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REVIEW OF GROUNDWATER MODEL IMPROVEMENT PLANS AT FEMP

02/25/94

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COMMENTS
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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REPLY TO THE ATTENTION OF:

FEB 2 5 1994

Mr. Jack R. Craig
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

HRE-8J

RE: Review of Groundwater Model Improvement Plans at FEMP

Dear Mr. Craig:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the Surface Water and Infiltration Model Summary Report and the Task Objectives and Technical Approach-Zonation and Values of Geochemical Parameters Report. These reports were submitted as part of the United States Department of Energy's groundwater modeling improvement process.

Attached are U.S. EPA's comments on these reports, which must be addressed and discussed in future groundwater modeling improvement meetings.

Please contact me at (312) 886-0992 if you have any questions.

Sincerely,

James A. Saric
Remedial Project Manager

Enclosure

cc: Graham Mitchell, OEPA-SWDO
Pat Whitfield, U.S. DOE-HDQ
Don Ofte, FERMCO
Jim Thiesing, FERMCO
Paul Clay, FERMCO

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TECHNICAL REVIEW OF THE SURFACE WATER AND INFILTRATION MODEL SUMMARY REPORT

GENERAL COMMENTS

1. The U.S. Department of Energy's (U.S. DOE) approach to this modeling effort, as well as others completed for the Fernald Environmental Management Project (FEMP), attempts to estimate the future concentration of contaminants in a medium which will always be greater than the actual future concentration, rather than attempting to estimate the actual concentration of contaminants which may be lower than those observed in the future. U.S. DOE's approach is designed to determine results as a conservative estimate of the future potential risk to receptors. To be consistent with this approach, U.S. DOE should assume that 100 percent of the contaminated runoff from the "representative storm event" infiltrates to the Great Miami Aquifer (GMA), not 37 percent of the contaminated runoff, as predicted in the report.

SPECIFIC COMMENTS

1. **Section 3.2.4, Page 3-7, Paragraph 2**. Table 3-2 presents the Soil Conservation Service (SCS) curve number for each subbasin. However, there are two average SCS curve numbers for some of the subbasins. U.S. DOE should explain why there are two numbers and which number was used in the model. In addition, the average SCS numbers listed in the last column of the table do not represent the average of the Weighted SCS Curve numbers in the next to the last column. U.S. DOE should explain how the average was derived or should correct the table. If the average SCS curve numbers are in error, U.S. DOE should discuss the effect this has on the results of the model.

2. **Section 3.4.5, Page 3-39, Paragraph 4**. The report concludes that the model compares favorably to measured increases in the river stage of Paddys Run and the elevation of the groundwater in response to an observed precipitation event. The report also presents a reasonable explanation for the error associated with the increase in the groundwater levels. While these statements are qualitatively correct, the quantitative comparison indicates a potential for significant error. For example, the modeled river stage of Paddys Run rose only one-half the height of what was observed. Assuming that U.S. DOE's explanation of why the modeled groundwater elevation rose only 1.65 feet is correct, the modeled rise in the river stage of Paddys Run should have been much greater than what was reported. U.S. DOE should explain why the river stage did not increase as

much as it should have. In addition, U.S. DOE should collect more field data to further verify the model.

3. **Section 3.4.5, Page 3-41, Paragraph 1**. U.S. DOE attempted to validate the model by conducting two types of volume calculations. The results of the two methods differed significantly but U.S. DOE stated that because the results of the two methods are within one order of magnitude, the results are therefore reasonable. An order of magnitude estimation of surface water infiltration does not appear to be accurate. Because the amount of water infiltrating into the GMA will affect the mass of contaminants entering the GMA and ultimately the concentration of contaminants in the GMA, U.S. DOE should provide additional documentation on the accuracy of its infiltration estimate.

4. **Section 4.1.2, Page 4-5, Paragraph 1**. To calculate the concentration of a contaminant in the surface water runoff, U.S. DOE needs to establish the following factors: the concentration of the contaminants, the extent of the contaminated area, and the volume of the contaminated material. U.S. DOE should present the methods it will use in determining these critical factors.

5. **Section 4.2.1, Page 4-15, Paragraph 1**. This section references a U.S. Environmental Protection Agency (U.S. EPA) Region 3 memorandum as its justification for the screening of contaminants of concern. This reference should be provided to U.S. EPA to determine if the justification is applicable in U.S. EPA Region 5.

6. **Section 4.5, Page 4-31, Paragraph 2**. The report states that the first scenario assumes the failure of the storm water management system will occur after 70 years. U.S. DOE should also include the assumptions made about remediation during this 70-year period. As the text is currently written, it is U.S. EPA's understanding that this scenario will not include any remediation.

7. **Section 4.6, Page 4-31, Paragraph 4**. This section presents available data for evaluating model performance but provides no discussion of how model performance will be evaluated. This section should discuss the following: (1) how the modeled results will be compared to the field data, and (2) what calibration criteria will be used to evaluate the acceptability of the model predictions.

8. **Section 4.6, Page 4-31, Paragraph 4**. The majority of the data presented in the subsections of this section is from the Routine Environmental Monitoring (REM) program. This data is considered analytical support level (ASL) B. Because the results of the model will be used to complete a

portion of the risk assessment, U.S. DOE should justify the use of ASL B data for this purpose. In addition U.S. DOE should provide a description of the type and level of quality assurance and quality control (QA/QC) associated with these analytical results.

9. **Section 4.6, Page 4-31, Paragraph 4**. This section presents the available analytical data for sediment and surface water samples. In addition to this data, the data on surface soils is critical to the estimation of contaminant concentration in surface runoff. Therefore, this section should also include the available data for surface soils.

10. **Section 4.6.1, Page 4-31, Paragraph 5**. The available analytical data for sediment samples is limited and suspect for the following reasons: (1) only three sediment samples were collected in the storm sewer outfall ditch (SSOD) and only one sediment sample was collected from Paddys Run, and (2) the REM data does not compare well to the remedial investigation/feasibility study (RI/FS) data--the REM data indicates significantly higher levels of contamination than the RI/FS data. U.S. DOE should discuss the uncertainties associated with such a limited database and how it will use this limited database in its modeling efforts.

11. **Section 4.6.2, Page 4-31, Paragraph 6**. The available analytical data for surface water samples is limited and suspect for the following reasons: (1) only one surface water sample was collected from Paddys Run and only three surface water samples were collected from the SSOD as part of the RI/FS, (2) only three surface water samples were collected from the SSOD and no samples were collected from Paddys Run as part of the REM program, (3) the unit of measure listed in Figure 4-10 is micrograms per gram (ug/g) which is not typically used for water samples, and (4) the concentrations listed in Figure 4-11 appear to be extremely low. For example, there are numerous reported concentrations below 1 microgram per liter (ug/L) which does not appear to be correct. U.S. DOE should discuss the uncertainties associated with such a limited database and how it will use this limited database in its modeling effort.

12. **Section 4.6.3, Page 4-40, Paragraph 2**. Many of the wells listed in this section have received contamination from sources other than the SSOD or Paddys Run. These other sources include, but are not limited to, the source areas associated with Operable Unit (OU) 2. U.S. DOE should present a method for determining the relative contribution of contamination present in some of the monitoring wells.

13. **Section 5.1, Page 5-1, Paragraph 2**. The results of the sensitivity analysis indicate that a 10 percent increase in the SCS curve number results in a 100 percent increase in storm water runoff. This indicates that the model is very sensitive to the SCS curve number. Because the model is very sensitive to the SCS curve number, U.S. DOE should conduct field tests to validate the accuracy of its estimates of the SCS curve number.

14. **Section 5.1, Page 5-1, Paragraph 2**. The results of the sensitivity analysis indicate that a 10 percent increase in the SCS curve number results in a 100 percent increase in storm water runoff. The report implies that this significant increase in runoff has only a minor effect on infiltration. While this may be accurate, the 100 percent increase in runoff will significantly affect the following: (1) sediment production, (2) the mass of contaminant loading to surface water bodies, (3) the concentration of contaminants in the runoff, and (4) the amount of runoff available from upgradient reaches and uncontaminated areas that is available to dilute the concentration of contaminants in the surface water runoff, SSOD, and Paddys Run. U.S. DOE should discuss how it will account for the effect that a 100 percent increase in runoff will have on the uncertainty in the model.

15. **Section 5.1, Page 5-1, Paragraph 2**. The report states that the total increase in infiltration volume at cross section D-D is 9-cubic-feet per foot of channel. The estimated increase should be expressed in total cubic feet so that the increase can be easily compared to the estimates presented in Sections 3.4.4.2 and 3.4.4.3.

16. **Section 5.3, Page 5-2, Paragraph 1**. The report states that the total decrease in infiltration volume at cross section C-C is 126-cubic-feet per foot of channel. The estimated increase should be expressed in total cubic feet so that the increase can be easily compared to the estimates presented in Sections 3.4.4.2 and 3.4.4.3.

17. **Section 5.5, Page 5-2, Paragraph 3**. The sensitivity analysis focused on the possible error associated with the infiltration rate. The sensitivity analysis should also include an analysis of the possible error in the mass of contaminant loading and the concentration of contaminants in storm water runoff, surface water, and the GMA. U.S. DOE should list the parameters for which each of these items is sensitive, and should provide a discussion on each.