From:	McDonald, Jeffrey
To:	"Gilmore, Tyler J"; Williams, Mark D
Cc:	Greenhagen, Andrew; Bayer, MaryRose; Vermeul, V R (Vince); Roy, Stephen; Smith, Robert H; Akhavan, Maryam; "Deniz (Inci) Demirkanli"
Subject:	RE: AoR delineation
Date:	Friday, February 28, 2014 10:10:00 AM

Tyler,

I may not be able to make the call today, but I'd suggest still moving forward with it with Molly and Maryam from HQ, Inci at Cadmus, and Steve Roy and Rob Smith from our office.

We think we should discuss:

- Our rationale (beyond what I have stated so far) for needing to look at pressure beyond the projected plume footprint.
- That we are working to clarify the applicability of the Nicot method and understanding any limitations of it.
- Exploring PNNL's perspective on things like:
    - The result you get when applying the Nicot method
    - Limitations of a pressure defined AoR
    - Other options for an AoR defined by pressure

Again, I'm sorry I probably won't be able to make the call.

Jeff

Jeffrey R. McDonald, Geologist
Underground Injection Control Branch
U.S. EPA - Region 5
(312) 353-6288 [office]
(312) 408-2240 [direct fax]
mcdonald.jeffrey@epa.gov

From: Gilmore, Tyler J [mailto:Tyler.Gilmore@pnnl.gov]
Sent: Friday, February 28, 2014 7:24 AM
To: McDonald, Jeffrey; Williams, Mark D
Cc: Greenhagen, Andrew; Bayer, MaryRose; Vermeul, V R (Vince)
Subject: RE: AoR delineation

Morning Jeff,
Would it be possible to have a conference call later today to discuss this in more detail? Some of the conditions in the Nicot paper are not applicable to our site. For example

The FutureGen site does not conform to two of the four assumptions in the Nicot 2008 paper (pg. 49)

a. Assumes system is "normally pressured"
b. Assumes "no thief zone between the USDW and the injection formation"

The other two assumptions are that the borehole fluid temperature is in thermal equilibrium with the formations and that the formations are mostly flat.

We would like to discuss how we could satisfy the regulations by monitoring for pressure and as you alluded to in your message we will be measuring indicators of pressure beyond the area of the separate phase CO2 front with the deformation and microseismic approaches. We would like to understand if more is needed.
Thanks
Tyler

I'm traveling back to the northwest right now and hope to be available by phone sometime after noon (PST). Is it possible to have a call after that time today?
Thanks
Tyler

From: McDonald, Jeffrey [mcdonald.jeffrey@epa.gov]
Sent: Thursday, February 27, 2014 3:33 PM
To: Williams, Mark D
Cc: Gilmore, Tyler J; Greenhagen, Andrew; Bayer, MaryRose
Subject: AoR delineation

Mark,

Thanks for talking today about the FutureGen Alliance (FGA) project. As we discussed, the issue of how the AoR is defined for this project has been a subject of discussion internally and with PNNL. Some of the issues that have caused us concern are:

- the regulatory requirement to track the pressure front
- the relatively small AoR that the plume footprint would define compared to one defined by increased formation pressures
- the inconsistent approach if ADM uses the Nicot method and the FGA uses the Birkholzer method

Although using the Nicot method is likely to result in a large AoR, we think that this needs to be considered. I think the FGA/PNNL has looked at this large area already, so we hope this is not too great a burden. We need to talk about how pressure might be monitored in the Mt. Simon, in the near plume and distant areas. We have had some discussions with you and your colleagues on this issue this week and previously. A few of the items that we'd like FGA to provide (by Monday, 3/3/14 ideally) are:

- a complete list of wells that penetrate the confining zone within a Nicot method described AoR. We think this is the maximum extent of the 5 psi contour. That is, where the Mt. Simon might be expected to have 5 psi above the current formation pressure based upon the proposed injection when the contour is furthest from the project location.
- an expanded list of all the monitoring wells with their predicted pressure profiles (injection and post injection phases)
- details on their DINSAR monitoring

    - how much area are you proposing to monitor?
    - how sensitive this is to changes in pressure. Specifically, can you overlay changes in pressure with changes in surface deformation?
- Details on how far outside the plume the passive seismic monitoring can “see” and what resolution you expect with increasing distance.

Please correct me if I missed an issue that we discussed. As always, if you and Tyler have questions or comments, please let us know.

Thanks,

Jeff

Jeffrey R. McDonald, Geologist
Underground Injection Control Branch
U.S. EPA - Region 5
(312) 353-6288
mcdonald.jeffrey@epa.gov