

## **Responses to NDEP Comments Dated February 13, 2008 on Slug Test Results, BRC CAMU Area, Henderson**

Note: NDEP Comments are in regular font, followed by BRC responses in *italics and yellow highlights*.

The document reports the results of slug testing at monitoring wells in the vicinity of the CAMU. Of the fourteen originally proposed testing locations, six were not tested because access was not possible or the location was not found. Two additional tests were performed, which had not been proposed. Spatial coverage along the southern CAMU boundary appears to be generally even. However, coverage perpendicular to the assumed direction of groundwater flow leaves approximately 1/3 of the CAMU area (the northwestern 1/3) without data (which appears to be a data gap).

All of the test data appears to be of good quality. One test solutions "fit line" is not visible on the test printout in the appendix (AA-BW-08A Slug 1 In). However, the resultant hydraulic conductivity which is reported in the Table 2 agrees roughly with the five other tests conducted at that location. All of the test solutions appear to have been conducted properly, weighting the second hydraulic response, versus the first or third response. Aquifer thickness parameters were all consistent within the group of tests for each location.

All calculations of groundwater velocity appear correct in Table 3, except the last two values were not rounded properly (for MCF-BW-10A and MCF-BW-11A, average linear velocity should be 0.067 and 0.042 rather than 0.066 and 0.041). Arithmetic averages are used in Table 2, whereas the NDEP would recommend using geometric mean. IT is noted, however, that the difference in most of these numbers would be negligible since most Ks grouped well for each location.

*Response: BRC notes and concurs with the comments above.*

It should be understood that the calculated groundwater velocity is the average velocity of all particles; half of the particles will travel faster than the average; the toe of a plume or tracer injection will arrive at some downgradient monitoring point faster than predicted using the average groundwater velocity. To get a better estimate for tracer arrival time, it is suggested that BRC use a 1, 2 or 3-D transport equation such as Domenico.

*Response: The scope of this field work was to use slug testing to determine a hydraulic conductivity for the wells and provide an average linear velocity. The average linear velocities reported represent a generalized travel time for planning purposes. Any sampling of down-gradient wells for tracer arrival times would normally begin prior to the estimated arrival time to the monitoring well to assure measurement of any groundwater with faster moving particles.*

The highest and lowest reported K values are for wells right next to each other (B-14R and EC-1). One of the missed wells (AA-BW-090A) is also in that vicinity. NDEP recommends going back out with the proper tools to get into AA-BW-090A and verify the K value in that vicinity (EC-1). Please advise the NDEP **by February 29, 2008** regarding this matter.

*Response: The total depth of monitoring well AA-BW-09 is 55.23 feet with the current water level at 49.02 feet below top of casing (6.21 feet of water column). The data logger with the cable connected is approximately one foot in length and ideally should be set a few inches above the bottom of the well. The slug used in these tests is 5.5 feet in length and hence the slug test would require a minimum water column of 6.5 feet to avoid hitting the data logger during insertion and removal of the slug. Therefore monitoring well AA-BW-09 was not tested due to the water column of 6.21 feet being too low.*

H-39 was also missed (well casing extends 12 feet above ground surface). Getting data from that location would cut the data gap of northwestern 1/3 of CAMU area down substantially and should be considered. Please advise the NDEP **by February 29, 2008** regarding this matter.

*Response: Monitoring well H-39 has been abandoned in anticipation of CAMU construction and is no longer available for testing.*

NDEP also suggests that BRC attempt to locate well H-41 (not found for these field activities) and collect data to develop a K at that location to bolster the tracer test area K end points. Please advise the NDEP **by February 29, 2008** regarding this matter.

*Response: Monitoring well H-41 was abandoned in anticipation of CAMU construction and is no longer available for testing.*

With reference to the proposed tracer test, NDEP would recommend injecting the dye in the vicinity of location H-41. That would allow for detection in the AA-BW-08 area in perhaps less than a year (which was not possible for the NDEP to determine because there was no scale on maps), and then again in the AA-BW-03A area in another year. It is expected that this matter will be discussed at an upcoming meeting regarding CAMU-area groundwater matters.

*Response: BRC will call NDEP in order to set up the referenced meeting so that all aspects and next steps of the proposed tracer test can be discussed.*