

From: [REDACTED]
To: [REDACTED]
Subject: RE: IWCS Containment Failure - comments
Date: Wednesday, July 07, 2010 10:23:00 AM
Attachments: [Roberts NFSS GW Data Ra-226.xls](#)

Hello [REDACTED],
[REDACTED] asked me to send you the text below to suggest a different way to look at the dataset for the Niagara Falls Storage Site (NFSS) Remedial Investigation.

To better understand the difference between groundwater data that are impacted by turbidity artifacts (sample cloudiness), high NTU (clarity measurement) and measurement interferences, [REDACTED] offers the following exercise that you can perform on the groundwater data from the NFSS:

1. Using the RI database, Annual Technical Memorandum, and/or older DOE documents, extract groundwater data for radionuclides that are have positive data quality flags (i.e., no flags or J flags or possibly UJ flags, which can be suspect – do not use U or R flagged data).
2. Compile these data in a table where you can compare the filtered and unfiltered counterparts from a well sampling event (note that filtered components are usually designated as "Dissolved" in the data tables). You may choose to set up a table with well IDs along the left margin and parameters along the top margin, differentiating between parameters that are total and dissolved fraction (i.e., Ra-226 and Ra-226, Dissolved).
3. Then either visually or numerically assess that matching parameter values (e.g., total and filtered fractions of Ra-226) for each well's sampling event, making sure the data matches for each event (i.e., don't mix events).
4. Notice how the results for the radionuclides are different for Ra, Th, Cs (and many others), which are favorably partitioned to soil, whereas the U data (and possibly other dissolved metals) are more coincident due to their greater relative mobility and geochemical condition promoting their solubility. Uranium still has an affinity to partition to soil, just at a lesser capacity than the other nuclides.
5. At lower (to quite low) concentrations, you may notice dissolved data are occasionally higher than the corresponding total results. This may be due to lab interferences and other issues normally resolved during the validation step (i.e., the data may be estimates and get J flagged). When this happens, re-sampling usually clarifies the issue and the affected result is explained (usually no issues there).
6. The dissolved/filtered fraction data more accurately represent the constituents that are mobile in groundwater, whereas naturally occurring radionuclides or those from anthropogenic sources (fall out and contaminated surface storages) that preferentially partition to soil and get into the water sample (causing turbidity or clarity issues) then cause the lab instruments to count a soil contribution as water, when it is not the actual case.
7. When you perform this on the groundwater results, you will start to see how the total fraction (unfiltered) data gathered during some mobilizations of the RI created your concern; where complimentary dissolved fraction data are available, the use of strictly total fraction data to assess transport is inaccurate and can actually lead one to believe groundwater impacts are truly a concern when they are not. This is a problem when we place wells within a contaminant source area; if the soil gets into the groundwater sample via turbidity, then the contaminant release to groundwater can be overestimated. Thus the prevalence of unfiltered and filtered data to ensure proper comparison of transport and geochemical conditions.

Attached is an example using Ra-226 from the RI, which shows how the filtering effect can indicate how the soil lessens true mobility by partitioning. This is sometimes more evident at higher concentrations because the low values we see at the NFSS (for Ra-226 example here) can produce somewhat coincident values due to generally being at the low solubility range for radium. As you can see, these analyses have to account for many variables and environmental components. Where we see dissolved concentrations at slightly elevated levels, then those locations can lead us to further investigation or better identify risk from soil contamination areas.

We hope this helps understand the nature of contaminant movement of groundwater in porous media and how the analyses of different data streams can clarify issues that sometimes are created by

differing collection and analysis methods. We hope you will continue this effort and perform similar assessments for other radionuclides.

The team is reviewing your letter of June 23 and a response will be provided to you shortly.

Sincerely,

[REDACTED]
US Army Corps of Engineers, Buffalo District
1776 Niagara Street
Buffalo, NY 14207

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

From: [REDACTED]

Sent: Wednesday, June 23, 2010 2:34 PM

To: [REDACTED]

Cc: [REDACTED]

Subject: IWCS Containment Failure - comments

[REDACTED]
Please see attached.

Thank you.

[REDACTED]