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GROUNDWATER SAMPLING USING MICRO-PURGE TECHNIQUES

02/25/94

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COMMENTS
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

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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: Groundwater Sampling Using Micro-Purge Techniques

Dear Mr. Craig:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the Groundwater Sampling Using the Micro-Purge Technique Report. This report documents the rational, procedures, findings, and conclusions for adopting a new technique utilizing low purge rates as a viable alternative to current purge and sampling methods for groundwater.

Although, U.S. EPA believes that micro-purging is a viable purging and sampling technique, there are concerns with the presented approach. Instead of purging set volumes of groundwater, wells should be micropurged until indicator parameters, such as dissolved oxygen, specific conductivity, and turbity, are stable. U.S. EPA has attached comments on this report, that must be addressed, before this approach can be implemented.

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
Jim Thiesing, FERMCO
Paul Clay, FERMCO

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PARTIAL
ACTION RESPONSE
TO R-0579
(7362)

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TECHNICAL REVIEW COMMENTS ON "WASTE MINIMIZATION AND GROUNDWATER SAMPLING EFFICIENCY: A NEW TECHNIQUE FOR PURGING GROUNDWATER MONITORING WELLS AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT (FEMP)"

GENERAL COMMENTS

1. During sampling, geochemical stabilization of groundwater indicates that groundwater being withdrawn from the monitoring well is representative of the producing formation. Research conducted by the U.S. Environmental Protection Agency (U.S. EPA) R.S. Kerr Environmental Research Laboratory (RSKERL) and others indicates that indicator parameters, such as turbidity, dissolved oxygen (DO), and specific conductivity, are better indicators of stabilization than purge volume (Barcelona, Wehrmann, Varljen, 1994). The U.S. Department of Energy (U.S. DOE) studies used set purge volumes, with the maximum volume equal to three well volumes, to define a well as being stable. The fact that DO stabilized in only 6 of the 16 tests is evidence that stabilization had not occurred in the majority of the volume-based FEMP tests. Therefore, U.S. DOE should purge groundwater until indicator parameters are stable.

2. Research pertaining to inorganic data performed by RSKERL shows that turbidity is the most sensitive indicator of stabilization and that dissolved oxygen (DO) is an acceptable indicator. RSKERL research also indicates that pH, temperature, and specific conductivity are the least sensitive indicators of inorganic stabilization. Additional research conducted by Barcelona, Wehrmann, and Varljen shows that specific conductivity is a good indicator of volatile organic compound (VOC) stabilization (Barcelona, Wehrmann, and Varljen, 1994). Although inorganics, and specifically uranium, are the primary contaminants of concern, VOC

contamination is known to exist at FEMP. Therefore, U.S. DOE should measure specific conductivity, DO, and turbidity during purging, not just for quality control purposes, but as indicators of groundwater stabilization.

3. Site specific conditions, and on a smaller scale, well specific conditions play a large role in determining the validity of the FEMP study. The FEMP study was based on 2000- and 3000-series monitoring wells. While the geologic conditions of the 2000- and 3000-series monitoring wells may be similar to the geologic conditions of the 4000-series monitoring wells because all are installed in the Great Miami aquifer, the geologic conditions of the 1000- series wells installed in the glacial overburden are probably not similar. In the 1000-series monitoring wells, turbidity may be higher than other monitoring wells due to a higher percentage of fine-grained material in the screened interval. Therefore, U.S. DOE should conduct additional studies using a larger data set (more monitoring wells) and monitoring wells representative of the entire monitoring well network at FEMP.

4. The FEMP document references a study that shows it took several days for the screened interval of a monitoring well to equilibrate after a minor disturbance. Because the FEMP study included only 3 days between tests, the screened interval may not have reached equilibrium. Future studies should include greater periods of time between tests to allow monitoring well conditions to equilibrate.

SPECIFIC COMMENTS

Abstract, Page 1, Line 3. The text states that studies have shown that groundwater samples can and should be collected without "prior well-volume exchange purging." Technically, this

statement is correct, however, it is misleading and could be interpreted as meaning no purging should be performed. The statement should clearly convey that purging should not cause an exchange of groundwater between the screened interval and the stagnant water in the casing above the screened interval. The sentence should either be revised to clearly state the intended meaning or be deleted.

Purpose and Scope of Investigation, Page 2, Paragraph 2. The text states that prior to sampling, only the pump and tubing volume will be purged. Based on the research cited in the FEMP document, purging should be conducted until indicator parameters, such as specific conductivity, DO, and turbidity, are stable. Although micropurging may require less purging, purging should be based on groundwater geochemistry stabilization, not the volume of groundwater purged. U.S. DOE should modify the purging and sampling technique to include purging until groundwater geochemistry is stable.

Discussion and Conclusion, Page 15, Paragraph 0. RSKERL research shows that the conventional 0.45 micron filter is a poor choice for any desired data use and recommends either a 0.1 or 5.0 micron filter depending on the data use. RSKERL research also shows that filtering metals should not be necessary if the low flow technique is performed properly. The FEMP document should provide the pore size of the in-line filter that U.S. DOE proposes to use for filtered metals analysis.

REFERENCES

Barcelona, M.J., H.A. Wehrmann, and M.D. Varljen. 1994. Reproducible Well-Purging Procedures and VOC Stabilization Criteria for Ground-Water Sampling. Ground Water. Volume 32, Number 1. Pages 12-22

Powell, R.M., and R.W. Puls. 1993. Passive Sampling of Groundwater Monitoring Wells Without Purging: Multilevel well chemistry and Trace Disappearance.

Puls, R.W., D.A. Clark, B. Bledsoe, R.M. Powell, C.J. Paul. 1992. Metals in Ground Water: Sampling Artifacts and Reproducibility. Hazardous Waste & Hazardous Materials. Volume 9, Number 2. Pages 149-161.

Puls, R.W. and R.M. Powell. 1992a. Transport of Inorganic Colloids through Natural Aquifer Material: Implications for Contaminant Transport. Environmental Science & Technology. Volume 26, Number 3. Pages 614-621.

Puls, R.W. and R.M Powell. 1992b. Acquisition of Representative Ground Water Quality Samples for Metals. Ground Water Monitoring Review. Volume 12, Number 3. Pages 167-176.

United States Environmental Protection Agency (U.S. EPA). 1989. Ground Water Sampling for Metals Analyses. U.S. EPA Superfund Ground Water Issue. R.W. Puls and M.J. Barcelona. EPA/540/4-89/001.

U.S. EPA. 1990. Colloidal-Facilitated Transport of Inorganic Contaminants in Ground Water: Part I. Sampling Considerations. U.S. EPA Environmental Research Brief. R.W. Puls, J.H. Eychaner, and R.M. Powell. EPA 600/M-90/023.

U.S. EPA. 1991. Facilitated Transport of Inorganic Contaminants in Ground Water: Part II. Colloidal Transport. U.S. EPA Environmental Research Brief. Puls, R.W., R.M. Powell, D.A. Clark, C.J. Paul. EPA 600/M-91/040.