Message

From: Dan Pope [DPope@css-inc.com]
Sent: 5/19/2017 2:11:12 PM
To: Davis, Eva [Davis.Eva@epa.gov]; Cosler, Doug [Doug.Cosler@TechLawInc.com]; 'Bo Stewart' [Bo@praxis-enviro.com]; Henning, Loren [Henning.Loren@epa.gov]; d'Almeida, Carolyn K. [dAlmeida.Carolyn@epa.gov]; Brasaemle, Karla [Karla.Brasaemle@TechLawInc.com]; Wayne Miller [Miller.Wayne@azdeq.gov]; Jennings, Eleanor [Eleanor.Jennings@parsons.com]; Steve Willis [steve@uxopro.com]
Subject: RE: ST12 response

Eva's comments are well-taken, I think. While I suspect that the benzene plume is not yet totally delineated, and that there is more LNAPL out there than has yet been found, I think that the possibility of major off-site movement of benzene is lower than in the past. Still, I think we should push hard for careful monitoring of GW COCs in the downgradient area – it's prudent to do so.

Also, keep in mind that benzene degrades under anaerobic conditions other than sulfate-reducing conditions (i.e., with TEAs other than sulfate), and will also degrade readily under aerobic conditions, so there's lots of ways for benzene to degrade out in the downgradient plume. A source-boundary-condition approach is useful to provide a fairly solid worst-case prediction, but after that the biodegradation portion of the model will be largely guesswork (that is, based on assumed biodegradation rates). Of course one could use single-well COC disappearance rates to plug in to the model as biodegradation rates.

A quick-and-dirty analytical model look at the downgradient plume would be interesting, though.

From: Davis, Eva [mailto:Davis.Eva@epa.gov]
Sent: Friday, May 19, 2017 7:55 AM
To: Cosler, Doug; 'Bo Stewart'; Henning, Loren; d'Almeida, Carolyn K.; Dan Pope; Brasaemle, Karla; Wayne Miller; Jennings, Eleanor; Steve Willis
Subject: RE: ST12 response

This all sounds like fun stuff for modelers to do, but a reality check here – the spill is what, 40 years old? And the plume has only been growing slowly during that time, and we just removed maybe half of the mass out there. There is still a whole lot out there, and stuff that is still hot is more mobile and will contain higher concentrations of fuel components, but as it cools there should be less migration. I don't know realistically that it would affect water supply wells 4 miles away. The plume may go under the planned housing development, but it is deep enough that it is not likely to cause VI problems, and I can't imagine that the development will putting in groundwater extraction wells.

From: Cosler, Doug [mailto:Doug.Cosler@TechLawInc.com]
Sent: Thursday, May 18, 2017 8:28 PM
To: 'Bo Stewart' <Bo@praxis-enviro.com>; Henning, Loren <Henning.Loren@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: RE: ST12 response

Bo's approach would be a reasonable and straightforward way to predict off-site plume migration (e.g., benzene). For example, the EPA BIOSCREEN model allows you to input a time-varying first-order source concentration that would represent concentrations at the downgradient boundary of the site (a first-order rate can approximately represent the box model concentration reductions with time). As Bo mentioned, in BIOSCREEN this source conc. then becomes the upgradient boundary condition for a two-dimensional aqueous-phase advection-dispersion (with sorption) and biodegradation (1st order kinetics, which should be OK for off-site predictions) model.

We could use AMEC's pore velocity and dispersion parameter values. Output can include 2D (plan view) plume maps versus time, which could overlay a basemap. Or, with less effort you could just show 1D plots of the maximum plume centerline concentrations a function of distance from the site. I have a FORTRAN code I've used in the past which computes the BIOSCREEN transport model solution (concentrations vs. time on a regular 3D grid), which is the Domenico-Schwartz analytical model, and I could dump out the concentrations to the Tecplot visualization software for developing some nice-looking plume maps.

From: Bo Stewart [mailto:Bo@praxis-enviro.com]
Sent: Thursday, May 18, 2017 8:11 PM
To: Henning, Loren <Henning.Loren@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Cosler, Doug <Doug.Cosler@TechLawInc.com>; 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: Re: ST12 response

Doug points out rightly that the box model has an average concentration leaving the source zone but in reality the upgradient side depletes first with the downgradient remaining closer to initial conditions for a longer period. With that caveat, the model produces a discharge that can be input to a dissolved plume model such as REMFuel and Bioscreen, with a little work. But assuming equilibrium with the NAPL at discharge as a constant boundary condition is probably sufficient for the timeframes of interest.

https://www.epa.gov/water-research/remediation-evaluation-model-fuel-hydrocarbons-remfuel

https://www.epa.gov/water-research/bioscreen-natural-attenuation-decision-support-system

A more comprehensive model of the plume to produce the graphic described by Carolyn and Loren is definitely in Doug's sweet spot.

Bo

On 5/18/2017 5:04 PM, Henning, Loren wrote:

> I'm appreciating the email traffic. As Carolyn said, we briefed Enrique in preparation for him to speak with his counterpart at DOD next week Thursday. Enrique is essentially looking for the "worst case scenario." Based on our modeling, what could we see happen at the site if the AF goes forward with EBR? Would we see migration of contamination, or complete remedy failure, looking at discreet timeframes. I'm available tomorrow if the team wants to get on the phone and discuss.
>
> Loren
>
> ---
>
> **From:** d'Almeida, Carolyn K.
> **Sent:** Thursday, May 18, 2017 4:57 PM
> **To:** Cosler, Doug <Doug.Cosler@TechLawInc.com>; 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Bo Stewart <Bo@praxis-enviro.com>; Henning, Loren <Henning.Loren@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis

<steve@uxopro.com>
Subject: RE: ST12 response

Thanks Doug

I think Enrique is looking for a graphic display showing modeled plume contours at say, 5 years 10 years 20 years, 50 years, etc for his discussions with AF management to illustrate the need for plume containment that EBR alone will not provide.

Carolyn d'Almeida
Remedial Project Manager
Federal Facilites Branch (SFD 8-1)
US EPA Region 9
(415) 972-3150

"Because a waste is a terrible thing to mind..."

From: Cosler, Doug [mailto:Doug.Cosler@TechLawInc.com]
Sent: Thursday, May 18, 2017 4:40 PM
To: d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Bo Stewart <Bo@praxis-enviro.com>; Henning, Loren <Henning.Loren@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: RE: ST12 response

Figure 4 in Bo's modeling memorandum shows that his volume-averaged box model does account for hydrocarbon constituents migrating off-site at the downgradient end of the well-mixed control volume. That is because his model correctly incorporates the flow of uncontaminated groundwater (and background sulfate) into the EBR treatment zone and the flow of contaminated gw off-site when the active EBR re-circulation period ends. This question was also brought up during past conference calls (e.g., Dan asked AMEC about this in the last call).

It is important to realize that in the volume-averaged model benzene, for example, is migrating off-site at concentrations well above the MCL until the TOR target of 5 ug/L is reached. Of course, the "real-life" situation at the STO012 site depends on several factors, such as: what are the NAPL saturation and composition in the downgradient portions of the site (compared to the volume-averaged model), what will be the actual biodegradation rates in the downgradient areas (e.g., Dan has pointed out that background sulfate will be used up as gw flows through the site), etc.

I'll let Bo comment on this further (he just sent an email!)

From: d'Almeida, Carolyn K. [mailto:dAlmeida.Carolyn@epa.gov]
Sent: Thursday, May 18, 2017 6:06 PM
To: Cosler, Doug <Doug.Cosler@TechLawInc.com>; 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Bo Stewart <Bo@praxis-enviro.com>; Henning, Loren <Henning.Loren@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: RE: ST12 response

Thanks everyone for your efforts with this. I just got off of the phone from briefing Enrique. He is very interested in your model conclusions, but has a follow up question that will require additional modeling effort. He wants to know given the slow degradation rate predicted by the model, can we also link a transport model to show growth of groundwater plume over the predicted timeframe?

Carolyn d'Almeida
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US EPA Region 9
(415) 972-3150

"Because a waste is a terrible thing to mind..."

From: Cosler, Doug [mailto:Doug.Cosler@TechLawInc.com]
Sent: Thursday, May 18, 2017 12:16 PM
To: 'Dan Pope' <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Bo Stewart <Bo@praxis-enviro.com>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: RE: ST12 response

I added my edits to Eva's version (attached). I believe I addressed a few of her comments and a couple of Dan's. I regret that I wasn't able to add my comments to Bo's original version before sending out yesterday; hence, all of the red-line. (Bo also needs to make sure he is OK with the changes I made).

Maybe we need to an updated "clean" version for Dan to make some of his edits and for Eleanor to look at?

Doug

From: Dan Pope [mailto:DPope@css-inc.com]
Sent: Thursday, May 18, 2017 11:31 AM
To: Cosler, Doug <Doug.Cosler@TechLawInc.com>; 'Davis, Eva' <Davis.Eva@epa.gov>; Bo Stewart <Bo@praxis-enviro.com>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Brasaemle, Karla <Karla.Brasaemle@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: RE: ST12 response

A couple of comments, most of which are not actionable, added to Eva's comments.

From: Cosler, Doug [mailto:Doug.Cosler@TechLawInc.com]
Sent: Thursday, May 18, 2017 8:56 AM
To: 'Davis, Eva'; Bo Stewart; d'Almeida, Carolyn K.; Henning, Loren; Dan Pope; Brasaemle, Karla; Wayne Miller; Jennings, Eleanor; Steve Willis
Subject: RE: ST12 response

I'm looking at this summary again this morning and will try to address as many of Eva's comments as I can.

Doug

From: Davis, Eva [mailto:Davis.Eva@epa.gov]
Sent: Wednesday, May 17, 2017 5:02 PM
To: Bo Stewart <Bo@praxis-enviro.com>; 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>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: RE: ST12 response

A few comments inserted in the document -

From: Bo Stewart [mailto:Bo@praxis-enviro.com]
Sent: Wednesday, May 17, 2017 2:48 PM
To: d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Davis, Eva <Davis.Eva@epa.gov>; 'Dan Pope' <DPope@css-inc.com>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Cosler, Doug <Doug.Cosler@TechLawInc.com>; Wayne Miller <Miller.Wayne@azdeq.gov>; Jennings, Eleanor <Eleanor.Jennings@parsons.com>; Steve Willis <steve@uxopro.com>
Subject: Re: ST12 response

Hi All,

Attached is the summary that Doug and I came up with. I also added an outline and made some edits to make the memo a little more readable. That is also attached. Please comment on/edit the summary to make it more understandable. We added some interpretative language that does not appear in the memo to get the point across although held back adding that these time estimates are still optimistic as they assume the degradation goes flawlessly.

Bo

On 5/11/2017 3:48 PM, d'Almeida, Carolyn K. wrote:

d'Almeida, Carolyn K. has invited you to ST12 response

Title:	ST12 response
Location:	Dial-In Number(s): (866) 299-3188 Conference C 4159722020
When:	Tuesday, May 16, 2017 10:30 AM – 12:00 PM
Organizer:	d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa
Description:	Dial-In Number(s): (866) 299-3188 Conference C 4159722020
Comment:	

Attendees:

Henning, Loren <Henning.Loren@epa.gov>
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