HLWYM HEmails

From: Randall Fedors
Sent: Monday, June 19, 2006 3:10 PM
To: Brittain Hill
Cc: Alexander Sun; Budhi Sagar; Robert Latta; Andy Campbell; Allen Fetter; Jack Guttmann; Jin-Ping Gwo; Elmo Collins; Lawrence Kokajko; Philip Justus; Timothy McCartin; Wilkins Smith; Eugene Peters; Jack Parrott; James Rubenstone
Subject: Re: Report of Unexpected Geologic Condition
Attachments: szfaults.JPG

Some relevant comments on faults in the DOE SZ flow model.

There are only a few faults in the DOE flow models are explicitly modeled as flow features (i.e., a Solitario Canyon Fault and it's splay, a Fortymile Wash Fault, a Bare Mountain Fault, and a Highway-95 Fault). The attached figure (sent by Alex Sun at the center) of the DOE SZ model that shows the faults that are explicitly included in their model. Note that the attached figure is markedly different in scale form Britt's aeromagnetic plot. The eastern splay of the Solitario Canyon Fault in the DOE SZ model corresponds to the general area near Well 24P. Obviously, the representation of faults in the DOE SZ model is extremely simplified. Because of the coarseness of the DOE SZ model, placement of the fault would not matter much (+/- 500 meters is not important). Thus, it only matters that the data from Well 24P be applied to the fault properties (not to interblock properties); i.e., do not upscale the flow rate to interblock properties, just apply it to fault properties. The implied conclusion is that the flow rate seems less extreme. However, we haven't identified the range of fault flow properties with which to compare Well 24P results.

As for the flow rate, Alex had this comment:
"... Jamie Walker from Nye County told me that the flow rate is on the order of kilometers/yr over a 10-m interval. A back-of-envelope calculation shows that the current flow velocity in that cell is around 0.8 km/yr. Of course, without knowing the depth of the flow interval, it's hard to be exact."

Note that the DOE grid is coarser than 10 m vertically-speaking. The model has vertical spacings increasing with depth, but is everywhere greater than 10 m. Thus the 10-m interval from the borehole is at a much smaller scale than the DOE SZ model grid; i.e., we have a scaling analysis to perform here (along the lines of a small zone of high flow, upscaled with larger zones of lower flow).

To sum this up, I don't think this is leading up to an unexpected condition, though we do need to keep following up and firming up our "facts." Of course, this doesn't address the issue of adequate representation of faults in the flow models.

--Randy

>>> Brittain Hill 06/19/2006 11:40 AM >>>
The flow rates determined for 24PB may be representative of saturated-zone faults, and may not be simply the upper end of a continuous range.

The attached figures show the location of 24P, which is along the SW border of the NTS (file NCEWDP_24P.jpg). This satellite image also shows the location of USGS mapped

faults in blue line. Note that the location of faults in <2km around 24P are highly uncertain, because the flat alluvium doesn't preserve fault traces very well.

The important figure is NCEWDP_24P_amag.jpg, which is the same location but with a high-resolution aeromagnetic survey plotted in the background. The very steep color gradient at 24P shows a strong northeast trending lineament, consistent with the mapped bedrock faults to the north. This gradient shows that a prominent fault is located directly beneath the alluvium at 24P; the mapped, blue fault-line should align with this gradient. Note that other NCEWDP drill holes do not intersect such prominent bedrock lineaments.

Significance of this information depends on the scale that DOE includes flow heterogeneity in its numerical models. If these flow rates are confirmed, we should verify that such relatively high flow-rate features (such as faults) are included appropriately in the flow-rate distributions used by DOE.

Britt

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>>> Jack Parrott 6/12/2006 5:35 PM >>>
Lawrence,

This morning (6/12/06) DOE (April Gil) informed the NRC OR office of an unexpected geologic condition regarding the groundwater flow rate measured in one of the Nye County groundwater wells south of Yucca Mountain. The well is NC-EWDP-24PB (see location 29P on the attached map). Investigators from LBNL, LANL, and the USGS, working cooperatively with Nye Co., measured flow rates in the section of the well between 730 and 790 ft deep (fractured Bullfrog tuffs) that were higher that had been anticipated. The work was being done under the Technical Work Plan entitled "Field Studies for Determination of Transport Properties of Radioactive Solutes and Colloids using Chemical Analogs," (OSTI-LBNL-TWP-00005). Part of the work under this plan consisted of using a method of flow logging called "Flowing Fluid Electrical Conductively Logging." This method had not been used by the Project before. Later, the higher that anticipated flow rates were confirmed using a different flow logging technique called the "Distributed Thermal Perturbation Log."

While the flow rates measured were higher that expected, the Project's saturated zone group thinks that they may not be inconsistent with the higher end of the range for flow described in the saturated zone models. However, more analysis of the data sets

and possibly more modeling work may be needed.

Reports of Unexpected Geologic Conditions that are considered "technically significant" are reported to the ORs under procedure AP-REG-009, "Reportable Geologic Condition." This condition is considered "non-technically significant," but was reported to the ORs as a courtesy. As part of this procedure, a written report of the condition will be formally (by letter) provided to the OR office and a copy will be sent to the State.

Jack

Hearing Identifier: HLW_YuccaMountain_Hold_EX
Email Number: 123

Mail Envelope Properties (Randall.Fedors@nrc.gov20060619150939)

Subject: Re: Report of Unexpected Geologic Condition
Sent Date: 6/19/2006 3:09:39 PM
Received Date: 6/19/2006 3:09:39 PM
From: Randall Fedors

Created By: Randall.Fedors@nrc.gov

Recipients:
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Tracking Status: None

Post Office:

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MESSAGE	5737	6/19/2006 3:09:39 PM
szfaults.JPG	65111	

Options
Priority: Standard

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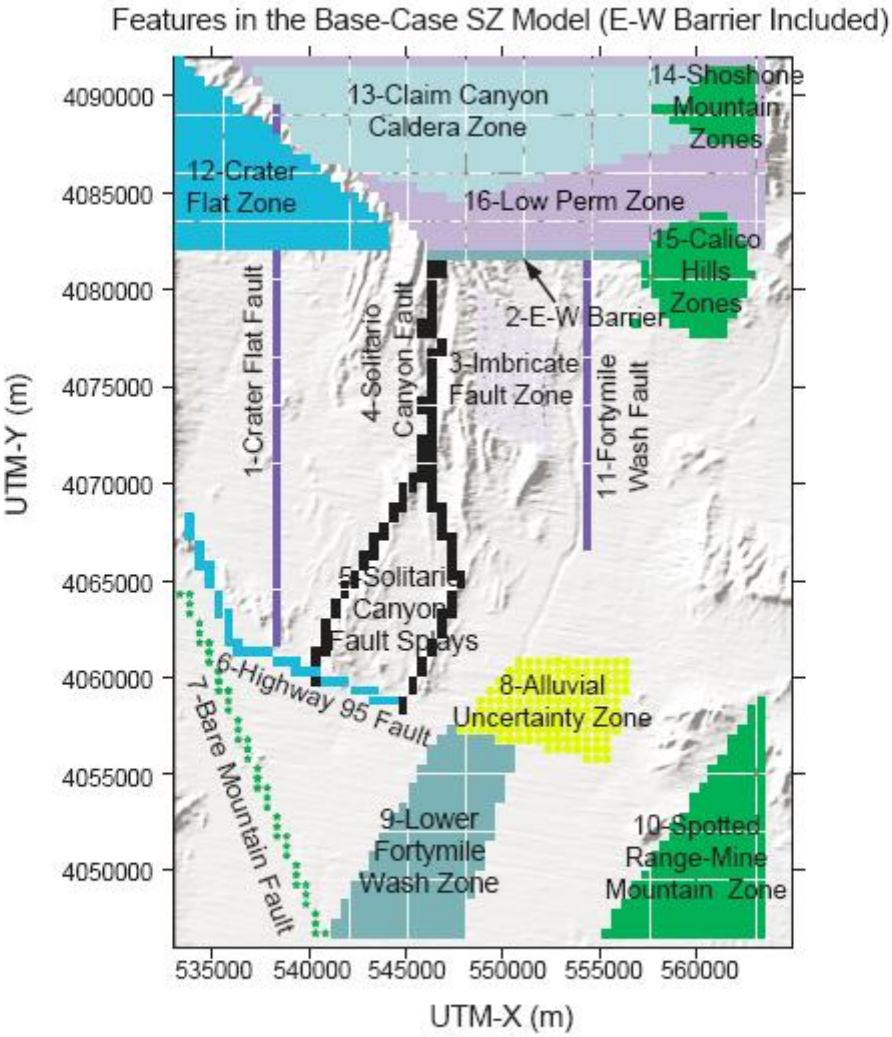

Source: Zyvoloski et al. (2003 [163341], Figure 2b).

Figure 4. Features of the Base-Case Saturated-Zone Model with East-West Barrier Included