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CC: "'Paul Marshall'" <Pmarshal@energy.state.ca.us>, "'Christopher Dennis'" ...
Date: 7/2/2008 5:21 PM
Subject: Review of Sentinel Workshop Data Request Responses

Hi Bill,

I completed my review of URS' June 27, 2008 "Responses to Groundwater Workshop Data Requests". The responses are notably thorough and detailed, and the effort is very much appreciated. Below I provide requests for additional follow-up information. I do not require this information to start my report, but I will need these issues resolved in order to complete the report. I spoke to George Muehleck of URS today regarding #'s 2, 3, and 4 below, and my understanding is that URS was already checking the tables and maps. Accordingly, I will start on my report Monday (assuming I'm excused from Jury duty).

1) GHB - The GHB conductance of 100 square feet per day per foot is not clear. For example, the conductance specified in the GHB input file for the model cell at row=3 and column=3 is 1,229,052 ft2/day. As defined by MODFLOW, conductance is calculated using the formula K*A/L, where K is the hydraulic conductivity; A is the area of the interface between the model and external boundary and is calculated as the product of the model cell width (which is variable in this model) and height (1,000 feet corresponding to the saturated thickness simulated by the model); and, L is the length between the model cell interface and the prescribed external head. "A" is defined by the model grid; please report the values of K and L used to calculate the GHB conductance.

2) Table 1 reports 17 transmissivity values for wells in the subbasin. Some of the values are from Slade (2000), who estimated transmissivity by multiplying the specific capacity by 2000. What are the sources for the other values? Were the other values estimated from specific capacity data or are they aquifer test results? It would be helpful to also report in Table 1 the T values for the well locations based on their corresponding location on Tyley's map (i.e., the T value specified in the model at the location corresponding to the well site).

3) If possible, can you please provide a copy of Appendix 3 to Slade's 2000 report (District Active Well Pumping Data and Specific Capacity Trend Diagrams), including Table 3-1 cited in the response.

4) Figure 1 shows the locations of the wells reported in Table 1; Figure 2 shows well locations relative to Tyley's T distribution map (the T distribution simulated by the model); and Figure 3 shows well locations,

posts some of the T values from Table 1, and provides an interpretive distribution of T in the basin based on some of the T values from Table 1. Why were not all of the values posted and utilized in Figure 3? I noted the disregarded values tend to be the "low" T values relative to the Tyley T distribution (DHSCWD #13, #14, and #16 and MSWD #23). The T value for MSWD #27 is also missing from Figure 3.

5) It appears one of the wells listed in Table 1 is missing from Figure 1 (MSWD#20). It has the lowest T value reported in Table 1 (11,600 gpd/ft) - this well should be posted or an explanation given for why it could not be located or should not be considered.

6) Tyley's T values are lower than the new values reported in Table 1 (the median value of the comparison ranges from about 2 to 1, depending on the Tyley contour interval the well is located in). However, resolution of #2, #3, and #4 above is required to assess the statement "Tyley T values is now thought to represent an extremely low case and is certain to overpredict impacts to nearby wells". The statement seems questionable given the uncertainty in natural systems and the methods employed to estimate T. Tyley and Slade's (2000) T values rely on specific capacity test results. Tyley multiplied specific capacity by 1800 whereas Slade multiplied specific capacity by 2000, so T values estimated from the same specific capacity value by these two methods will vary by about 10%. The theoretical range in the multiplier is 1500 to 2000 (1800 plus or minus about 15%), and the range observed by Thomasson (1960) was 1300 to 2200 (1800 plus or minus about 25%). Razack and Huntley (Journal of Groundwater, 1991, v. 29, n. 6) analyzed 215 specific capacity and T data pairs from a basin and concluded that the actual transmissivity could only be approximated from specific capacity data within a factor of 4 at a 90% confidence level. Furthermore, specific capacity is an uncertain value in itself, as it's value can be influenced by the pumping rate, duration of pumping, well construction, well age, etc., which are all factors not considered in the calculation of T (Thomasson 1960). A sensitivity analysis is therefore still valuable and should be reported to represent uncertainty in T. The data and analysis presented justifies using an uncertainty level substantially less than one order of magnitude; reporting the results from model runs using 2T and 0.5T seem to me to provide a reasonable range (where T is the Tyley transmissivity values specified in the model).

7) I would like copies of the model input files to all reported simulations as a means to answer additional questions I may have during completion of my review. The previous model files provided were extremely useful to my initial review effort, as I was able to quickly confirm model features not explained fully in the documentation (for example, the use of constant head cells and the horizontal anisotropy ratio of 5 - the model now considers anisotropy ratio's of 1 and 2).

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