03,01-04/05/96-01652

Baker

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April 5, 1996

Commander
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1510 Gilbert Street (Building N-26)
Norfolk, Virginia 23511-2699

Attn: Ms. Katherine Landman
Navy Technical Representative
Code 18232

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
Contract Task Order (CTO) 0232
Final Project Plan Amendments
Supplemental Groundwater Investigation/Feasibility Study (SGI/FS)
Operable Unit (OU) No. 10, Site 35
MCB, Camp Lejeune, North Carolina

Dear Ms. Landman:

This letter presents final amendments to the Remedial Investigation/Feasibility Study (RI/FS) Work Plan and Sampling and Analysis Plan (SAP) for Operable Unit (OU) No. 10 (Site 35) Camp Geiger Area Fuel Farm. These amendments were necessary to support the additional work to be conducted under the Supplemental Groundwater Investigation (SGI) at OU No. 10. The majority of information provided in the original Final Work Plan and SAP (Baker, 1993) is still applicable to the work scheduled to occur under the SGI. Specific sections of the original Work Plan and SAP have been modified to accommodate changes to the project's tasks, schedule, and project team. The health and safety concerns addressed in the Final RI/FS Health and Safety Plan (HASP) (Baker, 1993) are applicable to the SGI. As such, no modifications to this document were necessary for it to be followed during SGI field investigation activities. Modifications to the Work Plan and SAP are as follows:

## WORK PLAN AMENDMENTS

Included in the following subsections are the modifications and additions to the Final RI/FS Work Plan submitted to LANTDIV in December 1993. Sections 4.0 (Remedial Investigation/Feasibility Study Objectives) and Section 5.3 (Task 3 - Field Investigations) have been substantially modified to accommodate the additional work. Section 5.15 (Additional SGI tasks) presents two additional tasks, Data Management and Photo Album, that will be performed under the SGI. These tasks were also performed previously as part of the RI, however, they were not identified separately in the Final RI/FS Work Plan. Rather, these tasks were combined with other tasks. Two tasks presented in Sections 5.6 (Task 7 - Treatability Study/Pilot Testing) and 5.7 (Task 6 - Risk Assessment) of the Final RI/FS Work Plan will not be performed under the SGI. A treatability study-pilot test of in-situ air sparging (IAS technology) at Site 35 is the subject of work

being performed under a different task order (CTO-0323). Based on the results of the RI, LANTDIV, Camp Lejeune, EPA Region IV, and the NC DEHNR concurred that no additional risk assessment is required under the SGI.

## 2.2 Site 35 - Camp Geiger Area Fuel Farm

This section discusses the locations of proposed SGI Activities.

### 2.2.1 Site Location and Setting

The SGI will be conducted in the two areas of concern (AOC) shown in Figure 1. The northern AOC is bisected by and extends approximately 900 feet along Brinson Creek between existing monitoring wells 35MW-23 and 35-MW-36. The southern AOC is roughly bounded to the north by Fifth Street; to the east by buildings TC569, TC611, TC609, and TC608; to the south by Seventh Street and to the west by "C" Street.

## 4.0 REMEDIAL INVESTIGATION/FEASIBILITY STUDY OBJECTIVES

The objectives of this work are based on the recommendations of the previous RI and the data needs of the proposed pilot-scale evaluation of IAS technology. The overall objectives of the SGI are as follows:

- Delineate the horizontal and vertical extent and locate sources of solvent-related groundwater contamination in the surficial aquifer south of Fifth Street.
- Determine if Brinson Creek is acting as a hydraulic barrier, preventing solvent-related groundwater contamination from migrating off-site onto Onslow County property.
- Provide a detailed vertical profile of solvent-related and BTEX groundwater contamination and subsurface geology in the immediate vicinity of the proposed IAS pilot study.

## 5.3 Task 3 - Field Investigations

The specific activities of the SGI are presented in the following sections and include: Site Survey, Soil and Groundwater Sample Screening, Soil Investigation, and Groundwater Investigation.

### 5.3.1 Site Survey

Survey data will be provided for all roads, building foundations, storm sewer inlets, sanitary sewer manholes, tree lines and monitoring well locations (temporary and permanent) in the AOCs not surveyed under the previous RI or Preparation of RAC Design Package for Surficial Groundwater Remediation (CTO-0323). Survey points will include a latitude coordinate, longitude coordinate and an elevation expressed in feet of mean sea level. The vertical accuracy will be within 0.01 feet and horizontal accuracy within 0.1 feet. In addition all points will be referenced to the North Carolina State Plain Coordinate System (NCSPCS). A sufficient number of points will be established to tie new survey data with previous surveys conducted at Site 35.

### 5.3.2 Soil and Groundwater Sample Screening

Sample screening activities will be conducted in both the northern and southern AOCs. These activities will include the installation of temporary monitoring well clusters and on-site analysis of soil and groundwater samples.

In the northern AOC, temporary wells will be installed on the both the Onslow County (northeast) side and Activity (southwest) side of Brinson Creek. On the Onslow County (northeast) side of Brinson Creek, two, two-wells clusters will be installed. A cluster of this side of Brinson Creek will consist of a shallow and an intermediate well. The locations of these clusters are shown in Figure 1. On the Activity (southwest) side of Brinson Creek, 10, three well clusters will be installed. A cluster on this side of Brinson Creek will consist of a shallow, semi-shallow and intermediate well. The locations of these clusters are shown in Figure 2. Groundwater and soil samples collected from wells installed on both sides of Brinson Creek will be analyzed for solvent and fuel-related contaminants.

In the southern AOC, 10, two-well clusters will be installed. A cluster in this area will consist of a shallow and/an intermediate well. The locations of the first five well clusters to be installed in the southern AOC are shown in Figure 1. The locations of the remaining well clusters will be based on the levels of contamination detected in the initial five-well installation and are not shown in Figure 1.

#### 5.3.2.1 Groundwater Sample Screening

Temporary monitoring wells were selected as the screening method for both AOCs to limit the installation of a large number of permanent wells. A large number of permanent wells in the northern AOC could potentially impact the performance of the IAS pilot test and are more costly than temporary wells. In the southern AOC, the temporary wells will be used to establish the location of a limited number of permanent wells.

The objectives of the groundwater screening activities are as follows:

- Provide a detailed vertical profile of solvent-related and BTEX groundwater contamination and subsurface geology in the immediate vicinity of the in-situ air sparging pilot study (northern AOC).
- Determine if Brinson Creek is acting as a barrier to fuel and solvent-related groundwater contamination migrating off-site onto Onslow County property (northern AOC).
- Define the horizontal extent of solvent-related groundwater contamination in the upper portion of the surficial aquifer in the vicinity of Buildings TC470 and TC572 (southern AOC).
- Define the horizontal extent of solvent-related groundwater contamination in the lower portion of the surficial aquifer between Fifth and Seventh Street (southern AOC).
- Provide sufficient data to effectively locate permanent monitoring wells (southern AOC).

*Northern AOC*

To accomplish the objectives for the northern AOC, a total of 34 temporary wells will be installed. On the Activity (southwest) side of Brinson Creek three well clusters will be installed at 10 locations (30 wells, 35TW-16A,B,C through 35TW-25A,B,C) in the vicinity of existing monitoring well clusters 35MW-17, 35MW-18 ans 35MW-19 (see Figure 2). Well clusters in this area will consist of a shallow well screened across the water table (total depth approximately 5-10 feet below ground surface (bgs), a semi-shallow well screened midway between the confining layer and the water table (total depth approximately 20-25 feet bgs), and an intermediate well screened on top of the confining layer in the lower portion of the surficial aquifer (total depth approximately 35-40 feet bgs).

On the Onslow County (northeast) side of Brinson Creek, two-well clusters will be installed at two locations ( four wells, 35TW-26A,B and 35TW-27A,B). These wells will be located opposite of existing well clusters 35MW-23 and 35MW-36, respectively, that are located on the Activity (southwest) side of Brinson Creek (see Figure 1). Well clusters in this area will consist of a shallow and an intermediate well as described in the previous paragraph.

Shallow wells will be designated with an "A" (e.g., 35TW-16A); semi-shallow wells will be designated with a "C" (e.g., 35TW-16C); and intermediate wells will be designated with a "B" (e.g.,35TW-16B). The proposed temporary shallow wells include 35TW-16A through -27A. The proposed temporary semi-shallow wells include 35TW-16C through -25C. The proposed temporary intermediate wells include 35TW-16B through -27B. Split-spoon soil samples will be collected continuously to depth from all intermediate borings for the purpose of geological identification and description. Temporary well installation and abandonment procedures are included in Section 5.2.1 of the SAP.

Groundwater samples collected from the northern AOC temporary wells will be analyzed using an on-site mobile laboratory for benzene, toluene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, methyl tertiary butyl ether (MTBE) and total xylenes using modified EPA methods 8010A/8020A. Designations for these samples are presented in Table 1.

If groundwater sample screening activities conducted on the Onslow County (northeast) side of Brinson Creek indicate the presence of significant levels of VOC contamination, additional temporary well clusters will be installed to define the limits of contamination and to locate permanent monitoring wells. In addition, Baker will perform a field reconnaissance of this area to provide additional information regarding the presence of potential sources of contamination. A review of the available historical aerial photographs and U.S. G. S. maps conducted prior to the preparation of the project Plan Amendments did not identify any potential source of VOC contamination on the Onslow County (northeast) side of Brinson Creek.

*Southern AOC*

To accomplish the objectives of the SGI, a total of 30 temporary monitoring wells will be installed. These wells will be installed as well clusters at 15 locations (35TW-01A, B through 35TW-15A, B) within the limits of the well field (southern AOC) shown in Figure 1. Each cluster will consist of a shallow well screened in the upper portion of the surficial aquifer (total depth approximately 15- 20 feet bgs) and an intermediate well screened in the lower portion of the surficial aquifer (total depth approximately 35- 40 feet bgs). Proposed shallow wells have an "A" in the designation (e.g., 35TW-01A) and the intermediate wells have a "B" in the designation (e.g., 35TW-01B) so as to be consistent with the designations applied to the

temporary wells installed in the northern AOC. The proposed temporary shallow wells will include 35TW-01A through -15A. The proposed intermediate temporary wells will include 35TW-01B through -15B. Split-spoon soil samples will be collected continuously to the water table and then at five-foot intervals to depth, from all intermediate borings for the purpose of geologic identification and description.

Initially, a line of five temporary well clusters (TW-01A, B through TW-05A, B) will be installed along the northside of Sixth Street between "C" Street and "D" Street to establish an east to west baseline of groundwater data that will be used as a reference for the installation of the remaining temporary well clusters. Sixth Street was selected as the location of the baseline because it is halfway between the southern-most solvent-related groundwater contamination detected under the RI and Seventh Street. The location of these well clusters are shown on Figure 1. Sample designations for this AOC are included in Table 2.

The remaining 10 temporary well clusters (35TW-06A, B through 35TW-15A,B) will be located based on the field screening results of groundwater samples obtained from the initial five temporary well clusters. If the on-site analytical results indicated solvent- related contamination is widespread, more than 15 wells may be required. Conversely, if the results indicate the horizontal extent of solvent- related contamination is relatively contained , less than 15 wells may be installed. Contaminated wells will be defined with levels of chlorinated solvents (i.e., trichloroethene, cis-1,2-dichchloroethene, and trans-1,2-dichloroethene) that exceed Federal Maximum Contaminant Levels (MCLs) or North Carolina Groundwater Quality Standards (NCGQS). These halogenated indicator compounds were selected based on the recommendations of the Phase I RI (Baker, 1995) which indicated the need to extend the RI south of Fifth Street to define the extent of solvent-related groundwater contamination in the surficial aquifer.

5.3.2.2 Soil Sample Screening

Soil sample screening will be conducted at the southern AOC only. The objective of this effort is to identify potential sources of solvent-related groundwater contamination. To achieve this, a total of 15 subsurface soil samples will be collected from intermediate temporary well borings (35TW-01B through 35TW-15B) each sample will be obtained from the soil interval located immediately above the groundwater table.

Samples will be analyzed via the on-site mobile laboratory for trichloroethene and cis-and trans-1, 2-dichloroethene. Soil screening sample designations are presented in Table 3.

**5.3.3 Soil Investigation**

5.3.3.2 Subsurface Soil Sampling

Subsurface soil sampling will be conducted in both the northern and southern AOC. The objectives of the subsurface soil sampling are as follows:

- Provide subsurface lithologic data in both the northern and southern AOCs.
- Confirm potential sources of solvent-related groundwater contamination in the southern AOC.
- Identify potential sources of solvent-related groundwater contamination on the northeast side of Brinson Creek.

To accomplish these objectives, subsurface soil samples will be collected from a total of six permanent intermediate well borings. Five of these environmental soil samples will be collected from intermediate monitoring well borings in the southern AOC (35MW-39B -40B, -41B, -42B, and-43B) and one from the intermediate monitoring well boring in the northern AOC (35MW-44B). The locations of the well borings in the southern AOC will be based on the results of temporary well soil and groundwater sample screening activities. The proposed location of 35MW-44B in the northern AOC is shown in Figure 1.

5.3.3.3 Soil Analysis

At each intermediate well boring, one soil sample will be collected from directly above the soil/groundwater interface or from an interval exhibiting Photo Ionization Detector (PID) readings above background levels. These samples will be packed and shipped to Weston Environmental Metrics in University Park, Illinois and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs).

Sample designations for these soil samples are included in Table 4.

### 5.3.4 Groundwater Investigation

This phase of the SGI will include the installation and sampling of 14 new permanent monitoring wells and resampling 12 existing monitoring wells. The new wells will be installed as six two-well clusters (clusters consist of shallow (15-20 bgs), and intermediate (35-40 bgs) wells) and two deep wells (approximate depth 65 feet bgs). Five of the two-well clusters will be installed in the southern AOC and one cluster will be installed in the northern AOC on the northeast side of Brinson Creek. A single deep well will be installed in both the northern and southern AOCs. The two-well clusters will consist of a shallow well screened across the water table and an intermediate well screened in the lower portion of the surficial aquifer immediately above the confining layer. The deep wells will be installed through the confining layer and into the upper portion of the Castle Hayne aquifer. The 12 existing monitoring wells that are to be resampled consist of seven intermediate and five shallow wells located near or within the limits of the existing solvent-related groundwater contamination plume.

5.3.4.1 Shallow Groundwater Wells

The objectives of the groundwater investigation are as follows:

Northern AOC

- Determine if Brinson Creek is acting as a barrier to groundwater contamination migration.

Southern AOC

- Confirm the horizontal limits of the existing solvent-related groundwater contamination in the upper and lower portion of the surficial aquifer between Fifth Street and Seventh Street that were determined during SGI groundwater screening activities.

Previous Study Area and Northern AOC

- Determine if the levels of BTEX, MTBE, and solvent-related groundwater contamination have substantially changed since the previous RI was conducted in the spring of 1994.

To achieve the first objective, one or more permanent well cluster will be installed in the northern AOC on the northeastern side of Brinson Creek. The first permanent well cluster will be installed opposite existing well cluster 35MW-19A, B where solvent-related groundwater contamination exceeded 1,000$\mu$g/L in the lower portion of the surficial aquifier (see Figure 1). These wells will be designated as 35MW-44A, B. Determining if more than one permanent well cluster is needed will be based on the results of field screening of groundwater obtained from two temporary two-well clusters to be installed on the northeast side of Brinson Creek (see Figure 1). Additional permanent well clusters will be installed if significant contamination is encountered in the temporary wells. Their locations will be determined in the field based on these results.

To achieve the second objective, five permanent well clusters will be installed in the southern AOC. The exact locations of these well clusters will be based on the results of the groundwater screening effort. These clusters will be designated as 35MW-39 A, B through 35MW-43 A, B (shallow wells in a cluster are designated with an "A" and intermediate wells with a "B". The proposed permanent shallow wells include 35MW-39A through -43A. Proposed permanent intermediate wells include 35MW-39B through -43B. Permanent well clusters installed in the southern AOC, will be positioned to confirm either the presence or absence of solvent-related groundwater contamination. Three clusters will be located in areas where solvent-related contaminatants are detected during screening activities and two will be positioned just beyond the edge of the plume where no solvent-related groundwater contamination was detected.

At each permanent well cluster location, two, two-inch diameter, schedule 40 PVC wells will be installed. Each cluster will consist of a shallow well screened in the upper portion of the surficial aquifer (total depth approximately 15 - 20 feet bgs) and an intermediate well screened in the lower portion of the surficial aquifer (total depth approximately 40-45 feet bgs). Previous results indicate the water table will be encountered at approximately six to eight feet below the ground surface. The confining layer has been described as a greenish gray silt with some sand, little shells, and trace clay.

Both intermediate and shallow wells will be constructed with schedule 40 PVC casings and No.10 slot, two-inch diameter screens. The shallow wells will have 10-foot screens and the intermediate wells will have five-foot screens. All permanent monitoring wells constructed in the southern AOC will be flush mounted. The permanent wells constructed in the northern AOC will be installed with stick-up (two to three feet) steel casings, locking cap, and protective bollards.

To achieve the third objective, twelve existing monitoring wells (five shallow and seven intermediate) located in the previous study area adjacent to the southern AOC will be resampled to determine if the horizontal limits of the solvent-related contaminant plumes have changed substantially since the previous RI was conducted. To confirm known limits of solvent-related contaminant plumes, eight wells were selected from areas where moderate (50-100 µg/L) to high (1,000 µg/L) contaminant concentrations were previously detected. In addition, four wells were selected from areas where low to non-detectable levels of contamination were previously identified.

The five shallow existing wells that were selected for VOC resampling are located in the following areas:

- Moderate concentration area (50 µg/L) on the east side of F Street in the vicinity of the former ponded water area (35EMW-03).

- Moderate concentration area (50 µg/L) north of building TC474 and east of the former above ground storage tank farm (35MW-19A).

- Moderate concentration area (50 -100 µg/L) in the vicinity of buildings TC473 and TC470 (35MW-32A and 35MW-35A).

- Low concentration area (1 µg/L) east of buildings TC473 and TC470 (35MW-36A).

The seven intermediate wells that were selected for VOC resampling are located in the following areas.

- High concentration area (1,000 µg/L) in the vicinity of buildings TC474, TC473 and TC470 and east of the former above ground storage tank farm (35MW-19B).

- High concentration (1,000 µg/L) area near the intersection of E and Fourth Streets the east side of F Street (35MW-10B).

- Moderate concentration (100 µg/L) in the central area of the halogenated hydrocarbon plume (35MW-14B and 35MW-30B).

- Low concentration (1 µg/L) area that extends southwest from 35MW-25 along the edge of buildings TC341 to Fourth Street and south between buildings G531 and G534 to Fifth Street (MW-09B and MW-37B).

- Low concentration area east of building TC473 (35MW-36B).

Detailed well construction and installation information is included in the final RI/FS Work Plan and SAP (Baker, 1993).

5.3.4.2 Deep Groundwater Wells

A single deep groundwater monitoring well will be installed through the confining layer in the northern AOC. One (or more) deep wells will be installed in the southern AOC if significant contamination is detected in the intermediate zone during groundwater screening activities. The objective of this activity is as follows:

- Determine if solvent-related contamination, has migrated through the confining layer into the Castle Hayne Aquifer.

Deep well 35GWD-07 will be installed in the northern AOC on the northeast side of Brinson Creek adjacent to an area of high solvent-related groundwater contamination located in the vicinity of existing wells 35EMW-07 and 35MW19A, B (see Figure 1).

One or more deep wells will be installed in the southern AOC if contamination is detected in the intermediate zone temporary monitoring wells. For planning purposes one deep well (35GWD-06) was proposed in the southern AOC based on the results of the Phase I RI conducted by Baker in 1994. During this investigation five deep groundwater monitoring wells were installed. Four of these were installed directly through areas where significant levels of VOC contamination were detected in the intermediate and shallow zones. No VOC contaminants were detected in any of the five monitoring wells at levels above regulatory standards.

Detailed well construction information and well installation procedures are provided in the Final RI/FS and SAP (Baker, 1993).

5.3.4.3 Groundwater Sampling and Analysis

Samples collected from all 14 proposed permanent monitoring wells (35MW-39A, B through 35 MW-43A, B, 35GWD-06 and 35GWD-07) and the twelve existing monitoring wells (35EMW-03, 35MW-19A, -32A, -35A, -36A, -19B, -10B, -14B, -30B, -09B, -37B, and -36B) will be analyzed for TCL VOCs and MTBE.

Groundwater sample designations for existing permanent monitoring wells and new monitoring wells are included in Tables 5 and 6, respectively.

All samples will be packed and shipped to Weston Environmental Metrics for analysis. Raw data should be provided by the laboratory within 28 days.

## 5.15 Additional SGI Tasks

### 5.15.1 Data Management

Data Management involves the construction of data summary tables that combine validated data from the SGI with validated data acquired from the previous RI.

### 5.15.2 Photo Album

This task includes the preparation of an album of photographs to document SGI field activities. The photo album will include photo description and slides of each photo. Single copies of the photo album, with original photos and slides will be submitted to LANTDIV and MCB Camp Lejeune Environmental Coordinator.

## 6.0 PROJECT MANAGEMENT AND STAFFING

The proposed management and staffing of the SGI is presented below. The primary participants include:

Mr Matthew D. Bartman, Activity Coordinator
Mr. Daniel Bonk, P.E., Project Manager
Mr. Michael D. Smith, Site Manager/Project Engineer
Mr. Brian Davis, Site Geologist
Mr Thomas C. Fuller, QA/QC
Mr. Ronald Krivan, Health and Safety Officer

All field activities will be directed by Mr. Michael D. Smith, who will act as Site Manager.

Mr. Daniel L. Bonk will have overall responsibility for completing all deliverables. He will report directly to the Activity Coordinator, Mr. Matthew D. Bartman. Mr. Smith will be responsible for overseeing the SGI Report and FS Report/PRAP/ROD. He will report to Mr. Bonk and will be supported by geologist, engineers, biologists, chemists, environmental scientists, data technicians, drafters and clerical personnel, as needed.

Overall field and reporting QA/QC will be the responsibility of Mr. Thomas C. Fuller. Mr. John W. Mentz will provide Program Level technical and administrative support.

## 7.0 SCHEDULE

Figure 3 depicts the proposed schedule for SGI field work and Figure 4 is a revised schedule for all proposed RI/FS and SGI activities at Site 35. It is anticipated that field activities will commence the week of April 8, 1996 and to proceed through May 15, 1996. A summary of project deliverables is provided in Table 7.

## SAMPLING AND ANALYSIS PLAN AMENDMENTS

Included in the following subsections are modifications to the RI/FS SAP submitted to LANTDIV in December 1993.

### 3.1 Soil and Groundwater Screening

Sample screening activities will be conducted in both the northern and southern AOCs. These activities will include the installation of temporary monitoring well clusters and on-site analysis of soil and groundwater samples.

In the northern AOC, temporary wells will be installed on the both the Onslow County (northeast) side and Activity (southwest) side of Brinson Creek. On the Onslow County (northeast) side of Brinson Creek, two, two-wells clusters will be installed. A cluster of this side of Brinson Creek will consist of a shallow and an intermediate well. The locations of these clusters are shown in Figure 1. On the Activity (southwest) side of Brinson Creek, 10, three well clusters will be installed. A cluster on this side of Brinson Creek will consist of a shallow, semi-shallow and intermediate well. The locations of these clusters are shown in Figure 2. Groundwater and soil samples collected from wells installed on both sides of Brinson Creek will be analyzed for solvent and fuel-related contaminants.

In the southern AOC, 10, two-well clusters will be installed. A cluster in this area will consist of a shallow and/an intermediate well. The locations of the first five well clusters to be installed in the southern AOC are shown in Figure 1. The locations of the remaining well clusters will be based on the levels of contamination detected in the initial five-well installation and are not shown in Figure 1.

### 3.1.1 Groundwater Sample Screening

Temporary monitoring wells were selected as the screening method for both AOCs to limit the installation of a large number of permanent wells. A large number of permanent wells in the northern AOC could potentially impact the performance of the IAS pilot test and are more costly than temporary wells. In the southern AOC, the temporary wells will be used to establish the location of a limited number of permanent wells.

The objectives of the groundwater screening activities are as follows:

- Provide a detailed vertical profile of solvent-related and BTEX groundwater contamination and subsurface geology in the immediate vicinity of the in-situ air sparging pilot study (northern AOC).
- Determine if Brinson Creek is acting as a barrier to fuel and solvent-related groundwater contamination migrating off-site onto Onslow County property (northern AOC).
- Define the horizontal extent of solvent-related groundwater contamination in the upper portion of the surficial aquifer in the vicinity of Buildings TC470 and TC572 (southern AOC).
- Define the horizontal extent of solvent-related groundwater contamination in the lower portion of the surficial aquifer between Fifth and Seventh Street (southern AOC).
- Provide sufficient data to effectively locate permanent monitoring wells (southern AOC).

*Northern AOC*

To accomplish the objectives for the northern AOC, a total of 34 temporary wells will be installed. On the Activity (southwest) side of Brinson Creek three well clusters will be installed at 10 locations (30 wells, 35TW-16A,B,C through 35TW-25A,B,C) in the vicinity of existing monitoring well clusters 35MW-17, 35MW-18 ans 35MW-19 (see Figure 2). Well clusters in this area will consist of a shallow well screened across the water table (total depth approximately 5-10 feet below ground surface (bgs), a semi-shallow well screened midway between the confining layer and the water table (total depth approximately 20-25 feet bgs), and an intermediate well screened on top of the confining layer in the lower portion of the surficial aquifer (total depth approximately 35-40 feet bgs).

On the Onslow County (northeast) side of Brinson Creek, two-well clusters will be installed at two locations ( four wells, 35TW-26A,B and 35TW-27A,B). These wells will be located opposite of existing well clusters 35MW-23 and 35MW-36, respectively, that are located on the Activity (southwest) side of Brinson Creek (see Figure 1). Well clusters in this area will consist of a shallow and an intermediate well as described in the previous paragraph.

Shallow wells will be designated with an "A" (e.g., 35TW-16A); semi-shallow wells will be designated with a "C" (e.g., 35TW-16C); and intermediate wells will be designated with a "B" (e.g.,35TW-16B). The proposed temporary shallow wells include 35TW-16A through -27A. The proposed temporary semi-shallow wells include 35TW-16C through -25C. The proposed temporary intermediate wells include 35TW-16B

through -27B. Split-spoon soil samples will be collected continuously to depth from all intermediate borings for the purpose of geological identification and description. Temporary well installation and abandonment procedures are included in Section 5.2.1 of the SAP.

Groundwater samples collected from the northern AOC temporary wells will be analyzed using an on-site mobile laboratory for benzene, toluene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, methyl tertiary butyl ether (MTBE) and total xylenes using modified EPA methods 8010A/8020A. Designations for these samples are presented in Table 1.

If groundwater sample screening activities conducted on the Onslow County (northeast) side of Brinson Creek indicate the presence of significant levels of VOC contamination, additional temporary well clusters will be installed to define the limits of contamination and to locate permanent monitoring wells. In addition, Baker will perform a field reconnaissance of this area to provide additional information regarding the presence of potential sources of contamination. A review of the available historical aerial photographs and U.S. G. S. maps conducted prior to the preparation of the project Plan Amendments did not identify any potential source of VOC contamination on the Onslow County (northeast) side of Brinson Creek.

*Southern AOC*

To accomplish the objectives of the SGI, a total of 30 temporary monitoring wells will be installed. These wells will be installed as well clusters at 15 locations (35TW-01A, B through 35TW-15A, B) within the limits of the well field (southern AOC) shown in Figure 1. Each cluster will consist of a shallow well screened in the upper portion of the surficial aquifer (total depth approximately 15- 20 feet bgs) and an intermediate well screened in the lower portion of the surficial aquifer (total depth approximately 35- 40 feet bgs). Proposed shallow wells have an "A" in the designation (e.g., 35TW-01A) and the intermediate wells have a "B" in the designation (e.g., 35TW-01B) so as to be consistent with the designations applied to the temporary wells installed in the northern AOC. The proposed temporary shallow wells will include 35TW-01A through -15A. The proposed intermediate temporary wells will include 35TW-01B through -15B. Split-spoon soil samples will be collected continuously to the water table and then at five-foot intervals to depth, from all intermediate borings for the purpose of geologic identification and description.

Initially, a line of five temporary well clusters (TW-01A, B through TW-05A, B) will be installed along the northside of Sixth Street between "C" Street and "D" Street to establish an east to west baseline of groundwater data that will be used as a reference for the installation of the remaining temporary well clusters. Sixth Street was selected as the location of the baseline because it is halfway between the southern-most solvent-related groundwater contamination detected under the RI and Seventh Street. The location of these well clusters are shown on Figure 1. Sample designations for this AOC are included in Table 2.

The remaining 10 temporary well clusters (35TW-06A, B through 35TW-15A,B) will be located based on the field screening results of groundwater samples obtained from the initial five temporary well clusters. If the on-site analytical results indicated solvent- related contamination is widespread, more than 15 wells may be required. Conversely, if the results indicate the horizontal extent of solvent- related contamination is relatively contained , less than 15 wells may be installed. Contaminated wells will be defined with levels of chlorinated solvents (i.e., trichloroethene, cis-1,2-dichchloroethene, and trans-1,2-dichloroethene) that exceed Federal Maximum Contaminant Levels (MCLs) or North Carolina Groundwater Quality Standards (NCGQS). These halogenated indicator compounds were selected based on the recommendations of the

Phase I RI (Baker, 1995) which indicated the need to extend the RI south of Fifth Street to define the extent of solvent-related groundwater contamination in the surficial aquifer.

### 3.1.2 Soil Sample Screening

Soil sample screening will be conducted at the southern AOC only. The objective of this effort is to identify potential sources of solvent-related groundwater contamination. To achieve this, a total of 15 subsurface soil samples will be collected from intermediate temporary well borings (35TW-01B through 35TW-15B) each sample will be obtained from the soil interval located immediately above the groundwater table.

Samples will be analyzed via the on-site mobile laboratory for trichloroethene and cis-and trans-1, 2-dichloroethene. Soil screening sample designations are presented in Table 3.

## 3.2 Soil Investigation

### 3.2.2 Subsurface Soil Sampling

Subsurface soil sampling will be conducted in both the northern and southern AOC. The objectives of the subsurface soil sampling are as follows:

- Provide subsurface lithologic data in both the northern and southern AOCs.
- Confirm potential sources of solvent-related groundwater contamination in the southern AOC.
- Identify potential sources of solvent-related groundwater contamination on the northeast side of Brinson Creek.

To accomplish these objectives, subsurface soil samples will be collected from a total of six permanent intermediate well borings. Five of these environmental soil samples will be collected from intermediate monitoring well borings in the southern AOC (35MW-39B -40B, -41B, -42B, and-43B) and one from the intermediate monitoring well boring in the northern AOC (35MW-44B). The locations of the well borings in the southern AOC will be based on the results of temporary well soil and groundwater sample screening activities. The proposed location of 35MW-44B in the northern AOC is shown in Figure 1.

### 3.2.3 Soil Analysis

At each intermediate well boring, one soil sample will be collected from directly above the soil/groundwater interface or from an interval exhibiting Photo Ionization Detector (PID) readings above background levels. These samples will be packed and shipped to Weston Environmental Metrics in University Park, Illinois and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs).

Sample designations for these soil samples are included in Table 4.

## 3.3 Groundwater Investigation

This phase of the SGI will include the installation and sampling of 14 new permanent monitoring wells and resampling 12 existing monitoring wells. The new wells will be installed as six two-well clusters (clusters consist of shallow (15-20 bgs), and intermediate (35-40 bgs) wells) and two deep wells (approximate depth 65 feet bgs). Five of the two-well clusters will be installed in the southern AOC and one cluster will be installed in the northern AOC on the northeast side of Brinson Creek. A single deep well will be installed in both the northern and southern AOCs. The two-well clusters will consist of a shallow well screened across the water table and an intermediate well screened in the lower portion of the surficial aquifer immediately above the confining layer. The deep wells will be installed through the confining layer and into the upper portion of the Castle Hayne aquifer. The 12 existing monitoring wells that are to be resampled consist of seven intermediate and five shallow wells located near or within the limits of the existing solvent-related groundwater contamination plume.

### 3.3.1 Shallow Groundwater Wells

The objectives of the groundwater investigation are as follows:

Northern AOC

- Determine if Brinson Creek is acting as a barrier to groundwater contamination migration.

Southern AOC

- Confirm the horizontal limits of the existing solvent-related groundwater contamination in the upper and lower portion of the surficial aquifer between Fifth Street and Seventh Street that were determined during SGI groundwater screening activities.

Previous Study Area and Northern AOC

- Determine if the levels of BTEX, MTBE, and solvent-related groundwater contamination have substantially changed since the previous RI was conducted in the spring of 1994.

To achieve the first objective, one or more permanent well cluster will be installed in the northern AOC on the northeastern side of Brinson Creek. The first permanent well cluster will be installed opposite existing well cluster 35MW-19A, B where solvent-related groundwater contamination exceeded 1,000$\mu$g/L in the lower portion of the surficial aquifer (see Figure 1). These wells will be designated as 35MW-44A, B. Determining if more than one permanent well cluster is needed will be based on the results of field screening of groundwater obtained from two temporary two-well clusters to be installed on the northeast side of Brinson Creek (see Figure 1). Additional permanent well clusters will be installed if significant contamination is encountered in the temporary wells. Their locations will be determined in the field based on these results.

To achieve the second objective, five permanent well clusters will be installed in the southern AOC. The exact locations of these well clusters will be based on the results of the groundwater screening effort. These clusters will be designated as 35MW-39 A, B through 35MW-43 A, B (shallow wells in a cluster are designated with an "A" and intermediate wells with a "B". The proposed permanent shallow wells include 35MW-39A through -43A. Proposed permanent intermediate wells include 35MW-39B through -43B. Permanent well clusters installed in the southern AOC, will be positioned to confirm either the presence or absence of solvent-related groundwater contamination. Three clusters will be located in areas where

solvent-related contaminants are detected during screening activities and two will be positioned just beyond the edge of the plume where no solvent-related groundwater contamination was detected.

At each permanent well cluster location, two, two-inch diameter, schedule 40 PVC wells will be installed. Each cluster will consist of a shallow well screened in the upper portion of the surficial aquifer (total depth approximately 15 - 20 feet bgs) and an intermediate well screened in the lower portion of the surficial aquifer (total depth approximately 40-45 feet bgs). Previous results indicate the water table will be encountered at approximately six to eight feet below the ground surface. The confining layer has been described as a greenish gray silt with some sand, little shells, and trace clay.

Both intermediate and shallow wells will be constructed with schedule 40 PVC casings and No.10 slot, two-inch diameter screens. The shallow wells will have 10-foot screens and the intermediate wells will have five-foot screens. All permanent monitoring wells constructed in the southern AOC will be flush mounted. The permanent wells constructed in the northern AOC will be installed with stick-up (two to three feet) steel casings, locking cap, and protective bollards.

To achieve the third objective, twelve existing monitoring wells (five shallow and seven intermediate) located in the previous study area adjacent to the southern AOC will be resampled to determine if the horizontal limits of the solvent-related contaminant plumes have changed substantially since the previous RI was conducted. To confirm known limits of solvent-related contaminant plumes, eight wells were selected from areas where moderate (50-100 µg/L) to high (1,000 µg/L) contaminant concentrations were previously detected. In addition, four wells were selected from areas where low to non-detectable levels of contamination were previously identified.

The five shallow existing wells that were selected for VOC resampling are located in the following areas:

- Moderate concentration area (50 µg/L) on the east side of F Street in the vicinity of the former ponded water area (35EMW-03).
- Moderate concentration area (50 µg/L) north of building TC474 and east of the former above ground storage tank farm (35MW-19A).
- Moderate concentration area (50 -100 µg/L) in the vicinity of buildings TC473 and TC470 (35MW-32A and 35MW-35A).
- Low concentration area (1 µg/L) east of buildings TC473 and TC470 (35MW-36A).

The seven intermediate wells that were selected for VOC resampling are located in the following areas.

- High concentration area (1,000 µg/L) in the vicinity of buildings TC474, TC473 and TC470 and east of the former above ground storage tank farm (35MW-19B).
- High concentration (1,000 µg/L) area near the intersection of E and Fourth Streets the east side of F Street (35MW-10B).
- Moderate concentration (100 µg/L) in the central area of the halogenated hydrocarbon plume (35MW-14B and 35MW-30B).

- Low concentration (1 µg/L) area that extends southwest from 35MW-25 along the edge of buildings TC341 to Fourth Street and south between buildings G531 and G534 to Fifth Street (MW-09B and MW-37B).

- Low concentration area east of building TC473 (35MW-36B).

Detailed well construction and installation information is included in the final RI/FS Work Plan and SAP (Baker, 1993).

### 3.3.2 Deep Groundwater Wells

A single deep groundwater monitoring well will be installed through the confining layer in the northern AOC. One (or more) deep wells will be installed in the southern AOC if significant contamination is detected in the intermediate zone during groundwater screening activities. The objective of this activity is as follows:

- Determine if solvent-related contamination, has migrated through the confining layer into the Castle Hayne Aquifer.

Deep well 35GWD-07 will be installed in the northern AOC on the northeast side of Brinson Creek adjacent to an area of high solvent-related groundwater contamination located in the vicinity of existing wells 35EMW-07 and 35MW19A, B (see Figure 1).

One or more deep wells will be installed in the southern AOC if contamination is detected in the intermediate zone temporary monitoring wells. For planning purposes one deep well (35GWD-06) was proposed in the southern AOC based on the results of the Phase I RI conducted by Baker in 1994. During this investigation five deep groundwater monitoring wells were installed. Three of these were installed directly through areas where significant levels of VOC contamination were detected in the intermediate and shallow zones. No VOC contaminants were detected in any of the five monitoring wells at levels above regulatory standards.

Detailed well construction information and well installation procedures are provided in the Final RI/FS and SAP (Baker, 1993).

### 3.3.3 Groundwater Sampling and Analysis

Samples collected from all 14 proposed permanent monitoring wells (35MW-39A, B through 35 MW-43A, B, 35GWD-06 and 35GWD-07) and the twelve existing monitoring wells (35EMW-03, 35MW-19A, -32A, -35A, -36A, -19B, -10B, -14B, -30B, -09B, -37B, and -36B) will be analyzed for TCL VOCs and MTBE.

Groundwater sample designations for existing permanent monitoring wells and new monitoring wells are included in Tables 5 and 6, respectively.

All samples will be packed and shipped to Weston Environmental Metrics for analysis. Raw data should be provided by the laboratory within 28 days.

### 3.3.4 Water Level Measurements

During the SGI a minimum of two rounds of static water levels will be collected from all existing and newly installed permanent monitoring wells.

## 5.2 Monitoring Well Installation and Well Development

Permanent shallow and deep wells and temporary shallow wells will be installed under this SGI. Temporary monitoring well installation and well development procedures not discussed in the original Baker FSAP will be presented in this section.

### 5.2.1 Temporary Well Installation

Temporary well construction should follow the procedures outlined for the installation of permanent wells outlined in Section 5.2 Well Installation and Development of the Baker FSAP with the following exceptions:

Temporary well clusters will be installed in the northern and southern AOCs. The construction of these clusters is somewhat unique and is based on the goals of the sampling activity. The objective of the sampling effort in the northern AOC was to provide a detailed profile of solvent-related and BTEX groundwater contamination in a well defined area. As such, clusters installed in the north will consist of a shallow well (5-10 feet bgs) screened across the water table, an intermediate well (35-40 feet bgs) seated in the confining layer and screened across the lower portion of the surficial aquifer, and a semi-shallow well (15-20 feet bgs) screened between the shallow and the intermediate wells. All of these wells will be constructed with five feet of screen. Splits spoons will be continuously collected to depth during the advancement of the intermediate well boring.

In the Southern AOC the objective was to define the horizontal extent of solvent-related contamination in the upper and lower portion of the surficial aquifer over a broad area and duplicate existing permanent well cluster construction. As such clusters will consist of a shallow well (15-20 bgs) screened across the water table with a 10 foot screen and an intermediate well (40-45 feet bgs) seated in the confining layer with a five foot screen. If the confining layer is at a depth of less than 15 feet bgs and the aquifer thickness is less than 10 feet thick, only one intermediate well will be installed. Splits spoons will be collected continuously to the water table and at 5 foot intervals thereafter to depth during the advancement of the intermediate well boring.

All temporary wells will be constructed with 1-inch diameter (ID) schedule 40 PVC casing and No. 10 slot (0.01-inch) screens.

- Temporary wells will be installed in borehole advanced by a 3 1/4-inch I.D. auger or equivalent. The well will be installed through the auger with a 2 inch-diameter well sock. As the augers are removed the borehole will be allowed to collapse around the well. If collapse is not complete No. 1 silica and will be placed in the borehole to approximately two feet above the screen. No grout seal or grout will be used unless a well is not sampled on the day it is installed.

- Development of the temporary wells is not required. However, the same volume of water introduced into the borehole during construction to prevent heaving sands must be removed prior to purging and sampling.

- Temporary wells will be removed manually and any remaining open boreholes will be backfilled with bentonite.

### 5.2.2 Well Development

All permanent shallow and intermediate groundwater monitoring wells will be developed using a centrifugal pump and check valve or inertial pumping system (Wattera). All deep wells will be developed with the Wattera system. As the well is opened HNU readings will be taken. In addition well depths and water levels will be measured and well volumes calculated. The check valve is secured to the end of a length of flex hose that is inserted into the well and is secured to a pump to the bottom of the well. All flex hose will be decontaminated with a damp paper towel prior to any insertion into the well. The flex hose may be secured with radiator clamps. If used radiator clamps should be wrapped with wells sock to limit any scoring of the inside of the well. The pump may then be manually primed by thrusting the flex hose up and down in the well. The discharge nozzle should be equipped with a valve to control flow. The valve and accelerator should be adjusted to establish constant flow. Once started the pump should run for 10 to 15 minutes to pump out any stagnant water. The flex hose should then be removed and a surge block secured to the flex hose. To flush accumulated sediment out of the sand pack the well should be surged along the entire length of the screen in approximately two foot intervals. Surging should be performed for approximately 20 minutes. After surging is completed the check valve should be reinserted into the well and the pump restarted. Pumping should continue until PH, temperature, and conductivity readings have stabilized (three successive readings varying no more than 10 percent) and turbidity is less than 10 NTUs. Total pumping time should not exceed 3 hours.

### 5.3 Groundwater Sample Collection

To reduce or eliminate sediments in groundwater samples and greatly reduce the possibility of cross contamination between sampling points, a peristaltic pump will be used to collect ground water samples from all permanent groundwater monitoring wells. A peristaltic pump can provide a maximum lift of approximately 25 feet. Although there are deep and intermediate wells that will be sampled the static water level is only six to eight feet below ground surface. Typically, Baker peristaltic pumps do not have power sources and must be run off of a vehicle battery.

Prior to collecting a sample, a minimum of three to five well volumes should be removed. A conductivity, pH, temperature, and turbidity readings will be taken from each well volume. Purging may be concluded and a sample collected when three to five well volumes have been removed, and three successive readings of conductivity, pH, and temperature vary no more than 10 percent.

### 5.8 Surveying

Survey data will be provided for roads, major building foundations, tree lines and monitoring well locations (temporary and permanent) in the AOCs not surveyed under the previous RI or RAC Design for Site 35 Groundwater (CTO-0323). Survey points will include a latitude coordinate, longitude coordinate and an elevation expressed in feet of mean sea level. The vertical accuracy will be within .1 feet and horizontal accuracy within .1 feet, and horizontal will be within .1 feet. In addition all points will be referenced to the North Carolina State Plain Coordinate System (NCSPCS). A sufficient number of points will be established to tie new survey data with previous surveys conducted at Site 35.

## 5.9 Handling of Site Investigation Generated Waste

### 5.9.3 Designation of Potentially Hazardous and Nonhazardous IDW

5.9.3.1 Drill Cuttings

All drill cuttings will be containerized in a roll-off box pending analytical results that determine whether or not the material is hazardous or non-hazardous. Only non-hazardous cuttings will be spread out on the ground.

5.9.3.2 Monitoring Well Development and Purge Water

All development or purge water generated by the SGI will be containerized in a 5,000-gallon tanker or 1,000-gallon polyethylene storage tanks.

5.9.3.3 Decontamination Fluids

All equipment and personal decontamination fluids generated by the SGI will be containerized in a 55 gallon drum.

### 5.9.8 Disposal of Contaminated Materials

A single composite of drill cuttings will be collected from the roll-off box and analyzed in accordance with TCLP and RCRA Hazardous Waste Characteristics, in order to assess disposal options.

A single sample will be collected from the 5,000-gallon tanker or 1,000-gallon polyethylene tanks used to store liquid IDW during the SGI. The sample will be analyzed for TCL volatiles, semivolatiles, pesticides and PCBs, and inorganics. Based on the analytical results and the prior approval of LANTDIV and MCB Camp Lejeune, liquid IDW will be transported to an off-base facility for treatment and disposal, transported to the Hadnot Point Industrial Area Groundwater Treatment Plants for treatment and disposal, or discharged on site.

Sample designations for IDW samples are presented on Table 8.

Baker appreciates the continued opportunity to serve the Navy. if you have any question please do not hesitate to contact Mr. Matthew Bartman at (412) 269-2053 or me at (412) 269-2063.

Sincerely,

BAKER ENVIRONMENTAL, INC.

Daniel L. Bonk, P.E.
Project Manager

DLB/lq

cc: Mr. Neal Paul, MCB Camp Lejeune
Ms. Gena Townsend, USEPA
Mr. Patrick Watters, NC DEHNR
Mr. Jim Dunn, OHM
Ms. Lee Anne Rapp, P.E., Code 18312 (w/o attachments)
Ms. Beth Collier, Code 02115 (w/o attachments)

## TABLE 1

## SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)
## CAMP GEIGER AREA FUEL FARM
## GROUNDWATER SAMPLING IDENTIFICATION NUMBERS FOR TEMPORARY WELLS
## IN NORTHERN AREA OF CONCERN
## CONTRACT TASK ORDER 0232

| | ANALYSIS REQUESTED | | COMMENTS | |
|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID | NORTHERN[2] AOC CONTAMINANTS | TURN AROUND | Lab[3] |
| TEMPORARY WELLS (PROPOSED)[1] NORTHERN AOC | 35-TW16A-04 | X | 24 hour | Microseeps |
| | 35-TW16B-04 | X | 24 hour | Microseeps |
| | 35-TW16C-04 | X | 24 hour | Microseeps |
| | 35-TW17A-04 | X | 24 hour | Microseeps |
| | 35-TW17B-04 | X | 24 hour | Microseeps |
| | 35-TW17C-04 | X | 24 hour | Microseeps |
| | 35-TW18A-04 | X | 24 hour | Microseeps |
| | 35-TW18B-04 | X | 24 hour | Microseeps |
| | 35-TW18C-04 | X | 24 hour | Microseeps |
| | 35-TW19A-04 | X | 24 hour | Microseeps |
| | 35-TW19B-04 | X | 24 hour | Microseeps |
| | 35-TW19C-04 | X | 24 hour | Microseeps |
| | 35-TW20A-04 | X | 24 hour | Microseeps |
| | 35-TW20B-04 | X | 24 hour | Microseeps |
| | 35-TW20C-04 | X | 24 hour | Microseeps |
| | 35-TW21A-04 | X | 24 hour | Microseeps |
| | 35-TW21B-04 | X | 24 hour | Microseeps |
| | 35-TW21C-04 | X | 24 hour | Microseeps |
| | 35-TW22A-04 | X | 24 hour | Microseeps |
| | 35-TW22B-04 | X | 24 hour | Microseeps |
| | 35-TW22C-04 | X | 24 hour | Microseeps |
| | 35-TW23A-04 | X | 24 hour | Microseeps |
| | 35-TW23B-04 | X | 24 hour | Microseeps |
| | 35-TW23C-04 | X | 24 hour | Microseeps |
| | 35-TW24A-04 | X | 24 hour | Microseeps |
| | 35-TW24B-04 | X | 24 hour | Microseeps |
| | 35-TW24C-04 | X | 24 hour | Microseeps |
| | 35-TW25A-04 | X | 24 hour | Microseeps |
| | 35-TW25B-04 | X | 24 hour | Microseeps |
| | 35-TW25C-04 | X | 24 hour | Microseeps |
| | 35-TW26A-04 | X | 24 hour | Microseeps |
| | 35-TW26B-04 | X | 24 hour | Microseeps |
| | 35-TW27A-04 | X | 24 hour | Microseeps |
| | 35-TW27B-04 | X | 24 hour | Microseeps |
| TOTAL ANALYSES | | 34 | | |

Notes:

(1) Temporary well sampling is a screening tool. No duplicates or MS/MSD will be collected and no trip blanks will be sent.

(2) The following analyses will be performed on groundwater samples collected from the northern AOC: benzene, toluene, trichloroethene, cis-1,2-dichloroethene, trans-1,2,-dichloroethene, ethylbenzene, methyltertiary butyl ether and xylenes. These analyses will be performed using modified EPA methods 8010A/8020A.

(3) Microseeps Inc. from Pittsburgh, PA is providing on-site lab services.

**TABLE 2**

**SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)**
**CAMP GEIGER AREA FUEL FARM**
**GROUNDWATER SAMPLING IDENTIFICATION NUMBERS FOR TEMPORARY WELLS**
**IN SOUTHERN AREA OF CONCERN**
**CONTRACT TASK ORDER 0232**

| | ANALYSIS REQUESTED | | COMMENTS | |
|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID | SOUTHERN[2] AOC CONTAMINANTS | TURN AROUND | Lab[3] |
| TEMPORARY WELLS (PROPOSED)[1] SOUTHERN AOC | 35-TW01A-04 | X | 24 hour | Microseeps |
| | 35-TW01B-04 | X | 24 hour | Microseeps |
| | 35-TW02A-04 | X | 24 hour | Microseeps |
| | 35-TW02B-04 | X | 24 hour | Microseeps |
| | 35-TW03A-04 | X | 24 hour | Microseeps |
| | 35-TW03B-04 | X | 24 hour | Microseeps |
| | 35-TW04A-04 | X | 24 hour | Microseeps |
| | 35-TW04B-04 | X | 24 hour | Microseeps |
| | 35-TW05A-04 | X | 24 hour | Microseeps |
| | 35-TW05B-04 | X | 24 hour | Microseeps |
| | 35-TW06A-04 | X | 24 hour | Microseeps |
| | 35-TW06B-04 | X | 24 hour | Microseeps |
| | 35-TW07A-04 | X | 24 hour | Microseeps |
| | 35-TW07B-04 | X | 24 hour | Microseeps |
| | 35-TW08A-04 | X | 24 hour | Microseeps |
| | 35-TW08B-04 | X | 24 hour | Microseeps |
| | 35-TW09A-04 | X | 24 hour | Microseeps |
| | 35-TW09B-04 | X | 24 hour | Microseeps |
| | 35-TW10A-04 | X | 24 hour | Microseeps |
| | 35-TW10B-04 | X | 24 hour | Microseeps |
| | 35-TW11A-04 | X | 24 hour | Microseeps |
| | 35-TW11B-04 | X | 24 hour | Microseeps |
| | 35-TW12A-04 | X | 24 hour | Microseeps |
| | 35-TW12B-04 | X | 24 hour | Microseeps |
| | 35-TW13A-04 | X | 24 hour | Microseeps |
| | 35-TW13B-04 | X | 24 hour | Microseeps |
| | 35-TW14A-04 | X | 24 hour | Microseeps |
| | 35-TW14B-04 | X | 24 hour | Microseeps |
| | 35-TW15A-04 | X | 24 hour | Microseeps |
| | 35-TW15B-04 | X | 24 hour | Microseeps |
| TOTAL ANALYSES | | 30 | | |

Notes:

(1) Temporary well sampling is a screening tool. No duplicates or MS/MSDs will be collected and no trip blanks will be sent.

(2) The following analyses will be performed on groundwater samples collected from the southern AOC: trichloroethene, cis-1,2-dichloroethene, and trans-1,2,-dichloroethene. These analyses will be performed using modified EPA methods 8010A.

(3) Microseeps Inc. from Pittsburgh, PA is providing on-site lab services.

TABLE 3

SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)
CAMP GEIGER AREA FUEL FARM
SOIL SAMPLING IDENTIFICATION NUMBERS FOR TEMPORARY WELL BORINGS
IN SOUTHERN AREA OF CONCERN
CONTRACT TASK ORDER 0232

| | ANALYSIS REQUESTED | | COMMENTS | |
|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID[1] | SOUTHERN AOC CONTAMINANTS[2] | TURN AROUND | LAB |
| TEMPORARY WELL SOIL BORINGS (PROPOSED) SOUTHERN AOC | 35-TW01B-XX | X | 24 hr | Microseeps |
| | 35-TW02B-XX | X | 24 hr | Microseeps |
| | 35-TW03B-XX | X | 24 hr | Microseeps |
| | 35-TW04B-XX | X | 24 hr | Microseeps |
| | 35-TW05B-XX | X | 24 hr | Microseeps |
| | 35-TW06B-XX | X | 24 hr | Microseeps |
| | 35-TW07B-XX | X | 24 hr | Microseeps |
| | 35-TW08B-XX | X | 24 hr | Microseeps |
| | 35-TW09B-XX | X | 24 hr | Microseeps |
| | 35-TW10B-XX | X | 24 hr | Microseeps |
| | 35-TW11B-XX | X | 24 hr | Microseeps |
| | 35-TW12B-XX | X | 24 hr | Microseeps |
| | 35-TW13B-XX | X | 24 hr | Microseeps |
| | 35-TW14B-XX | X | 24 hr | Microseeps |
| | 35-TW15B-XX | X | 24 hr | Microseeps |
| | 35-TW26B-XX | X | 24 hr | Microseeps |
| | 35-TW27B-XX | X | 24 hr | Microseeps |
| TOTAL ANALYSES | | 15 | | |

Notes:

(1) The XX in the sample ID indicates the interval where the soil sample was collected. The interval will be based on site conditions.

(2) The following analyses will be performed on soil samples collected from the southern AOC: trichloroethene, cis-1,2,-dichloroethene, trans-1,2,-dichloroethene. These analyses will be performed using modified EPA methods 8010A.

TABLE 4

**SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)**
**CAMP GEIGER AREA FUEL FARM**
**SOIL SAMPLING IDENTIFICATION NUMBERS FOR PERMANENT WELL BORINGS**
**CONTRACT TASK ORDER 0232**

| | ANALYSIS REQUESTED | | QA/QC | | COMMENTS | |
|---|---|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID[1] | TCL VOA[2] | DUPLICATE [3] | MS/MSD | TURN AROUND | LAB[4] |
| PERMANENT WELL BORINGS SOUTHERN AOC | 35-MW39B-XX | X | | | 28 day | Weston |
| | 35-MW40B-XX | X | | | 28 day | Weston |
| | 35-MW41B-XX | X | | | 28 day | Weston |
| | 35-MW42B-XX | X | | | 28 day | Weston |
| | 35-MW43B-XX | X | | | 28 day | Weston |
| | 35-MW43B-XXD | X | | | 28 day | Weston |
| PERMANENT WELL BORING NORTHERN AOC | 35-MW44B-XX | X | X | X | 28 day | Weston |
| TOTAL ANALYSES | | 7 | 1 | 1 | | |

Notes:

(1) The XX in the sample ID indicates the interval where the soil sample will be collected. This interval will be based on site conditions.
(2) Level IV data quality will be provided by the lab. However, a Level III data package will be delivered.
(3) Duplicates have been arbitrarily assigned and can be changed.
(4) Weston Environmental Metrics.

TABLE 5

**SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)**
**CAMP GEIGER AREA FUEL FARM**
**GROUNDWATER SAMPLING IDENTIFICATION NUMBERS FOR RESAMPLING OF EXISTING PERMANENT WELLS**
**CONTRACT TASK ORDER 0232**

| | ANALYSIS REQUESTED | | | QA/QC | | COMMENTS | |
|---|---|---|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID | TCL VOA[1] | MTBE[2] | DUPLICATE[3] | MS/MSD | TURN AROUND | LAB[4] |
| PERMANENT WELLS (EXISTING) | 35-EMW03-04 | X | X | | | 28 day | Weston |
| | 35-MW09B-04 | X | X | | | 28 day | Weston |
| | 35-MW10B-04 | X | X | | | 28 day | Weston |
| | 35-MW10B-04D | X | X | X | | 28 day | Weston |
| | 35-MW14B-04 | X | X | | | 28 day | Weston |
| | 35-MW19A-04 | X | X | | | 28 day | Weston |
| | 35-MW19B-04 | X | X | | | 28 day | Weston |
| | 35-MW19B-04D | X | X | X | X | 28 day | Weston |
| | 35-MW30B-04 | X | X | | | 28 day | Weston |
| | 35-MW32A-04 | X | X | | | 28 day | Weston |
| | 35-MW35A-04 | X | X | | | 28 day | Weston |
| | 35-MW36A-04 | X | X | | | 28 day | Weston |
| | 35-MW36B-04 | X | X | | | 28 day | Weston |
| | 35-MW37B-04 | X | X | | | 28 day | Weston |
| TOTAL ANALYSES | | 14 | 14 | 2 | 1 | | |

Notes:

(1) Level IV data quality will be provided by the Laboratory. However, a Level III data package will be delivered.
(2) MTBE = Methyl Tertiary Butyl Ether
(3) Duplicates have been arbitrarily assigned and can be changed.
(4) Weston Environmental Metrics.

TABLE 6

**SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)**
***CAMP GEIGER AREA FUEL FARM***
**GROUNDWATER SAMPLING IDENTIFICATION NUMBERS FOR SGI PERMANENT WELLS**
**CONTRACT TASK ORDER 0232**

| | ANALYSIS REQUESTED | | | QA/QC | | COMMENTS | |
|---|---|---|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID | TCL VOA[1] | MTBE[2] | DUPLICATE[3] | MS/MSD | TURN AROUND | LAB[4] |
| SOUTHERN STUDY AOC | 35-MW39A-04 | X | X | | | 28 day | Weston |
| | 35-MW39B-04 | X | X | | | 28 day | Weston |
| | 35-MW39B-04D | X | X | X | X | 28 day | Weston |
| | 35-MW40A-04 | X | X | | | 28 day | Weston |
| | 35-MW40B-04 | X | X | | | 28 day | Weston |
| | 35-MW41A-04 | X | X | | | 28 day | Weston |
| | 35-MW41B-04 | X | X | | | 28 day | Weston |
| | 35-MW42A-04 | X | X | | | 28 day | Weston |
| | 35-MW42B-04 | X | X | | | 28 day | Weston |
| | 35-MW43A-04 | X | X | | | 28 day | Weston |
| | 35-MW43B-04 | X | X | | | 28 day | Weston |
| | 35-MW43B-04D | X | X | X | | 28 day | Weston |
| | 35-GWD06-04 | X | X | | | 28 day | Weston |
| NORTHERN STUDY AREA | 35-MW44A-04 | X | X | | | 28 day | Weston |
| | 35-MW44B-04 | X | X | | | 28 day | Weston |
| | 35-GWD07-04 | X | X | | | 28 day | Weston |
| TOTAL ANALYSES | | 16 | 16 | 2 | 1 | | |

Notes:

(1) Level IV data quality will be provided by the lab. However, a Level III data package will be delivered.
(2) MTBE - Methyl Tertiary Butyl Ether
(3) Duplicates have been arbitrarily assigned and can be changed.
(4) Weston Environmental Metrics.

TABLE 7

SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)
CAMP GEIGER AREA FUEL FARM
BAKER PROJECT DELIVERABLES
CONTRACT TASK ORDER 0232

| Project Deliverable | Due Date |
|---|---|
| SGI Meeting | August 8, 1996 |
| Draft SGI Report | September 12, 1996 |
| Draft Final SGI Report | November 11, 1996 |
| Final SGI Report | January 3, 1997 |
| Draft FS/PRAP | November 11, 1996 |
| Draft Final FS/PRAP | January 8, 1997 |
| Final FS/PRAP | February 28, 1997 |
| Draft ROD | January 8, 1997 |
| Draft Final ROD | February 28, 1997 |
| Final ROD | April 20, 1997 |

TABLE 8

**SUPPLEMENTAL GROUNDWATER INVESTIGATION FOR OU NO. 10 (SITE 35)**
**CAMP GEIGER AREA FUEL FARM**
**IDW SAMPLE IDENTIFICATION NUMBERS**
**CONTRACT TASK ORDER 0232**

SOILS

| | ANALYSIS REQUESTED | | | | | | COMMENTS | |
|---|---|---|---|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID | RCRA Characteristics | TCLP VOA | TCLP SVOAs | TCLP Pest/Hebicides | TCLP Metals [2] | TURN AROUND | LAB |
| | 35-IDW-ROB | X | X | X | X | X | 14 day | Weston |
| TOTAL ANALYSES | | 1 | 1 | 1 | 1 | 1 | | |

LIQUID

| | ANALYSIS REQUESTED | | | | | | COMMENTS | |
|---|---|---|---|---|---|---|---|---|
| TYPE/LOCATION | SAMPLE ID | TSS/TDS | TCL VOA | TCL SVOAs | TCL Pest/PCBs | TAL Metals | TURN AROUND | LAB |
| | 35-IDW-TNK | X | X | X | X | X | 14 day | Weston |
| TOTAL ANALYSES | | 1 | 1 | 1 | 1 | 1 | | |

Notes:

(1) RCRA Hazard Characteristics

FIGURE 3
PROPOSED SCHEDULE FOR SGI FIELD WORK
SITE 35 (OPERABLE UNIT 10), MCB, CAMP LEJEUNE

| Task Name | Dur. | Start | Finish |
|---|---|---|---|
| MOBILIZATION | 6d | 3/23/96 | 3/29/96 |
| TEMPORARY WELL INSTALLATION | 0d | 3/23/96 | 3/23/96 |
| SAOC | 8ed | 4/8/96 | 4/16/96 |
| NAOC | 5ed | 4/16/96 | 4/21/96 |
| PERMANENT WELL INSTALLATION | 10ed | 4/25/96 | 5/5/96 |
| WELL DEVELOPMENT | 6ed | 4/27/96 | 5/3/96 |
| PERMANENT WELL SAMPLING | 5ed | 5/9/96 | 5/14/96 |
| SLUG TEST | 1ed | 5/14/96 | 5/15/96 |
| IDW SAMPLING | 1ed | 5/14/96 | 5/15/96 |
| SITE SURVEY | 8ed | 5/8/96 | 5/16/96 |
| DEMOBILIZATION | 1d | 5/15/96 | 5/15/96 |