From:	McDonald, Jeffrey
To:	"Gilmore, Tyler J"
Cc:	Akhavan, Maryam; Greenhagen, Andrew; Bayer, MaryRose; Roy, Stephen
Subject:	discussion points for 2/19 phone call on critical pressure calculations at FG
Date:	Tuesday, February 18, 2014 1:40:00 PM

Tyler,
Here are some comments and questions that Maryam came up with regarding the method FG proposes. These are not for action. They are just to help guide the discussion on tomorrow's phone call. Can you pass them on to the relevant PNNL people that will be joining us?
Jeff

Comments on "Analysis of impacts on lowermost USDW from focused leakage of Brine from plugged and abandoned or poorly constructed wells at the FutureGen 2.0 site"

1- The top boundary condition used for the analytical solution was not provided in the report; please provide the description of the top boundary condition.
2- FG indicated in Table 1, page 8 of the report that hydraulic conductivity of the St. Peter Sandstone was taken from Waverly project (26 km from the center of FG 2.0 injection wells) listed by Buschbach and Bond (1967,1974). A sensitivity analysis for the hydraulic conductivity of the St. Peter Sandstone by using a higher value needs to be done.
3- FG calculated the thickness of the reservoir, 330 ft, by combining the upper permeable portion of the Mt. Simon (Mt. simon6 model layer) and the Emhurst member of the Eau Clair Formation. It would be helpful if a sensitivity analysis for the thickness of the reservoir using a smaller value, 208 ft, is done (combining the injection interval, Mt. Simon 11, and upper part of it and Eau Clair Formation).
4- FG used hydraulic conductivity of 30 mD for the Ironton Sandstone formation (first thief zone layer) by using average representative samples form sidewall core analyses. Average hydraulic conductivity values used for this formation in the model was 26.3 mD. It is more conservative to test a smaller value such as 25 mD for this layer.
5- FG indicated in Table 1, page 8 of the report that hydraulic conductivity of the New Richmond sandstone was taken from Waverly project (26 km from the center of FG 2.0 injection wells) listed by core laboratories (1966). A sensitivity analysis for the hydraulic conductivity of the New Richmond sandstone by using a lower value needs to be done.
6- FG used hydraulic conductivity of 9000 mD for the Potosi Dolomite (second thief zone layer). They indicated that "Preliminary estimates using a very conservative analysis based on the fluid losses during drilling indicate that the permeabilities of the lost-circulation zones are at least 5,000 mD. The permeability of the Potosi Dolomite at the Cabot waste injection well in Tuscola, Illinois, has been reported as 9,000 mD.", Please provide the reference for 9000 mD?
   Also, they indicated that "Greb et al. (2009) listed permeabilities of core samples measurements for the Copper Ridge Formation, a vuggy dolomite similar to the Potosi, for a DuPont waste injection well in Louisville, Kentucky. The average horizontal permeability for the Copper Ridge Formation at the Louisville site, as reported by Greb et al. (2009), was 60 mD with the values ranging up to 632 mD.". FG used the 9000-mD for the base case and reported the result for one set of simulation with the lower value of 60 mD. Using the lower value of 60 mD result is more conservative.
   FG determined hydraulic properties of the injection reservoir based on fitting the simulated reservoir pressure responses from the injection model used in the UIC permit at the two well locations of interest. It is not clear that if the hydraulic conductivity of the injection reservoir is different for the base case and the case where the lower value of 60 mD is used for the Potosi Dolomite. If the same value was used, FG needs to determine the hydraulic properties of the injection reservoir using the value of 60 mD for the Potosi Dolomite.

7- FG indicated on page 9 of the report that they used Equation 4 of EPA 2011 AOR guidance document for the threshold pressure calculation. This equation has been modified in the EPA 2013 AOR guidance document (Equation 2). Please use this equation and recalculate the hydraulic head difference and provide the detailed calculation in the report.

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