path. If that is what we really should be representing, then it would make sense to also apply colloid filtration to the fraction of flow that has fast bypass of the UZ. Below are some options on how to do this in order of ease of implementation:

1. Do nothing and call the current approach conservative. (given the high effect on dose in some realizations, this strikes me as too conservative).
2. Just apply the same filtration factor to the bypass fraction that was used for the matrix flow fraction. (Easiest to implement, but could be difficult to explain)
3. Add a separate new parameter to account for filtration of bypassed fraction in the saturated zone. (Not too hard to implement, but would require some revision to the user manual chapter.)
4. Rethink the whole filtration factor concept. Rather trying to use uncertain layer-specific factors, we could use a single effective parameter to represent permanent colloid filtration along the entire UZ/SZ flow path. (probably not too hard to implement; but would require some revision to the user manual chapter)

I am interested to hear thoughts on the subject. I'll also talk to David Pickett since he has helped on this topic in the past.

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Jim Winterle  
Manager, Performance Assessment Group  
Geosciences and Engineering Division  
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**Mail Envelope Properties** (dpickett@cnwra.swri.edu20070328113900)

**Subject:** RE: Follow-up from validation presentation  
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**From:** David Pickett

**Created By:** dpickett@cnwra.swri.edu

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