Message

From: Bo Stewart [Bo@praxis-enviro.com]
Sent: 8/17/2017 6:08:48 PM
To: Davis, Eva [Davis.Eva@epa.gov]; d'Almeida, Carolyn K. [dAlmeida.Carolyn@epa.gov]; Henning, Loren [Henning.Loren@epa.gov]; Dan Pope [DPope@css-inc.com]; Brasaemle, Karla [Karla.Brasaemle@TechLawInc.com]; Cosler, Doug [Doug.Cosler@TechLawInc.com]
CC: Wayne Miller [Miller.Wayne@azdeq.gov]; Steve Willis [steve@uxopro.com]; Eleanor Jennings [ejennings@teci.pro]
Subject: Re: response to TOR estimates

They are mixing apples and oranges. Increasing the dissolution rate is not the same as increasing the mass transfer coefficient -- the increased dissolution rate in the references appears to be based on increased concentration gradients resulting from degradation in proximity to the NAPL and were measured in one-dimensional columns without soil heterogeneity.

Amos et al 2008, "Laboratory experiments were conducted to assess microbial reductive dechlorination in one-dimensional sand columns ... PCE-NAPL dissolution enhanced by up to 13.6-fold (maximum) and 4.6-fold (cumulative) relative to abiotic dissolution ... These results demonstrate that microbial growth within NAPL source zones is possible, provided that contaminant concentrations remain below levels toxic to the dechlorinating organisms"

Cope and Hughes, 2003, "Experiments were conducted in upflow columns containing glass beads (diameters 500−750 μm) contaminated with a residual NAPL consisting of tridecane and labeled 14C-PCE ... Total chlorinated ethenes removal for the columns that retained dechlorinating populations was enhanced from 5.0 to 6.5 times over the removal that would have resulted from dissolution alone."

The purpose of the research was to demonstrate the occurrence of biological degradation within a NAPL source zone, not just in the downgradient dissolved plume. Most conventional modeling assumes the source zone is toxic to microbes and degradation is neglected. Yet, the ST012 memo describes degradation within the source zone as asserted by the research papers. I'll have to check myself, but from that perspective, the volume-averaging in the memo calculates a greater increase in the overall dissolution rate by including source zone bio than described in the research.

All of this off the top of my head, again, I'll have to check it in more detail.

On 8/17/2017 10:25 AM, Davis, Eva wrote:

> Their answer to that is that the bio will increase dissolution – but there is bio on-going now, is equilibrium partitioning happening now?
>
> **From:** Bo Stewart [mailto:Bo@praxis-enviro.com]
> **Sent:** Thursday, August 17, 2017 12:09 PM
> **To:** Davis, Eva <Davis.Eva@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Dan Pope <DPope@css-inc.com>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Cosler, Doug <Doug.Cosler@TechLawInc.com>
> **Cc:** Wayne Miller <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>; Eleanor Jennings <ejennings@teci.pro>
> **Subject:** Re: response to TOR estimates
>
> The lack of mixing is included in the bulk mass transfer coefficient.

I only read through the response quickly this morning and haven't looked at the references but they persist with trying to justify equilibrium between NAPL and groundwater on the bulk scale. The assertion is that mass transfer will not come into play, even for high degradation rates and extensive soil heterogeneity and that is simply not valid.

My questions in return are "So when do you think NAPL mass transfer would be important?" and "Under those assumed conditions did you evaluate pump and treat as a remedial alternative?"

On 8/17/2017 9:10 AM, Davis, Eva wrote:

> Guess we shouldn't be surprised that they basically disregard criticism of their modeling efforts – even after they admitted that their modeling was inappropriate. They want to conclude that the long TOR are only due to overly conservative assumptions that add up. it seems to me that there is still at least one very limiting factor that I don't recall being included in the comments that were submitted – the lack of complete mixing. Wasn't complete mixing assumed in the modeling that Doug and Bo did? That isn't going to happen when LNAPL occupies a rather large portion of the pores, and likely means that the assumptions in the models were not conservative enough ? or am I wrong about that?
>
> **From:** d'Almeida, Carolyn K.
> **Sent:** Wednesday, August 16, 2017 6:03 PM
> **To:** Henning, Loren <Henning.Loren@epa.gov>; Davis, Eva <Davis.Eva@epa.gov>; Dan Pope <DPope@css-inc.com>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Cosler, Doug <Doug.Cosler@TechLawInc.com>
> **Subject:** RE: response to TOR estimates
> Skimming through this I am afraid this agree-to-disagree language could continue into interpretation of results for many years to come....
> Carolyn d'Almeida
> Remedial Project Manager
> Federal Facilities Branch (SFD 8-1)
> US EPA Region 9
> (415) 972-3150
> *"Because a waste is a terrible thing to mind..."*
>
> **From:** d'Almeida, Carolyn K.
> **Sent:** Wednesday, August 16, 2017 3:07 PM
> **To:** Henning, Loren <Henning.Loren@epa.gov>; Davis, Eva <Davis.Eva@epa.gov>; Dan Pope <DPope@css-inc.com>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Cosler, Doug <Doug.Cosler@TechLawInc.com>
> **Subject:** response to TOR estimates
> In case you haven't downloaded it yet
> Carolyn d'Almeida
> Remedial Project Manager
> Federal Facilities Branch (SFD 8-1)
> US EPA Region 9
> (415) 972-3150
> *"Because a waste is a terrible thing to mind..."*

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