

HLWYM PEmails

From: James Weldy [jweldy@swri.edu]
Sent: Wednesday, March 07, 2001 5:34 PM
To: plaplante@swri.edu
Subject: RE: Soil Buildup

I don't think that the simplified modeling is that bad because the second effect shows up in the soil-to-plant transfer factors. For the most part, radionuclides with large Kds have small soil-to-plant transfer factors so in that sense, the soil is acting as a sink. Clearly, it is dependent on chemical conditions of the soil vs. those that the transfer factors were measured at, but that effect is not completely ignored in the models.

James

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

From: Patrick LaPlante [mailto:plaplante@swri.edu]
Sent: Wednesday, March 07, 2001 4:24 PM
To: jweldy@swri.edu; pbertetti@gargol.cnwra.swri.edu
Subject: RE: Soil Buildup

That sounds about right (I think the only nuclide that leaching impacts to any degree is Tc). Also, as I indicated before, if it is sorbed then the plant uptake would have to be adjusted for those soil conditions and it would seem like the soil would act as a sink rather than a source (binds NP so it can't move into roots). Of course, we have not made similar adjustments to any of the radionuclides w/ high kds (a contradiction in the simplified modeling...but a conservative one).

I was originally thinking about it mostly impacting inhalation, but now I recall that inhalation is not significant for NP in groundwater and for the volcano scenario there is already a blanket of ash so it would also probably be negligible.

Thanks for the quantification...

Pat

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

From: James Weldy [mailto:jweldy@swri.edu]
Sent: Wednesday, March 07, 2001 4:57 PM
To: plaplante@swri.edu; pbertetti@gargol.cnwra.swri.edu
Subject: RE: Soil Buildup

I don't think that this is going to be a very big issue. I did a quick calculation in which I decreased the leach rate of Np by 2 orders of magnitude to increase the retained concentration of Np in the soil. After 15 years of buildup (the base value in the TPA code), the Np DCF only increases by 2%. Even after 1000 years of buildup with this lower leach rate, the Np DCF increases by less than a factor of 2. I think that the reason is that the Np uptake by plants is dominated by wet deposition on the leaves, not root uptake.

James

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

From: Patrick LaPlante [mailto:plaplante@swri.edu]
Sent: Wednesday, March 07, 2001 3:39 PM
To: pbertetti@gargol.cnwra.swri.edu; 'James Weldy (jweldy)'; 'Patrick Laplante (plaplante)'

Subject: RE: Soil Buildup

I talked to Bradbury today and it looks like his ideas are worth checking into. The soil information and models we have used for the biosphere are generic simple leaching models that do not account for potential site-specific geochemical reactions. If Np is bound tightly to calcite in soils then perhaps this would be a 'sink' for plant uptake availability but it could be a source for buildup related to inhalation pathway. It might help resolve the issue if we had detailed geochemical data on the Amargosa Valley soils (not sure anybody has that info). Perhaps there is a way to modify the Np Kd in the leach model to reflect this sorption potential. (?)

Thanks for passing this along. I will talk w/ James and Chris about their thoughts and we'll see where it takes us.

Pat

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

From: Paul Bertetti [mailto:pbertetti@gargol.cnwra.swri.edu]
Sent: Wednesday, March 07, 2001 3:22 PM
To: James Weldy (jweldy); Patrick Laplante (plaplante)
Subject: FW: Soil Buildup

Gentlemen,

John Bradbury would like you to consider his thoughts on the possible sequestration of Np in the near surface environment as a result of irrigation/soil watering. He is concerned that we may be neglecting a potential source of significant Np exposure.

Thanks.

Paul

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

From: John Bradbury [mailto:JWB@nrc.gov]
Sent: Wednesday, March 07, 2001 8:55 AM
To: CAM1@nrc.gov
Cc: dturner@gargol.cnwra.swri.edu; pbertetti@gargol.cnwra.swri.edu; DJB@nrc.gov
Subject: Soil Buildup

In a cursory review of the biosphere, I note that DOE considered soil buildup by assuming an equilibrium is reached for the processes of adsorption, leaching, radioactive decay, wind and water erosion, and irrigation. As a result, for most radionuclides an increase in dose due to soil buildup was less than 15%.

The conceptual model appears to neglect coprecipitation of contaminants with relatively insoluble phases like calcite, gypsum, and sepiolite. The soil buildup factor for neptunium is only 1.01. However, the CNWRA has shown that calcite, precipitating from a groundwater having 28 ppb Np, will contain between 500 and >1000 ppm Np.

Furthermore, Drever 1988, describes wetting drying cycles of arid environments which suggests even though the readily soluble salts can be leached from the soil the calcite will persist.

What are your thoughts on these observations?

Thanks, John

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Priority: Standard
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