UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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CHICAGO, IL 60604-3590

4270

FERNALD
LOG C-01213

2002 MAY 15 A 9:50

FILE:
REPLY TO THE ATTENTION OF:

MAY 14 2002

Mr. Johnny W. Reising
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

SRF-5J

RE: Uranium Sorption and Partitioning of GMA PSP

Dear Mr. Reising:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the United States Department of Energy's (U.S. DOE) Project Specific Plan (PSP) for the analysis of uranium sorption and partitioning of Great Miami Aquifer matrix sediments. The document presents an approach to evaluate how uranium is adsorbed and partitioned on Great Miami Aquifer matrix sediments at the Fernald site.

The document does not adequately explain why the proposed study is required, and it does not provide information on how the study results will be used to improve the accuracy of cleanup predictions, which is the primary objective of the study.

Therefore, U.S. EPA disapproves the uranium sorption and partitioning PSP. U.S. DOE must submit a revised PSP and responses to comments addressing U.S. EPA's enclosed comments within thirty (30) days receipt of this letter.

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

Sincerely,

James A. Saric
Remedial Project Manager
Federal Facilities Section
SFD Remedial Response Branch #2

Enclosure

cc: Tom Schneider, OEPA-SWDO
Sally Robison, U.S. DOE-HDQ
John Bradburne, Fluor Fernald
Terry Hagen, Fluor Fernald
Tim Poff, Fluor Fernald

# TECHNICAL REVIEW COMMENTS ON "PROJECT SPECIFIC PLAN FOR THE ANALYSIS OF URANIUM SORPTION AND PARTITIONING OF GREAT MIAMI AQUIFER MATRIX SEDIMENTS"

## FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

### GENERAL COMMENT

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not Applicable (NA) Page #: NA Line #: NA
General Comment #: 1
Comment: The project specific plan (PSP) does not adequately explain why the proposed study is required or how the study results will be used to meet the study's primary objective, which is improving the accuracy of cleanup predictions. For example, Section 1.0 of the PSP states that "operational experience with the remedy suggests that the equilibrium assumption may not be valid and that sorption and desorption reaction rates for uranium in the aquifer may not be equal. A disequilibrium [nonequilibrium] approach may be required in order to improve the accuracy of cleanup predictions." However, the PSP does not demonstrate that the operational data for the Greater Miami Aquifer (GMA) matrix sediments at the Fernald Environmental Management Project (FEMP) in fact suggest that the equilibrium assumption is not valid and that sorption and desorption rates for uranium in the aquifer are not equal. The PSP should include adequate information to show (1) that the actual cleanup results are significantly different from the predictions made based on the assumption that equilibrium conditions exist in the aquifer and (2) that the observed differences are due to the absence of equilibrium conditions in the aquifer.

The PSP proposes that a "semi-qualitative" and "semi-selective" chemical extraction study be performed to generate the data required to meet the study's primary objective-that is, improving the model currently used to predict cleanups. However, the PSP provides no details regarding how the study results will be used to improve the current cleanup model. To allow the U.S. Environmental Protection Agency (U.S. EPA) to properly evaluate the proposed approach, the PSP should provide a step-by-step description of how the results obtained from each of the eight steps associated with the extraction study will be used to determine chemisorption and desorption coefficients and how these coefficients will be used to improve the current cleanup model. In addition, the PSP should explain why the study is identified as "semi-qualitative" and how semi-qualitative study results will be used to meet the study's primary objective, as quantitative results will be required for accurate determination of the chemisorption and

desorption coefficients that are to be used to improve the accuracy of cleanup predictions.

**SPECIFIC COMMENTS**

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 1.0 Page #: 1 Lines #: 18 through 23
Original Specific Comment #: 1
Comment: The text initially mentions that the enhanced cleanup model would provide for four reaction rate parameters: the (1) chemisorption coefficient, (2) desorption coefficient, (3) precipitation coefficient, and (4) dissolution coefficient. However, the text later states that "in the GMA, uranium concentrations are not high enough to result in significant precipitation/dissolution reaction rates." For this reason, according to the PSP, only chemisorption and desorption are of interest for the proposed study. Because the purpose of the study is to improve the accuracy of cleanup predictions, the PSP should provide calculations to show that ignoring the precipitation and dissolution rates will not impact the accuracy of cleanup predictions. In addition, the PSP should explain why the enhanced model would ignore physical adsorption (adsorption occurring as a result of van der Waals forces).

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.5 Page #: 6 Line #: NA
Original Specific Comment #: 2
Comment: The text lacks explanations and details that U.S. EPA needs to properly evaluate the proposed approach to meet the study objective. Specific deficiencies associated with the proposed approach are summarized below.

- The text initially states that soil samples will be ground to less than 200 mesh size (less than 74 microns) and that the ground samples will be analyzed using X-ray diffraction (XRD). The text later states that subsamples will then be treated using a sequential leaching procedure. The text should clarify whether the term "subsamples" refers to the ground samples or to samples "as obtained" from the field. If ground samples are to be used for the leaching test, the PSP should explain how the results obtained for the ground samples will be representative of actual field conditions.

- The text describes the eight-step, sequential extraction procedure as "semi-selective," indicating that each extraction step is only partially selective to target species and thus may not remove only the target species specific to that step. The text should

discuss the impacts of using a semi-selective extraction procedure on meeting the study's objective.

- The PSP should either (1) provide a reference for the proposed multi-step extraction procedure or (2) explain why the proposed procedure is necessary and why the extraction parameter conditions are adequate to accomplish the objective of each extraction step.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.7 Page #: 8 Line #: NA
Original Specific Comment #: 3
Comment: Phase 2 of the study schedule includes characterization of sediment samples primarily to determine the distribution of uranium in the samples. For example, a high-resolution transmission electron microscopy technique will be used to determine the uranium fractions associated with carbonate minerals or iron oxides. However, Step 3 of the extraction procedure, which targets the uranium fraction bound to carbonate minerals, is to be conducted during Phase 1. Because each extraction step is intended to target different uranium fractions, the extraction procedure should be implemented after sediment characterization studies have been completed. Depending on the outcome of the characterization studies, the extraction procedure may have to be adjusted. For example, (1) omission or modification of one or more of the proposed extraction steps may be required, or (2) a new extraction step may need to be added to the proposed extraction procedure.