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AUG 2 2 2001

Mr. James A. Saric, Remedial Project Manager
United States Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

DOE-0826-01

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL OF RESPONSES TO THE OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE PUMPING TEST REPORT, PILOT PLANT DRAINAGE DITCH URANIUM PLUME, AQUIFER RESTORATION AND WASTE WATER PROJECT

The purpose of this letter is to transmit, for your review and approval, the subject comment responses. The AQTESOLVE computer program printouts were supplied to the commentor at GeoTrans for backup to the comment responses. The printouts will be made available to others upon request.

If you have any questions or require additional information, please contact John Kappa at (513) 648-3149 or Robert Janke at (513) 648-3124.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:Kappa

Enclosure: As Stated

Recycled and Recyclable

cc w/enclosure:
R. J. Janke, OH/FEMP
J. Kappa, OH/FEMP
K. Nickel, OH/FEMP
T. Schneider, OEPA-Dayton (three copies of enclosure)
G. Jablonowski, USEPA-V, SRF-5J
F. Bell, ATSDR
M. Schupe, HSI GeoTrans
R. Vandegrift, ODH
F. Hodge, Tetra Tech
AR Coordinator, Fluor Fernald Inc./MS78

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K. Chaney, EM-31/CLOV
N. Hallein, EM-31/CLOV
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D. Brettschneider, Fluor Fernald, Inc./MS52-5
D. Carr, Fluor Fernald, Inc./MS2
M. Frank, Fluor Fernald, Inc./MS90
T. Hagen, Fluor Fernald, Inc./MS65-2
W. Hertel, Fluor Fernald, Inc./MS52-5
S. Hinnefeld, Fluor Fernald, Inc./MS52-2
M. Jewett, Fluor Fernald, Inc./MS52-2
T. Walsh, Fluor Fernald, Inc./MS46
ECDC, Fluor Fernald, Inc./MS52-7

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RESPONSES TO OEPA COMMENTS ON THE PUMPING TEST REPORT PILOT PLANT DRAINAGE DITCH URANIUM PLUME AQUIFER RESTORATION AND WASTE WATER PROJECT

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

AUGUST 2001

U.S. DEPARTMENT OF ENERGY

3

RESPONSES TO OEPA COMMENTS ON THE PUMPING TEST REPORT PILOT PLANT DRAINAGE DITCH URANIUM PLUME AQUIFER RESTORATION AND WASTE WATER PROJECT

1. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 2.1 Pg #: 2-1 Line #: 20 Code: C
Original Comment #: 1

Comment: The archived sediment samples may be analyzed at a future date. What are the criteria that will be used to determine if the samples will be analyzed? Reference to the SCQ indicates that soil samples collected for the analysis of uranium have a holding time of one year. It should be noted that the samples from the control well were collected on August 17, 2000.

Response: The subject-archived samples will be analyzed for the Kd study. The decision to proceed with the additional Kd work was pending budget and scheduling logistics that have since been resolved. The driving criterion for sample selection is location. Additional samples for the Kd study will be collected from three different geographic locations across the FEMP site as monitoring wells and/or extraction wells are drilled. The objective is to maximize the geographic distribution so that all areas of the plume are represented in the study.

Although the SCQ does have a holding time requirement, data objectives for this study will not be compromised if the holding time for these samples extends past 1-year. The subject samples are containerized and sealed. The half-life of the uranium is also sufficiently long.

Action: No action required.

2. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 5.1 Pg #: 5-2 Line #: 20 Code: C
Original Comment #: 2

Comment: As indicated in the text, recovery data was collected for the aquifer test. Why was no analysis conducted on the recovery data? Analysis of the recovery data provides an independent check on the results of the pumping test. In addition, recovery data are often more reliable because the recovery occurs at a constant rate. Pumping test data are often influenced by rate fluctuations. The early time drawdown plots for Wells 32764, 32763, and 32767, for example, show impacts by small but significant changes in the pumping rate.

Response: Table 1 (attached) provides the results of the test as analyzed using the "Unconfined Neuman (1974)", the "Theis (1935)" and the "Theis (1935) Residual Drawdown Recovery" Methods contained in AQTESOLVE, Version 3.01. When using the Theis 1935 Residual Drawdown Recovery Solution, care was taken to only use data with values of time large enough (.02 minutes to 3.68 minutes depending on the observation well) to make the variable μ less than a critical value (e.g., $\mu \leq 0.01$). This was done by solving the following formula for time $\mu = r^2 S / 4Tt$, where $\mu = 0.01$, r = radius from the well, S = storativity, and T = transmissivity. The storativity and transmissivity values used were those obtained using the Theis (1935) solution method. As the Table indicates the average result for the Neuman analysis was 424 feet/day. The average result for the Theis Recovery was 480 feet/day, a 13% difference.

Action: None Required.

4

3. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 5.9 Pg #: 5-10 Line #: 10 Code: C
Original Comment #: 3

Comment: A review of the data tables for each observation well provided in Appendix D indicates that the correction for precipitation and for barometric pressure correction do not appear to be correctly applied. In both cases, each measurement is corrected only to the time of the immediately preceding measurement, not to the beginning of the test. As a result, the cumulative correction relative to the starting time of the test is not incremented and carried forward for each measurement. If the precipitation and barometric pressure corrections are applied correctly, slightly greater drawdowns are observed in each well and a lower hydraulic conductivity is calculated.

Response: Although the approaches taken to administer drawdown corrections for the effects of precipitation and barometric pressure were correct, the implementation contained an error so that the precipitation correction was improperly applied.

The issue concerning precipitation is that the correction was only applied to each preceding measurement and not to the beginning of the test. Although the corrections could have been referenced back to the start of the test, it was just as easy to apply the corrections to each time step. As explained below the results are the same.

As explained on Page 5-6 of the report, for the first five hours of the test the water level appeared to be rising at a rate of 4.5×10^{-5} feet/minute. During the remainder of the test the water level appeared to be falling at a rate of 3.83×10^{-5} feet/minute. To correct the drawdown data, the rise was subtracted out, and the fall was added back in. Over the course of the test (10,078 minutes) this results in a net correction of 0.36 feet.

$(-4.5 \times 10^{-5}$ feet/minute) (300 minutes) + $(3.83 \times 10^{-5}$ feet/minute) (9778 minutes) = (-0.0135 feet) + (0.3745 feet) = 0.36 feet.

The spreadsheet error mentioned earlier involved the application of the two correction factors. In calculations for several of the wells the correction factor was not changed after 300 minutes. After this correction was made, the net correction due to precipitation for all the wells was 0.36 feet.

The corrected data was analyzed again using the Unconfined Neuman (1974) method contained in Aqtesolve. Table 1 (attached) provides the results and compares the results to what was previously reported in the Test Report. As the table indicates that difference is 11% or less. Because the groundwater model is relatively insensitive to changes in hydraulic conductivity values, a change of hydraulic conductivity of this magnitude will not have an effect on modeled output.

Corrections for barometric pressure were applied as outlined in Kruseman and de Ridder (1989) and are believed to be correct. The correction for changes in barometric pressure is based on the barometric efficiency of the well in which the water level is measured. The barometric efficiency was calculated for each well in the pumping test using the largest barometric pressure change recorded during of the test. Therefore, the largest barometric efficiency for each well should have resulted. The barometric efficiency was used to determine how much of the water level change between readings was due to changes in barometric pressure.

Action: No action required.

5

4. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 5.9 Pg #: 5-10 Line #: 18 Code: C
Original Comment #: 4

Comment: The statement that the aquifer test results indicate that conductivities increase with distance from the pumping well is not supported by the test data. A composite plot of all wells shows that the drawdown curves for the observation wells converge to the Theis solution at late time. Given, as suggested in the text, that conductivities increase in all directions radially from the pumping well (by a factor of about one third, based on the reported results), the drawdown curves would differ from one another, depending on distance from the pumping well. The curves for the wells near to the pumping well would flatten at late time as the higher conductivity material begins to supply water to the test well. This affect is not seen in the data.

Response: The text was pointing out that the analysis method used resulted in the appearance that the hydraulic conductivity increased with distance from the pumping well. The exact reason for these results is not known. The average hydraulic conductivity (452 feet/day) was used as the representative hydraulic conductivity for this portion of the aquifer for modeling purposes. As discussed in the response to Comment 5 below, using composite data plots results in a hydraulic conductivity of 384 feet/day, a 15% difference

Action: No action required.

5. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 5.9 Pg #: 5-10 Line #: 18 Code: C
Original Comment #: 5

Comment: The Neuman method assumes that the aquifer is homogeneous. As such, transmissivity and the Kv/Kh ratio are assumed to be uniform throughout the test domain. Consequently, the calculated aquifer parameter values should be roughly equivalent within a reasonable margin of error. Considering that the calculated aquifer parameters should ideally be roughly equivalent, the analysis of each observation well should not be conducted without some consideration given to the other wells. A more effective approach for analyzing the data from this test would be to match to the Neuman solution to the composite drawdown curve for all observation wells. Using composite data plots enables an integrated analysis of all test data and calculation of aquifer parameters more representative of the site in general.

Response: DOE agrees that a composite analysis should be performed. The data was therefore analyzed using the composite drawdown curve for all observation wells. The result was a transmissivity of 2.359×10^4 feet^2 / day. This translates into a hydraulic conductivity of 384 feet/day, using a saturated thickness of 61.41 feet. This result varies from the average reported Neuman result (452 feet/day) by 15%. The Aqtesolve printout for the composite run is attached.

Action: No action required.

6

6. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 6.0 Pg #: 6-1 Line #: 26 Code: C
Original Comment #: 7
Comment: The report does not provide a discussion in support of the conclusion that the aquifer behaves isotropically.
Response: The observation that the aquifer behaves isotropically is based on drawdown recorded at observation wells located at equal distances from the pumping well. As shown in Figure 3-1, Observation Wells 32766 and 32768 are both 100 feet away from the pumping well and located orthogonal to the each other in relation to the pumping well. Observation Wells 32763 and 32767 are both 50 feet away from the pumping well and also located orthogonal to each other in relation to the pumping well. As reported in Table 5-5 the drawdown 50 feet away from the pumping well, regardless of direction from the pumping well were 3.436 feet and 3.468 feet. The drawdown 100 feet away from the pumping well, regardless of direction were 2.918 feet and 2.794 feet.
Action: No action required.

7. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: Appendix A Pg #: NA Line #: NA Code: C
Original Comment #: 8
Comment: The reported easting coordinate for Well 32762 and the easting coordinate for Well 32767 appear to be incorrect. Please provide the correct coordinates for these wells.
Response: The correct easting for 32762 is 1347214.5. The correct easting for 32767 is 1347351.
Action: No action required.

7

TABLE 1

Well	Previously Reported Results Neuman Solution ft/day (a)	New Results Corrected for Precipitation Neuman Solution ft/day (b)	Percent Change (c)	Theis Result Confined Solution ft/day	Theis Recovery Confined Solution ft/day	Percent Change (d)
32762	521	502	4	446	540	8
32763	441	411	7	425	461	12
32764	414	368	11	440	435	19
32766	445	422	5	401	483	15
32767	436	406	7	426	468	15
32768	454	436	4	411	491	13
Average	452	424		425	480	

(a) From Table 5-5 of the Pumping Test Report. Corrected values.
(b) Precipitation correction factor in spreadsheet corrected
(c) Percent difference between Preciously reported Neuman and corrected Neuman
(d) Percent difference between corrected Neuman and Theis Recovery

8