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COMMENTS ON THE SOUTH PLUME EE/CA

05/18/90

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OhioEPA
State of Ohio Environmental Protection Agency
Southwest District Office
40 South Main Street
Dayton, Ohio 45402-2086
(513) 285-6357
FAX (513) 285-6249

Richard F. Celeste
Governor

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May 18, 1990

RE: COMMENTS ON THE SOUTH PLUME EE/CA

Mr. Bobby J. Davis
Environmental Manager
U.S. DOE - FMPC
P.O. Box 398705
Cincinnati, Ohio 45239

Dear Mr. Davis:

This letter provides Ohio EPA comments on the south plume EE/CA. Many of our comments have been incorporated in U.S. EPA's submittal. However, in an effort to meet the 30-day review cycle, several comments were added that are not included in U.S. EPA's comments. With the extension of the comment period to June 17, 1990, it is possible that Ohio EPA may submit additional comments.

As stated in my March 30, 1990 letter to Mr. Andrew Avel, Ohio EPA would still like to plan a technical meeting with DOE to discuss overall water management issues at the site.

If you have any questions about the attached comments, please contact me.

Sincerely,

Graham E. Mitchell
DOE Coordinator

GEM/klj

cc: Maury Walsh, OEPA, CO
Catherine McCord, USEPA
Robert Owen, ODH

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GENERAL COMMENTS--SOUTH PLUME EE/CA

1. Based on our review of the field data and groundwater flow and uranium transport analysis presented in the IT report, we agree conceptually that the proposed groundwater extraction is consistent with the stated removal action objectives.

2. The model application is too poorly documented in the IT report to permit a thorough understanding or review of the simulated results. A thorough documentation of the model and its underlying bases should be presented prior to selection of a final groundwater recovery design.

3. As noted by IT, field data limitations hinder the ability to adequately assess the reliability and accuracy of the specific design of the proposed remedial action.

4. The planned future field data acquisition during the RI/FS and refinement of the model should resolve issues relating to well placement, extraction rates and remedial action duration.

5. IT proposes Alternative 4, rather than Alternative 5, due to:

   * the cost of providing additional effluent treatment (Alternative 5);

   * the redundancy of such an expense with plans to construct a more comprehensive and effective wastewater treatment facility at FMPC; and,

   * the expectation that uranium concentrations in the extracted groundwater will be relatively low during the early years of pumping.

   This rationale provokes the following questions:

   * Can loadings to the effluent pipeline be reduced in a less costly manner by more effective use of existing treatment capabilities and/or by modification of current production and wastewater management practices?

   * Can less costly effluent treatment processes be implemented that will not be redundant with future construction of a new wastewater facility?

   * What happens if much higher-than-expected uranium concentrations are pumped prior to completion of the planned FMPC wastewater treatment facility?

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6. The proposed pipeline location is advantageous because it backtracks through an area where the groundwater is already contaminated and because releases from much of the proposed pipeline would be within the capture zone of the recovery well system.

7. A uranium concentration of 37 ug/l was detected in Well 2127 adjacent to Paddys Run south of Fernald. What additional work will be done to investigate the potential presence of uranium in groundwater that may have been contaminated by leakage from Paddys Run south of the southern plume?

SPECIFIC COMMENTS

1. Executive summary, Page 2, first paragraph: The last sentence in this paragraph is misleading. The NCP was finalized in March 1990 and therefore, there are no proposed revisions pending. This last sentence should be changed as follows: "Additionally, based on the recent (March 1990) revisions to the NCP, removal actions . . ."

2. Executive Summary, Page 4, first paragraph: DOE must use the most current analytical data available as part of their evaluation of the south plume removal action. The most recent data that is used in this EE/CA is more than 9 months old. Surely conditions have changed somewhat since then which will effect assumptions that are used in the EE/CA.

3. Executive Summary, Page 5, second full paragraph: The EE/CA must discuss the basis for and appropriateness of using the DOE Derived Concentration Guide's 50-year committed effective doze equivalent limit of 4 mrem for setting a removal action limit of 33 ug/l for uranium in groundwater. This 33 ug/l limit represents approximately 1×10^{-4} excess lifetime cancer risk level for uranium. While this may be acceptable for use in the removal action as an interim action criterion, this is well above the 1×10^{-6} risk level that the NCP uses as the point of departure for assessing long-term cleanup goals and will likely be unacceptable to Ohio EPA if used as a standard for long-term cleanup of either on-site or off-site groundwater. In addition, current USEPA risk assessment guidance (see Comment #13 below) requires the use of 72 years as the lifetime for exposed years, not 50 years as is used in this EE/CA.

4. Section 1.0, Introduction, Page 2, top partial paragraph: See Comment #1 above.

5. Section 2.3, Analytical Data, Page 25, first paragraph: See Comment #2 above.

6. Section 2.3, Table 2-2: Analytical data on uranium from sampling rounds 7 and 8 which should be available by now, should be included in the EE/CA.

7. Tables 2-3, 2-4, 2-5: It is incredible that data validation for sampling rounds 5 and 6 are still not complete. These sampling rounds were conducted from 9 months to over a year ago!

8. Section 2.4.3.3, Potential Receptors, Page 45, last paragraph: A third potential future receptor of uranium in groundwater south of the FMPC would include any individual who may install a well for potable use, crop irrigation or livestock feeding from areas located within the existing south plume. In addition, under the no action alternative, future unrestricted potable use of private and industrial wells which exist and have been found to be contaminated with uranium at levels exceeding established health or risk-based criteria, must also be considered. Wells falling into this category would include 2060, 2061, and 3062.

9. Section 4.2.3, last paragraph: Has DOE explored the possibility of speeding up the process of bringing a public water supply to Crosby Township?

10. Section 4.2.4.1: Has DOE considered the option of pumping from both the center of the plume (to remove the highest concentrations) and the leading edge (to control plume movement)?

11. Section 4.2.4.3: Discuss the discharge options of discharging directly south to the Great Miami River and via Manhole 175 in greater detail. This discussion should include costs, administrative controls, etc., to justify DOE's decision to pump the groundwater back to FMPC.

12. Section 4.2.4.6, Alternative 5: Has DOE considered the option of treating the contaminated ground water with an anion exchange system for uranium removal?

13. Section 5.1, Evaluation Criteria, Page 3: The EE/CA must show how the acceptable daily intake of 2.7 ug/kg/day was derived and not just reference another report. The EE/CA is a stand alone document and all exposure assumptions (such as the estimated daily intake and acceptable daily intake) and attendant calculations must be provided. In addition, the risk assessment must be consistent with USEPA's document titled: Risk Assessment for Superfund, Volume I--Human Health Evaluation Manual (Part A). (Also, see Comment #3 above.)

14. Section 5.2.1, Pages 6 and 7: The EE/CA must show how radiation doses were calculated for the drinking water pathway as well as for all pathways for both the hypothetical maximally exposed off-site receptor (36 mrem and 88 mrem, respectively) and for the average exposed off-site receptor (18 mrem and 47 mrem, respectively). The individual data that was used to calculate average exposure conditions must also be provided as it is unclear what data was averaged or how it was averaged.

15. Section 5.2, Page 8, second paragraph: The EE/CA must show how the Hazard Indices were calculated for the exposed individuals mentioned here.

16. Section 5.6.2: Discuss the impact of this increased flow (4.5 CFS) on the capacity of the effluent line. What is the ultimate capacity of the effluent line? As more contaminated water is treated from the site (waste pits, stormwater, production area), will the effluent line become overloaded?

17. Section 5.6.2: Aquatic and public health impacts are usually evaluated at critical low flows (30-day, 10-year low flows) to determine worst case. Low flow in the Great Miami river should also be used along with average flows for these determinations.

18. Section 5.3.1, Page 10: Calculations and assumptions used in the calculations on this page for determining maximally and average exposures to off-site receptors must be provided. It is difficult to provide meaningful review of this document when this information is not given.

19. Section 5.4, Alternative Water Supply: Alternatives which evaluate an alternate water supply should include provisions for the proper abandonment of existing contaminated water supply wells to discourage any use of this contaminated water. For various reasons, some individuals will continue to use an old well that is contaminated even though an alternate supply has been provided.

20. Section 6.0: What is the estimated time difference for implementation between alternate #4 and alternate #5.

21. Appendix A: It appears, based on groundwater modeling of the proposed extraction system for the south plume, that contaminants from the Paddys Run Road site will be drawn into the DOE interceptor wells. The effects of this scenario must be taken into account by DOE before such an extraction system is implemented. Further, installation of the south plume interception system should be coordinated closely with the Paddys Run Road site companies so as not to adversely impact

the progress of the RI/FS or potential future remedial actions at that site.

22. Appendix A: What is the chemical form or complex of the uranium found in the south plume?

23. Appendix A: Discuss the potential impacts of the high concentrations of phosphorus in the groundwater around the Paddys Run Road site on the mobility of uranium if the two plumes overlap or if one plume is drawn into the other through this removal action.

DETAILED COMMENTS ON MODEL APPLICATION

24. There are twelve blocks in the northern section of the grid in which the block thickness of layer 3 is negative 1.0 feet. This is, of course, incorrect, but probably does not impact the transport analysis because the waste is not near this area. The cause for the negative thickness probably results from an auxiliary calculation in a spreadsheet or other format in which elevation data are calculated from thicknesses or thicknesses from elevation files. Either way, the result should be consistent and non-negative block thickness for input to the model.

25. The geologic structure is not presented. There are numerous features in the layering of the grid (as interpreted from the input data files) that are not presented. It is important to present the geologic interpretation and conceptual model. As an example, the attached figure displays the grid through column 12 which corresponds approximately to section D-D'. While most of the hydrostatic structure is very important to the flow and transport analysis; other features are unnecessarily included, but they do not contribute to the realism of the model. For example, there is a crescent shaped anticlinal structure in layers 3, 4, and 5 in the southwest corner (J=12-30). The rise is approximately 13 feet. The impact of this feature on the assessment of the remedial alternative is probably minor.

26. Incomplete data files do not allow confirmation of the water supply wells. The two wells AW-3 and AW-4 in the two files provided (no action and pump & treat) are pumping continuously at 112 gpm throughout the 5-year predictive simulation. The data file for an alternate water supply was not provided and could not be reviewed.

27. The choice of hydraulic conductivities is not documented in the report.

28. The source term rates and positions are not documented or supported. In the model, a mass flux rate is imposed along Paddys Run. The most significant mass is assumed to enter a section of the reach between Willey Road and New Haven Road (0.054 lbs./day at 27 blocks). This totals to 1.5 lbs. per day.

29. The basis for 'present conditions' distribution of uranium in Figure A-2 is not defined. It is not known whether the model was used to recreate the historical evolution of the plume. Possibly the concentrations were simply initialized by significantly extrapolating the Round 4 measurements (Figure 2-11). Because there is generally little movement over the next five years (Figures A-2 versus A-3 and A-7), the 'current conditions' overwhelm the additional sources applied along Paddys Run.

30. The simulated vertical distribution of uranium is not presented. It is not known how much simulated vertical spreading of uranium occurred and whether this significantly reduced simulated uranium concentrations in the uppermost layer.

31. The dispersivity value reported does not match with the data files. The report indicated that longitudinal and transverse dispersivities of 50. and 1.0 feet were used. The data set (F3DSOL9-DAT) uses values of 10. and 0.5 feet.

32. The dispersivity values will probably cause oscillation. The grid in the areal plane is uniformly chosen as 125 feet. The longitudinal dispersivity is 10.0 and the transverse is 0.5 feet. This results in a cell Peclet number of 12.5. Because a central difference in space is used, the concentration solution will probably cause severe oscillations. Switching to backwards-in-space is not recommended. The current modeling approach will probably result in significant artificial negative uranium concentrations around the edge of the plume. Mathematically the minimum longitudinal dispersivity is 62.5 feet. Based on our experience, a value as low as 30 may be acceptable, but not as low as 10 feet. Furthermore, it is not clear how such a low value is justified. However, dispersivities of 50. and 1.0 ft., if used in other runs as indicated in the report, are appropriate.

33. The uniform grid spacing is not very efficient. The grid is composed of 78 x 102 blocks of equal spacing at 125 feet. Generally, the flow solution requires greater extent than the transport equation in order to utilize sensible hydrologic boundaries. In the northern portion of the site, source terms are introduced, but are not significant to this model

demonstration. The grid layout and orientation seem to be simply a convenient mesh that nests with the regional flow model, but is not overly efficient in the transport analysis. The technique behind nested grids can easily accommodate rotated grids. It is strongly recommended that a rotation be included to reduce the total number of blocks. The edges of the grid could also be graded with increasing space at the edges. There are few field problems that require almost 40,000 grid blocks to adequately represent the physical system. With good engineering judgement, the number of grid blocks could be significantly reduced.

34. The choice of retardation is not well documented, justified and may not be conservative. The retardation factor of 9 was used in the simulations. Attempts of using factors of 1, 6, and 12 were tried. Because the approach used to define the source loadings and initial plume distribution are not provided, it is difficult to assess the confidence and implications associated with presenting the one value of 9. A higher retardation causes an approximate linear increase in the remediation time required. A higher retardation also implies that a greater release of uranium is required when the source is calibrated with water concentrations.

35. The general travel time for uranium to reach the extraction wells is substantially greater than the simulation period. The particle (unretarded) travel time from Paddys Run to the extraction well is on the order of 5 years as evidenced by the particle position time markers and independently confirmed by Darcy calculations. Based on the assumed retardation, the uranium travel time is 9 times this value or approximately 50 years. The predicted concentration at the extraction wells (Figure A-8) displays ever increasing concentration levels up to 5 years, at which time the simulations were terminated. It is not clear why simulations were stopped at 5 years. The time required to remediate the site, based on current degree of absorption, must be on the order of decades.

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