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NAS CECIL FIELD, FL
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LETTER OF TRANSMITTAL AND MEMORANDUM REGARDING U S GEOLOGICAL SURVEY RESPONSE TO U S EPA REGION IV OVERVIEW OF NATURAL ATTENUATION SAMPLING AT OPERABLE UNIT 8 (OU 8) SITE 3 NAS CECIL FIELD FL
5/9/1997
U S GEOLOGICAL SURVEY

MAY 9 1997

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Water Resources Division
Stephenson Center, Suite 129
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Commanding Officer
Southern Division Naval Facilities Engineering Command
P.O. Box 190010
Charleston, South Carolina 29419-9010
Attn. Code 1879 (Mark Davidson)

Dear Mr. Davidson:

Enclosed is a memo responding to the recent comments made by Fred Slone of the EPA.

Sincerely,

Francis H. Chapelle
Hydrologist

Memo

To: Mark Davidson, Southern Division NAVACENGCOM

From: Francis Chapelle, U.S. Geological Survey

Subject: USEPA overview of natural attenuation sampling, Site 3, NAS Cecil Field

Date: May 9, 1997

In February of 1997, USEPA Region 4 held a conference in Atlanta on the general subject of natural attenuation. At that meeting, the U.S. Geological Survey reported on field methods for assessing redox conditions in ground-water systems that we have developed over the last five years. Because redox conditions control the rate and extent of chlorinated ethene degradation, these methods were of great interest to EPA personnel and to private contractors working on Naval facilities. At that time, we were asked to demonstrate these methods in a field setting, and we agreed to do so at Site 3, NAS Cecil Field.

The demonstration was scheduled for April 2, 1997. EPA personnel arrived on April 1, and observed a USGS employee evaluating the effects of peristaltic pump tubing material on measurements of dissolved oxygen and VOCs in ground water. The next day, EPA personnel participated in the demonstration of methods for measuring dissolved oxygen, ferrous iron, and dissolved sulfide. In observing the methods used to obtain ground-water samples, the EPA personnel noted several instances of how standard Region 4 sampling protocols and decontamination procedures were not followed. The EPA personnel enumerated these deficiencies in an undated memo addressed to the EPA project manager of NAS Cecil Field.

Many of the concerns expressed by the EPA personnel have merit, and we appreciate their prompt and thorough comments. In the future, USGS sampling to assess natural attenuation performed at federal facilities for regulatory/enforcement purposes will strictly adhere to Region 4 guidance.

In sampling trips previous to the demonstration of April 2, we have delineated the distribution of redox processes at Site 3. The data used in this evaluation include concentrations of dissolved oxygen, ferrous iron, sulfide, methane, and hydrogen. These data were collected using procedures that have undergone extensive procedural development and QA and QC evaluations by the USGS. Furthermore, these data clearly demonstrate that the contaminant plume at Site 3 is dominated by Fe(III) reduction, and that the plume becomes progressively more reducing as it approaches Rowell Creek. These data are important because they provide clear explanations for the behavior of chlorinated ethenes at this site. For example, it has been previously observed that TCE transforms readily to DCE at this site, but that DCE tends to persist. Under Fe(III) reducing conditions, transformation of TCE to DCE is relatively efficient, but transformation of DCE to

VC is relatively inefficient. Thus, the observed persistence of DCE can be explained by ambient redox processes at this site. Similarly, while production of VC is relatively inefficient, oxidation of VC is relatively efficient under Fe(III)-reducing conditions. This explains why VC is not observed in the contaminant plume. These conclusions, which have been experimentally verified in laboratory studies using sediments from this site, have important implications for future site remediation.

Because the redox data and the experimental data are so important in understanding the behavior of Site 3, and because these data were collected using the best available methods (EPA Region 4 does not yet have guidance on measuring redox-sensitive parameters or for laboratory investigations), it is appropriate that these data be considered in making regulatory decisions. Extensive VOC data using Region 4 guidelines has already been gathered from existing monitoring wells at this site. However, it was deemed necessary to have a data set in which diffusion samples and ground-water samples were analyzed using the same procedures (headspace GC-FID analysis as opposed purge-and-trap GC analysis). The important point, however, is our ground-water VOC data are not necessary for regulatory confirmation of natural attenuation in the shallow aquifer at Site 3.

One particularly serious concern of the EPA personnel was that our sampling procedures might have introduced contamination from a contaminated well (CEF-3-28S) into a previously uncontaminated well (CEF-3-29D). Measured concentrations of 1,1 DCE and cis-DCE in ground water produced from CEF-3-28S during this sampling event were 246.8 μg/L and 122.7 μg/L, respectively. However, there were no detects of any chlorinated ethene in ground water produced from CEF-3-29D (< 2 μg/L). Thus, the data show that our sampling procedures did <u>not</u> introduce contamination into well CEF-3-29D. Again, however, the expressed concerns of the EPA personnel are valid and EPA-mandated decontamination procedures will be used in the future.

Methods for assessing the efficiency of natural attenuation of chlorinated ethenes have only been developed in the recent past. Bringing these methods to bear on problems of regulatory concern will present significant challenges for those in the USGS and EPA. It is incumbent upon the USGS to describe proposed new methods clearly and concisely. Those in EPA must assess these proposed methods critically and establish reliable procedures for their implementation as deemed appropriate. This will not be an easy or simple process. But it will be greatly facilitated if effective communication between the two agencies is maintained. We in the USGS look forward to working with our partners in EPA as this process moves forward.