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MCRD PARRIS ISLAND
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LETTER REGARDING DIRECT PUSH BORING METHODS TO COLLECT GROUNDWATER SAMPLES DURING AN INTERIM ACTION INVESTIGATION AT DRY CLEANING FACILITY SPILL AREA WITH ATTACHMENT MCRD PARRIS ISLAND SC
1/21/1994
BECHTEL

Bechtel

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Mr. Paul M. Bergstrand
South Carolina Department of Health
& Environmental Control
Division of Groundwater Protection
2600 Bull Street
Columbia, SC 29201

SUBJECT: Bechtel Job No. 22567
Department of the Navy Contract No. N62467-93-D-0936
DO 0048, PARRIS ISLAND, SC, DRY CLEANING FACILITY SPILL AREA, DIRECT PUSH BORING PERMIT APPLICATION
Subject Code: 7550

Dear Mr. Bergstrand:

Bechtel Environmental, Inc.; under contract to the Department of the Navy, Southern Division (SOUTHDIV); will be utilizing Direct Push Boring methods to collect groundwater samples during an interim action site investigation at the Parris Island Dry Cleaning Facility Spill Area (Figure 1.) The purpose of this field work is to confirm and further define the horizontal and vertical extent of the solvent contaminated groundwater. Also the physical properties of the groundwater will be determined for the selection and design of the treatment system.

The sampling and data collection activities will be done in two phases. The first phase will be done using cone penetrometer technology in three boreholes located outside the limits of the contaminant plume, both up- and down-gradient. The proposed location of these three boreholes is presented on the enclosed Figure 2. The location of any clay lenses and the Hawthorn formation will be determined at these boreholes using cone penetrometer readings. Soils samples will also be collected at these locations for visual classification of any clay lenses and the Hawthorn formation.

The second phase will be the use of direct push sampling to collect samples to define the contaminated plume. A discrete sample will be used to collect groundwater samples from within the plume of contaminated groundwater to define the horizontal and vertical limits of the plume. The proposed direct push sample locations are presented in Figure 2. Samples locations will shift as necessary to avoid utilities. Samples will be collected from within the surface water aquifer at depths of approximately 3 to 4 ft to a maximum of 45 ft using direct push technology. These borings shall not penetrate the Hawthorn in order to avoid opening a contaminant pathway to the Floridian Aquifer.

ACTION REQ'D	[ ] YES	[✓] NO	DUE DATE _____
RESPONSE TO CHRON NO. _____			

Bechtel Environmental, Inc.

Groundwater sampling will continue until the analyses from two consecutive samples are below the cleanup criteria or until the Hawthorn formation or a clay lens is encountered, whichever occurs first. The results from the onsite sample analysis will be reviewed daily and the sampling interval will be adjusted as needed to optimize data collection.

In the event pockets of pure solvent are discovered during sampling, vertical sampling will cease at these locations to prevent further vertical migration.

Each borehole will be filled with a cement/bentonite grout to the top of the hole using the tremie method.

If you have any questions about these responses, please feel free to give me a call at (423) 220-2167 or Roy Hoekstra at (423) 220-2271.

Sincerely,

K. S. Atchley
Project Manager

REH:cw:LR0781
Enclosure: As stated

bcc:
P. Tomiczek w/o encl
W. Hevrdeys w/encl
R. Hoekstra w/encl

1.0 INTRODUCTION

The Marine Corps Recruit Depot, Parris Island, South Carolina is an active recruit basic training facility. The Depot is currently constructing a new dry cleaning facility to replace an existing facility which is scheduled for demolition in the summer of 1997. A contamination assessment was performed in 1994 under the direction of Morale, Welfare and Recreation to evaluate the impact of reported spills of dry cleaning solvent tetrachloroethylene (PCE) at the existing dry cleaning facility. Figure 1 identifies the location of this facility. This initial assessment was conducted in May 1994. This assessment concluded that the soil and groundwater in the vicinity of the dry-cleaners had been adversely affected by releases from the existing aboveground storage tanks and potentially from former underground storage tanks which had contained a petroleum based solvent. Groundwater samples contained PCE and related compounds in excess of the maximum contaminant levels (MCLs) established by the U.S. EPA.

The data collected from results of this sampling plan will be used to select and design the treatment system that will be proposed as an interim action for this site. The final documents that implement the treatment system will be subject to South Carolina Department of Health and Environmental Control (SCDHEC) and Environmental Protection Agency (EPA) review and approval.

2.0 PURPOSE

The objective of the proposed interim action at the facility is to stabilize the plume and reduce/eliminate solvent source loading to the groundwater. The purpose of this field work is to confirm and further define the horizontal and vertical extent of the groundwater contamination. Also the physical properties of the groundwater will be determined for the selection and design of the treatment system. These objectives will be addressed by:

- Verifying the presence and depth of the Hawthorn Formation separating the shallow groundwater aquifer from the Floridian Aquifer and determining if any shallow clay lenses exist.
- Determine approximate hydraulic conductivity of the soil in the vicinity of the contaminant plume.
- Determine the vertical and horizontal extent of the contaminant plume. (The samples will be collected using direct push technology and a field GC will be used to analyze the samples and direct additional sample locations).
- Determine the physical properties of the groundwater needed for system design.

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3.0 HEALTH AND SAFETY

Safety and health protocols will be followed in accordance with the Task Specific site Safety and Health Plan (TSSHP). A site safety and health representative (SSHR) will be present during all sample collection and drilling activities. Sampling activities are anticipated to be conducted using personal protective equipment (PPE) defined in the TSSHP as standard construction attire. The SSHR may modify or upgrade the level of PPE based on site conditions.

Site controls will be maintained during site operations to prevent entry by unauthorized individuals. A control zone encompassing the work area will be established using rope and/or barricade tape as necessary. Visits within the controlled zone by personnel who are not part of the project team will be documented in the site logbook.

4.0 SCOPE OF WORK

The following are the major work activities which have been identified to delineate the contaminant plume:

- Prior to mobilization, the local office of SCDHEC will be contacted for approval to implement the work and to obtain any permits required.
- On arrival at the site a 25-foot sample grid will be established.
- After establishing the grid, MCRD Public Works personnel will be contacted to conduct a survey for underground utilities within the work zone. Individual sample points will be located to avoid utilities.
- Site activities will be coordinated with the Provost Marshall's office in case traffic needs to be rerouted, and to reduce the impact of sampling activities on the week's graduation ceremonies
- Three sampling points will be identified outside the limits of the contaminant plume, both up- and down-gradient. The location of any clay lenses and the Hawthorn formation will be determined at these sampling points. Hydraulic conductivity measurements will provide data for the system design.
- Moving to the suspected edge of the identified contaminant plume (Figure 2), approximately 25 to 40 direct push sampling points will be advanced to determine the current vertical and horizontal limits of contamination.
- Once the edges of the plume are defined, two groundwater samples will be collected from within the plume for data development for treatment system selection and design. An additional groundwater sample will be collected from the plume to provide background information.

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4.1 LOCATING THE AQUITARDS

The Dry Cleaner Facility site has two potential aquitards that could potentially limit the downward migration of the contaminates. The first is the possibility of a clay lens at a depth of approximately 12 feet and the second is the Hawthorn Formation. The Hawthorn Formation is discontinuous in the vicinity of Parris Island due to tidal scour and stream erosion. Where present, the Hawthorn has been reported at an approximate depth of 30 ft and to be 25 to 40 ft thick. Three sampling locations will be selected by Bechtel outside the expected contamination plume in order to minimize potential cross contamination, while attempting to identify the stratigraphy in the area. See Figure 2 for the proposed locations. Cone penetrometer logs of tip pressure and sleeve resistance, or an equivalent method, shall be used to locate the boundaries of any potential clay lenses and of the upper boundary of the Hawthorn. Testing shall be performed vertically at the locations to a maximum depth of 45 ft, which is the limits of the direct push technology.

4.2 OBTAINING SYSTEM DESIGN DATA

Physical groundwater data will be used to support the treatment technology selection and design. The following data will be collected:

- **Hydraulic Conductivity Measurements** -At the three locations used to locate potential aquitards, pressure probes or an equivalent method shall be used to determine the hydraulic conductivity of the soils within the shallow aquifer.

- **Petroleum Solvent Plume Physical Properties** - Two groundwater samples will be collected from the suspected petroleum solvent plume. Samples will be sent to the offsite lab for VOC analysis.

- **Dry Cleaner Solvent Plume Physical Properties** - Three groundwater samples will be collected; two from within the contaminant plume and one outside the plume for data development for treatment system selection and design. Samples will be sent to the offsite lab for analysis. A list of the required lab testing is included in Section 4.5.

4.3 IDENTIFYING THE EXTENT OF THE CONTAMINANT PLUME

Groundwater samples will be collected from the direct push sampling locations shown on Figure 2. Samples locations will shift as necessary to avoid utilities. Samples will be collected from within the surficial aquifer at depths of approximately 3 to 4 ft to a maximum of 45 ft using direct push technology. This sampling shall not penetrate the Hawthorn in order to avoid opening a contaminant pathway to the Floridian Aquifer.

Resistivity readings will be used to identify changes in the groundwater column, prior to conducting groundwater sampling. These changes could potentially be an indicator of the presence of dissolved solvents in the groundwater. In order to correlate resistivity logs

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and samples results, a resistivity probe will be advanced within the plume and resistivity readings will be collected continuously. Adjacent to this location, groundwater samples will be collected using direct push technology and analyzed for solvents. The sampling intervals will be determined based on the resistivity readings. Once the sample results are available, a comparison will be made with the resistivity readings. If the resistivity readings show a favorable correlation to the sampling results, then they will be used to help optimize sampling intervals, if a poor correlation exists, then the resistivity readings will not be used.

The minimum sampling interval for each direct push sampling location will be one sample from with in the plume and two consecutive clean samples at a five foot sample interval below the plume. If the Hawthorn formation or clay lenses are encountered sampling will cease. The results from the onsite sample analysis will be reviewed and the sampling interval will be adjusted as needed to optimize data collection.

In the event any pockets of pure solvent are discovered during sampling, vertical sampling will cease at these locations to prevent further vertical migration.

Grouting Holes
Each hole at a direct push loation will be filled with a cement/bentonite grout to the top of the hole using the tremie method.

Decontamination
All sampling equipment that is to be reused will be decontaminated according to EPA Region II SOPs as executed by Navy RAC Project Procedure 6024.

4.4 FIELD LABORATORY ANALYSIS

Groundwater samples will be screened on-site using a field gas chromatograph for the contaminants of concern: PCE; Trichloroethylene (TCE); cis-1,2-Dichloroethylene (cis-1,2 DCE); trans-1,2-Dichloroethylene (trans-1,2 DCE); and Vinyl Chloride.

A Photovac 10S50 portable GC with a photoionization detector (PID) will be used for field analysis of groundwater samples. Standard operating procedures 2108: Photovac 10S50, 10S55, and 10S70 Gas Chromatograph Operation and 2109: Photovac GC Analysis for Air, Soil Gas, Water, and Soil contained in the U.S. EPA's *Compendium of ERT Field Analytical Procedures* (OSWER Directive 9360.4-04) will be used to direct field analysis efforts.

The GC will be able to quantify concentrations of the contaminants of concern to values below the MCLs. Table 1 lists the MCLs for these contaminates.

TABLE 1. GROUNDWATER MCLs	
Contaminant	**Standard**
PCE	5 ppb
TCE	5 ppb
Vinyl Chloride	2 ppb
cis 1,2-DCE	70 ppb
trans 1,2-DCE	100 ppb

Other parameters that will be measured with water quality instruments on each groundwater sample include:

- temperature;
- dissolved oxygen;
- pH and Eh;
- field alkalinity; and
- conductivity.

The modified Winkler procedure will be run for dissolved oxygen on each groundwater sample in addition to the use to the dissolved oxygen probe.

Ten percent of the samples will be sent for off-site laboratory analysis to confirm on-site screening results. Additionally, any onsite analysis that has unknown or unusual detections will also be sent for offsite analysis.

4.5 OFFSITE LABORATORY ANALYSIS

The ten percent groundwater screening samples sent to the offsite laboratory for confirmation of the field laboratory results, will be analyzed for EPA method 601 for volatile halocarbons and EPA method 602 for volatile aromatics. Two groundwater samples will be collected from within the suspected petroleum solvent plume and will be analyzed for the entire suite of VOCs, as well as other constituents as determined necessary.

Two groundwater samples will be collected from within the contaminant plume and one background groundwater sample outside the plume will be collected and analyzed for the following:

- metals (iron, manganese, calcium, magnesium, sodium, potassium);
- ion analysis (bromide, chloride, fluoride, nitrate, nitrite, orthophosphate, sulfate);
- total dissolved solids;
- total suspended solids;
- TKN;
- sulfites;
- BOD;

- Ammonia;
- total phosphorous;
- total organic carbon;
- filtered total carbon (dissolved organic carbon);
- methane;
- carbonate;
- hardness; and
- turbidity.

This information will be used to select the treatment technology and will provide design data.

4.6 WASTE MANAGEMENT

Waste minimization will be an ongoing part of the field effort as a means to reduce or eliminate the generation of investigation derived waste (IDW). IDW will be managed on the principle that to the extent possible, no contamination will be added or taken from the site.

Disposable plastic (sheeting, gloves, PPE, etc.) that is soiled or visually contaminated from a location within the contaminated area will be decontaminated and reused or disposed of as garbage. If any of the disposable items are contaminated, they will be disposed of in accordance with state and federal regulations

All water that is generated by the sample collection effort, will be containerized in 55 gallon drums, sampled, and analyzed by the field GC before disposal. Any contaminated water will be disposed of in accordance with state and federal regulations. The depot's FOTW will be used for disposal if the lab results are acceptable.

5.0 REFERENCES

Tetrachloroethylene Contamination Assessment and Conceptual Corrective Action Plan, U. S. Marine Corps Recruit Depot, Dry Cleaning Facility, S&ME, Inc. June 1994

Standard operating procedures 2108: Photovac 10S50, 10S55, and 10S70 Gas Chromatograph Operation and 2109: Photovac GC Analysis for Air, Soil Gas, Water, and Soil contained in the U.S. EPA's *Compendium of ERT Field Analytical Procedures* (OSWER Directive 9360.4-04)

All work will be performed in accordance with Bechtel's *Navy RAC Project Procedures*.

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