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OHIO EPA COMMENT ON SOUTH PLUME GROUNDWATER MODELING REPORT

06/03/93

OEPA/DOE
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LETTER

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George V. Voinovich
Governor

June 3, 1993

Mr. Jack R. Craig
Project Manager
U.S. Doe Fernald Site
P.O. Box 398705
Cincinnati, Ohio 45239-8705

Dear Mr. Craig:

Ohio EPA has reviewed the South Plume Groundwater Modeling Report and has the following comments.

1. Section 4.5.3, page 4-9, line 27: A graph/table of the simulated dissolved and sorbed uranium mass-in-place as a faction of time should be presented. This is available from the model output in the mass balance summary. This would be useful for several reasons. First, the mass-in-place presented in the form of time vs log of uranium mass would provide an effective display of the mass removed and the mass not captured. This could be augmented with the results of Figure 4-24 (cumulative wellfield uranium removal vs time) to provide a better overall display of the removal effectiveness. This appears to be done, in part, in the figure except the secondary y-axis is in percentage. This figure indicates that 56% of the mass (approximately 11,000 lbs.) is removed and 44% is not captured after 80 years.

   Secondly, the model output provides summaries over time of the uranium mass on a layer-by-layer basis. This would be very informative in understanding the "underflow" beneath the wells. Based on the results presented, it is not clear as to exactly how much of the 44% not captured is simply too far to the south of the capture zone and how much mass travels beneath the wells and is not captured.

2. Section 4.5.4, page 4-10, line 32: All of the capture zones appear to be significantly influenced by the boundary condition used to represent Paddy's Run. The pumpage creates drawdown of 1 to 2 feet in this area, and the validity of the boundary condition must be revisited. For example, where the 522 ft. contour (Figure 2-9) crosses Paddy's Run (approximately the point where the river becomes effluent under "average conditions"), a 2 ft. drop in the water level could cause this point to shift over 1000 ft. downstream. (Based on Figure 3-12 of the Groundwater

Modeling Report, Summary of Development, IT Corp. April 1993). In other words, under pumping conditions, the stream may be adequately represented by simply applying 32 in/yr of recharge everywhere. The capture zone could be significantly reduced in the western region. Note: Recharge from Paddy's Run upgradient of Wiley Road in the model is on the order of 80 gpm. Has a reality check been performed?

3. Section 4.5.4, page 4-11, line 12: In Figure 4-32, there should be a better explanation of significant vertical movement. This is especially true for movement near the y-coordinate of 7,500 ft. Is this associated with the large number of recharge blocks used to represent Paddy's Run (see GWMR Summary of Model Development, IT, April 1993, Figure 6-8) just west of waste storage area? The pathlines are not "spurious", but rather demonstrate the impact of boundary condition and need for careful review, analysis and understanding.

4. Sensitivity of the vertical hydraulic conductivity and clay interbred hydraulic conductivity should be reviewed and discussed. These parameters are nearly as important to the capture zone as the horizontal hydraulic conductivity. It is important to reflect that during the transport model development, recharge over the site area was reduced to 2 in/yr (IT, April 1993, page 5-34). There has been more than a foot head differential across the clay interbred (downward) (IT, page 5-41), but changes in the vertical-to horizontal conductivity by an order of magnitude had a "small adverse effect on the calibration" (IT, page 5-47). The model currently uses 1/10, although 1/100 and 1/1 were evaluated during sensitivity analysis (IT, page 5-49). Locally the anisotropy could be very sensitive to the flow path and should not be easily dismissed.

5. Section 4.4.2, page 4-6, line 15: The well spacing varies between 279 ft. (Wells 2-3) and 375 ft. (Wells; 1-2, 3-4) according to the state coordinates in Table 5-1, p. 5-4. This is generally consistent with cones of depression in Figure 4-28, page 4-43. Thus a better average spacing would be 343 ft., not 280 ft./ (Also, correct crossing contours on Figure 4-28).

6. Time of travel is difficult to confirm. While 5 and 10-yr. capture zones are shown in Figures 4-29 to 4-31, it would be helpful to provide particle location using one-year increments as was provided in Figure A-5.

7. Section 4.5.3, page 4-9: Why are calculations performed to the year 2063? While the simulated concentration, removal rate and mass removed (Figures 4-22 to 4-24) were checked for consistency, there is little justification for extended simulation beyond the first 20 years based on the uncertainty of the model predictions.

If you have any questions about these comments please contact Mike Proffitt or me.

Sincerely,

Graham E. Mitchell
Project Manager

GEM/yrc

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