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STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
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October 21, 1998

Mrs. Becky Cato Johnson
7295 Highway 94 South
St. Charles, MO 63304

Dear Becky:

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Thank you for the opportunity to review the report titled "Completion Report For The Pilot Pumping Test For The Groundwater Operable Unit At the Weldon Spring Site" Revision A dated September 1998. Your staff produced a high quality report in a short period of time. In the past, when I have reviewed pump tests on other projects I have been handed only the raw data and tried to make heads or tails from it.

Based on my review, I agree with the general conclusion that "the portion of the aquifer exhibiting TCE contamination is amenable to groundwater recovery using conventional wells." I would recommend that the additional long-term testing (suggested in Section 8.2.2) be conducted in the future to quantify a sustainable pumping rate and to determine if long-term pumping would dewater the shallow aquifer in the vicinity of the test site for considerable periods. I have a number of specific comments that I would like to share.

Comment 1. Section 1, Introduction, paragraph 2: Diana Travis, MDNR, has made the comment previously that the maximum TCE concentration was 9,000 ug/l at Well 2038 during the 6/96 sampling event not 1,300 ug/l listed in this paragraph.

Comment 2. Section 3.2, Water Level Monitoring, paragraph 2 and Table 3-1. I do not see the point of monitoring the water level of the additional 12 wells only during the recovery period, without obtaining the water levels before the pump test was initiated or during the pumping phase.

Comment 3. Section 4.1.1, Stratigraphy, paragraph 1. The description of the *strongly weathered subzone* "vuggy, weakly cemented chert breccia with minor limestone fragments in a sandy, clay matrix . . . generally found at the top of the weathered unit but is discontinuous across the site" is similar to what is commonly identified as residuum. Is your *strongly weathered subzone* the same unit as residuum or are you considering them as distinctly different units?

Comment 4. Section 5.1, Hydrogeology, paragraph 2. I believe a word is missing for the first sentence. Inserting the word "divide" after "groundwater" would make the sentence complete.

Comment 5. Section 5.4.2. Area of Influence, paragraph 6. The total drawdown of MW-3027 is given as 0.5' in this paragraph, but is indicated to be 1.5' in paragraph 1 of this same section. Which is correct?

Comment 6. Figure 5-5. The groundwater surface contours are presented in this figure in great detail with relatively few data points. Please explain how the contours were determined. Also, a large area of the hydraulic capture zone is depicted around MW-2035 with no data points to support this interpretation. Please explain how this portion of the hydraulic capture zone was determined.

Comment seven. Section 5.4.3. Aquifer Properties, Table 5-2 and paragraph six. I only had time to review one of the references, Boonstra and Boehmer (1986), on the fractured dike-aquifer analytical model. According to the authors, the model presented in this paper only considers dikes less than 10 m wide, which is considerably smaller than the effective width of 100' used in the analysis of the WSSRAP groundwater operable unit pump test.

Comment 8. Section 8.2. Conclusions. Much of this report deals with the role of weathering of the upper Burlington Keokuk bedrock. This needs to be emphasized in this section. In addition to stratigraphy and structure, the degree of solution weathering of the Burlington Keokuk Formation has significant influence on the permeability and direction of groundwater flow beneath the chemical plant.

Comment 9. Section 8.2.2. Aquifer Test Analysis, bullet 1. Typographical error in the segment "shallow bedrock aquifer *if* semi-confined" should probably be written "shallow bedrock aquifer *is* semi-confined.

Comment 10. Section 8.2.3. Aquifer Test Analysis, bullet 9. There are two possible typographical errors in the second sentence. Suggested changes: characteristic *on* to characteristic *of* and aquifer *of* to aquifer *with*.

Comment 11. Section 8.3. Discussion, paragraph 2. I understand that the intent of this report is to deliver the pump test results to the Argonne National Laboratory. The process of "natural flushing" used at Oak Ridge U. S. DOE site may be appropriate, however MDNR would be concerned if TCE cannot be contained on site at WSSRAP.

If you have any questions concerning these comments please call me at (573)368-2132.

Sincerely,

GEOLOGICAL SURVEY PROGRAM

Myrna Ruelf

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Geologist

MLR/lh

c: Branden Doster
Glenn Carlson