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Final

Site Specific Work Plans Records Search and RCRA Facility Investigation Addendum For SWMU 360

Marine Corps Base Camp Lejeune
Jacksonville, North Carolina

NAVFAC
Naval Facilities Engineering Command

Prepared for

Department of the Navy

Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

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December 2005

Prepared by

CH2MHILL

Site Specific Field Sampling and Analysis Plan
Records Search and
RCRA Facility Investigation Addendum
SWMU 360

Marine Corps Base
Camp Lejeune, North Carolina

Contract Task Order 0100

November 2005

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Under the

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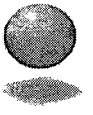

CH2MHILL

Charlotte, North Carolina

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List of Acronyms And Abbreviations

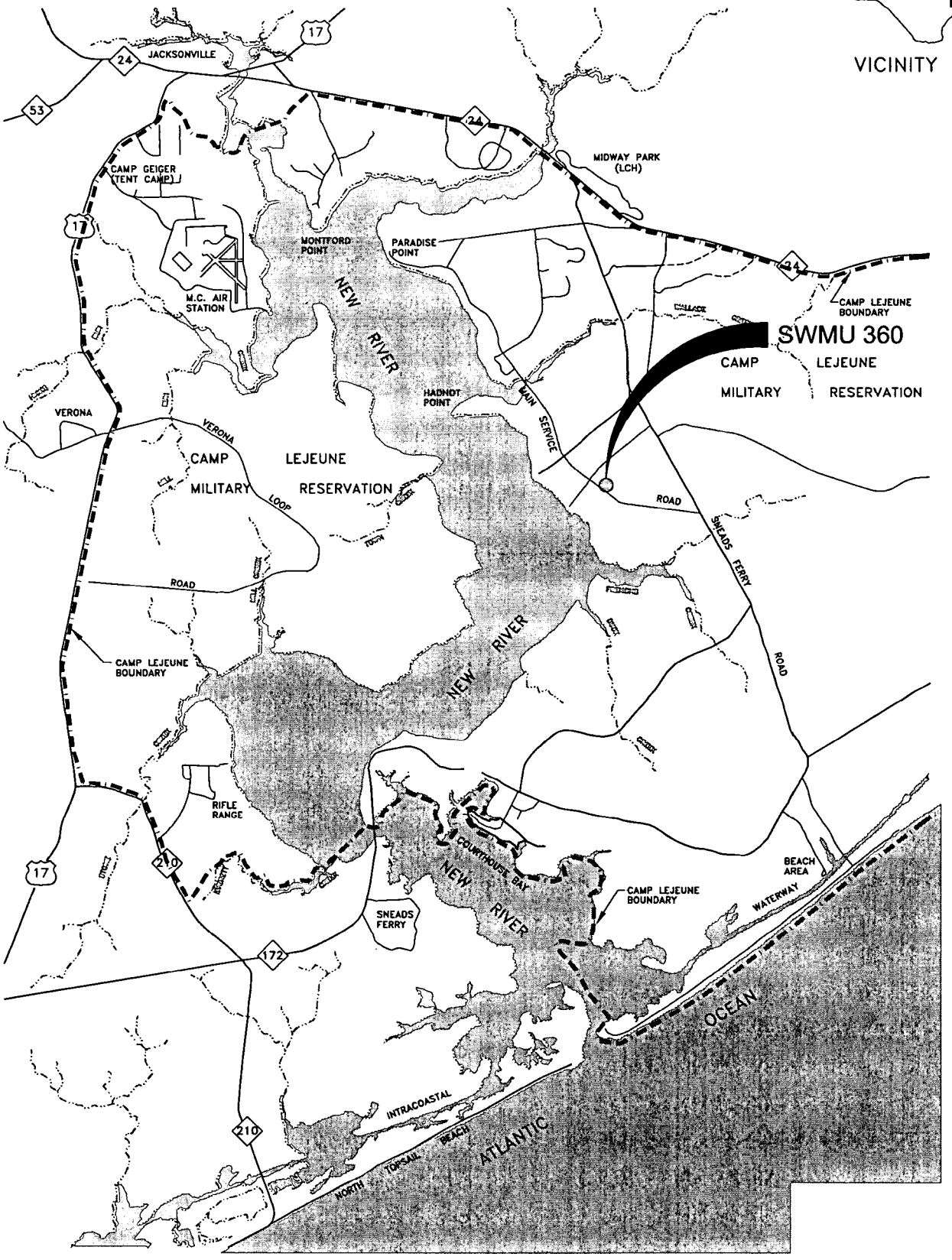
ASTM	American Society of Testing and Materials
Baker	Baker Environmental, Inc.
bgs	Below Ground Surface
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CSI	Confirmatory Sampling Investigation
CTO	Contract Task Order
DoN	United States Department of the Navy
DOT	Department of Transportation
DPT	Direct Push Technology
DQO	Data Quality Objective
EPA	Environmental Protection Agency
FID	Flame ionization detector
Ft	Foot or Feet
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
I.D.	Inside Diameter
IDW	Investigative-Derived Waste
MCB	Marine Corps Base
MSL	Mean Sea Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAVFAC	Atlantic Division, Naval Facilities Engineering Command
NCDENR	North Carolina Department of Environment and Natural Resources
NEESA	Naval Energy and Environmental Support Activity
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
PCE	Tetrachloroethene
PRG	Preliminary Remediation Goals
pH	Hydrogen Ion Concentration of a Solution
PID	Photo-ionization detector
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/ Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

SAR	SWMU Assessment Report
SVOC	Semi-Volatile Organic Compound
SWMU	Solid Waste Management Unit
TOC	Total organic carbon
TOD	Total oxidant demand
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
UST	Under ground storage tank
VOCs	Volatile Organic Compounds
WP	Work Plan
WQP	Water Quality Parameters

1.0 Introduction

This Site-Specific Work Plan presents the strategy and technical approach for an amended Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at Solid Waste Management Unit (SWMU) 360 - Building 1817 Underground Storage Tank (UST) at Marine Corps Base (MCB) Camp Lejeune, North Carolina (the Base). A general location/Index map of the Base showing the location of SWMU 360 is provided as **Figure 1-1**. This Work Plan also discusses the approach to conducting the SWMU assessment procedure at 56 new sites, all septic systems. This will include record review of the 56 new sites to determine if RCRA activities are warranted, and preparing a SWMU Assessment Report (SAR) on the new SWMUs in accordance with MCB, Camp Lejeune's Part B RCRA permit.

This Site-Specific Work Plan was prepared by CH2M HILL under Contract Task Order (CTO) 0100 of the Department of the Navy's (DoN's) Comprehensive Long-Term Environmental Action Navy (CLEAN) Program. CH2M HILL is responsible for implementation of this project. It should be noted that this Site-Specific Work Plan is to be used in conjunction with the Master Project Plans, which include the Master Work Plan, Master Quality Assurance Project Plan (QAPP), and Master Health and Safety Plan (HASP) (CH2M HILL, 2005). The Master Project Plans will be referenced to the greatest extent possible.



NOT TO SCALE

FIGURE 1-1
MCB CAMP LEJEUNE GENERAL LOCATION MAP
AMENDED RCRA FACILITY INVESTIGATION (RFI)
SMWU 360 CTO -0100
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: MCB CAMP LEJEUNE, 2000.

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EBL\NAVY CLEAN\CAMPLEJCADD\SWMU 360\CADD\Figure1-1.dwg

2.0 Background Information

Background information for the Base, including location, topography, geology, and regulatory history, is presented in the Master Work Plan and is not repeated herein. Site-specific background information for SWMU 360 is presented below. Background information for the 56 new sites (septic systems) is currently unknown.

2.1 SWMU 360 Building 1817 UST

Building 1817 is located in the Hadnot Point Industrial Area between Duncan Street and "O" Street and one block northeast of McHugh Boulevard. SWMU 360 was a former 300-gallon waste oil UST near Building 1817. The UST was removed in 1997 and samples of the soil confirmed that a petroleum release had occurred. The actual SWMU is located in the eastern portion of the compound, and a new wash pad was built near the UST excavation area. The compound is fenced in and has limited access (Baker Environmental, 2005). Figure 2-1 shows the layout of the SWMU area and monitoring wells in the vicinity.

2.1.1 Site History and Past Investigations

A petroleum release was confirmed as a result of the UST closure investigation in 1997. Catlin/Law Engineers and Scientists performed a limited site assessment, which included installing monitoring well 1817MW01 within the former UST excavation. Upon discovery of elevated concentrations of chlorinated compounds in the soil and groundwater, the site was removed from the UST program and included in the Confirmatory Sampling Investigation (CSI) under RCRA. The CSI conducted in 2002 included surface and subsurface soil sampling and the installation and sampling of four temporary wells. The CSI identified the following constituents of potential concern (COPCs) in soil:

- Volatile organic compounds (VOCs) - bromoform, methylene chloride, and tetrachloroethene (PCE)
- Pesticides - dieldrin
- Metals - arsenic

The following COPCs were identified in groundwater at SWMU 360:

- VOCs – cis-1,2-dichloroethene, PCE, and trichloroethene (TCE)
- Semivolatile organic compounds (SVOCs) – 4-methylphenol and acetophenone
- Pesticides – DDE, DDT, aldrin, alpha-chlordane, gamma-chlordane, heptachlor, heptachlor epoxide, alpha-BHC, and beta-BHC

Because the COPC concentrations exceeded the screening criteria, an RFI was recommended at the conclusion of the CSI.

In 2003, Michael Baker Jr., Inc. (Baker) conducted the initial RFI at SWMU 360. Surface and subsurface soil samples and groundwater samples were collected using direct push technology (DPT). Permanent monitoring wells were installed and sampled. Samples were analyzed for VOCs, SVOCs, pesticides, and metals. The RFI data narrowed down the list of soil COPCs to PCE

in subsurface soil, limited to the area in the northeast corner of the compound associated with Building 1817. Figure 2-2 shows the PCE concentrations in soil.

Pesticide and SVOC contamination found in the CSI was not confirmed in the RFI. It was suggested that except for the chlorinated solvents, the COPCs detected during the CSI may have been a result of turbidity within the temporary wells. PCE and TCE plumes were defined in the horizontal side gradient directions, but the up gradient, down-gradient, and vertical extent of groundwater contamination was not defined. In addition, evidence of a separate groundwater plume and up-gradient source of TCE contamination, and a side-gradient source of PCE contamination were noted in the RFI.

TCE concentrations at the site are generally an order of magnitude less than PCE concentrations, except near the plume boundaries. Figures 2-3 and 2-4 show the PCE plumes in the shallow and the intermediate aquifers (Baker, 2005).

The Human Health Risk Assessment (HHRA) for the RFI concluded that the PCE and TCE in groundwater exhibited a risk to human health for future adult and child residents. The ecological risk assessment determined that risk is not likely at the SWMU based on a negligible terrestrial habitat that does not warrant ecological evaluation and the fact that no aquatic habitat is present on or near the study area (Baker, 2005).

Legend

- Monitoring Well Location
- Solid Waste Management Unit
- Fence
- Gate
- Wall

NOTE: SWMU 360 - TW04, TW02, and MW021W appear to be located incorrectly

N

0 50 100 150 200 Feet

Figure 2-1
SWMU 360
MCB Camp Lejeune, North Carolina

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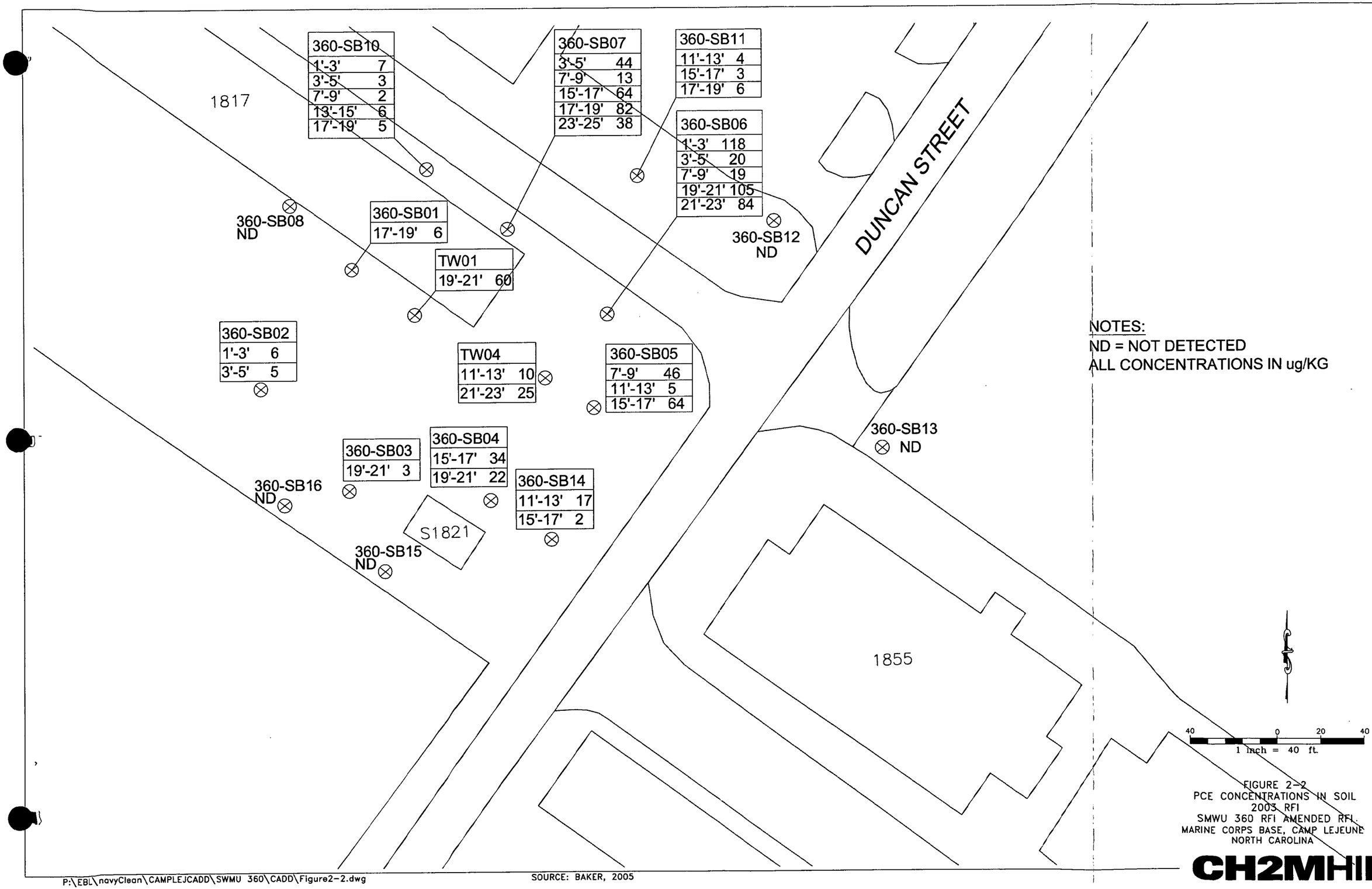
File Path: X:\USNavFaceNGCom\315007CampLejeune\Projects\Site89_FS\Figure 1 - TCE and PCA Impacts in shallow Groundwater (20 ft bgs).mxd, Date: 11 01, 2005



NOTES:
ND = NOT DETECTED
ALL CONCENTRATIONS IN ug/KG

FIGURE 2-2
PCE CONCENTRATIONS IN SOIL
2003 RFI
SMWU 360 RFI AMENDED RFI.
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

P:\EBL\navyClean\CAMPLEJCADD\SWMU 360\CADD\Figure2-2.dwg

SOURCE: BAKER, 2005

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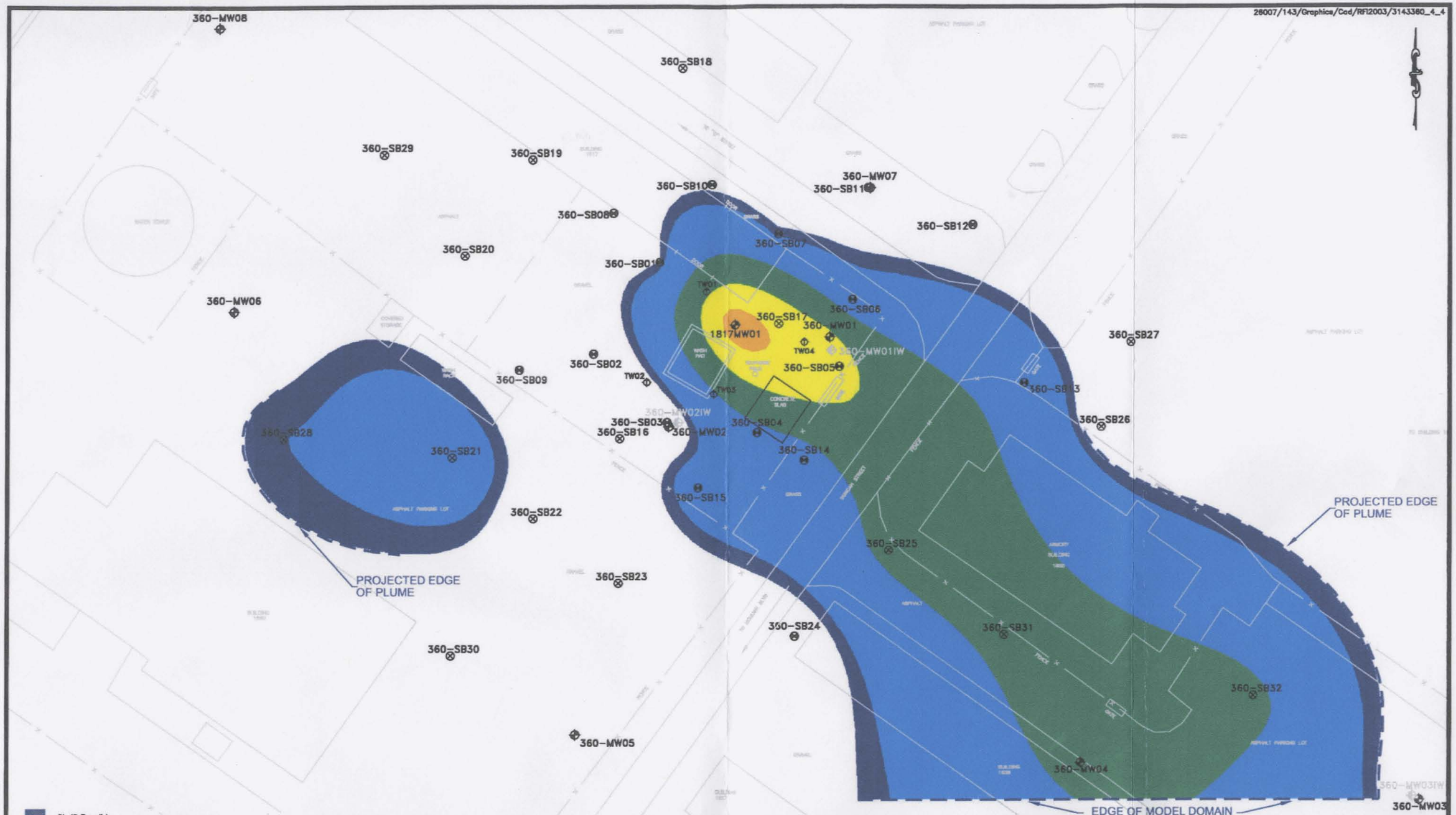


SOURCE: BAKER RFI REPORT, 2005

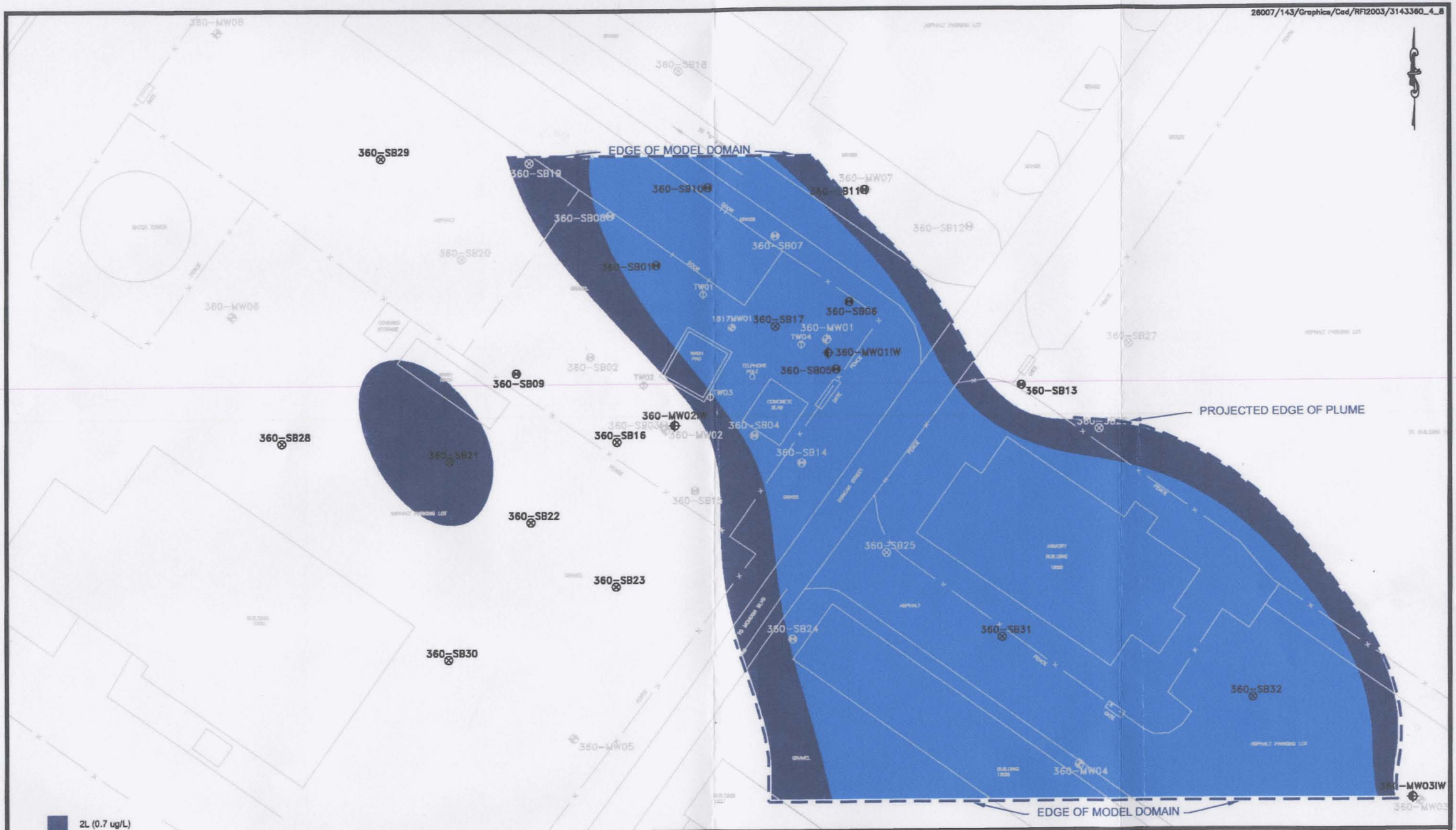
Baker

LEGEND

- ⊕ – PHASE II TEMPORARY WELL
- ⊕ – MONITORING WELL LOCATION
- ⊕ – INTERMEDIATE MONITORING WELL LOCATION
- ⊗ – SOIL BORING AND GROUND WATER GRAB LOCATION
- ⊗ – GROUND WATER GRAB LOCATION

SOURCE: MCB CAMP LEJEUNE MARCH 2000

FIGURE 2-3
PCE SHALLOW GROUNDWATER PLUME MAP
SWMU 360 RFI ADDENDUM WORK PLAN
MARINE CORPS BASE CAMP LEJEUNE



SOURCE: BAKER RFI, 2005

Baker

LEGEND

- ⊕ – PHASE II TEMPORARY WELL
- ⊕ – MONITORING WELL LOCATION
- ⊕ – INTERMEDIATE MONITORING WELL LOCATION
- ⊗ – SOIL BORING AND GROUND WATER GRAB LOCATION
- ⊗ – GROUND WATER GRAB LOCATION

SOURCE: MCB CAMP LEJEUNE MARCH 2000

FIGURE 2-4
PCE INTERMEDIATE GROUNDWATER PLUME MAP
SWMU 360 RFI ADDENDUM WORK PLAN
MARINE CORPS BASE CAMP LEJEUNE

3.0 Data Quality and Sampling Objectives

The site-specific objectives presented in this section have been developed using the USEPA seven-step data quality objectives (DQOs) process, as presented in the USEPA Guidance for the Data Quality Objectives Process (USEPA, 2000a) and USEPA Data Quality Objectives Process for Hazardous Waste Site Investigations (USEPA, 2000b).

3.1 Data Quality Objectives Process

DQOs are qualitative and quantitative statements, developed using the USEPA DQO process, that clarify study objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as a basis for establishing the quality and quantity of data needed to support decisions. DQOs define the performance criteria that limit the probabilities of making decision errors by considering the purpose of collecting data, defining the appropriate type of data needed, and specifying tolerable probabilities of making decision errors. The seven-step DQO process is as follows:

- Step 1 - State the Problem
- Step 2 - Identify the Decision
- Step 3 - Identify the Inputs to the Decision
- Step 4 - Define the Boundaries of the Study
- Step 5 - Develop a Decision Rule
- Step 6 - Specify Tolerable Limits on Decision Errors
- Step 7 - Optimize the Design for Obtaining Data

The following sections present the seven-step DQO process developed for the amended RFI at SWMU 360.

3.1.1 Step 1 – State the Problem

The first activity associated with this step is to establish the planning team. The planning team will include the North Carolina Department of Natural Resources (NC DENR), Naval Facilities Engineering Command (NAVFAC) Atlantic Division, MCB, Camp Lejeune, and CH2M HILL. These team members are decision-makers for the DQO Process.

The planning team's primary goal is to determine the potential for future corrective action at SWMU 360. Specifically, the objectives of the amended RI are as follows:

- Collect information to supplement and/or verify the environmental setting at the SWMU, including hydrogeology, geology, hydrology, topography, aquifer characteristics, and any other anthropogenic influences that may affect the hydrology or contaminant pathways at the site.

- Characterize the sources via the collection of analytical data, and evaluate the migration and dispersal characteristics of the release.
- Characterize the hazardous constituents (if any) via the collection of groundwater and soil samples in the vicinity of the SWMU. Characterization includes a definition of the extent, origin, direction and rate of movement of any contamination.
- Review the risk of any contaminants associated with the SWMU to human health.
- Provide recommendations for site management.

The problem is that SWMU 360 has not been adequately characterized and the extent of contamination has not been determined (i.e., a sufficient quantity of data does not exist to support a corrective action decision).

The final activity associated with this step is to identify available resources, constraints, and deadlines. The project team organization and project schedule are presented in Sections 5.0 and 6.0 of this Site-Specific Work Plan, respectively. The schedule presents the anticipated completion and/or submittal dates for specific tasks or documents.

3.1.2 Step 2 – Identify the Decision

The principal study question identified is:

- What is the nature and extent of contamination in the vicinity of SWMU 360?

Before a decision statement can be formulated, a definition of "contaminated" must be clarified. For the RCRA program, soil and groundwater will be considered "contaminated" if concentrations of COPCs exceed the applicable North Carolina 2L Standards, NC DENR soil to groundwater screening criteria and/or USEPA Region IX Preliminary Remediation Goals (PRGs) and the established background/secondary criteria (for metals only). It has been determined that the COPCs at this site are chlorinated solvents.

Considering the principal study question and definition of "contaminated," the decision statement is as follows:

- Define the nature and extent of contamination in the vicinity of the SWMU by determining whether or not the concentration of a given COPC at any given sampling point exceeds the regulatory driven criteria.

3.1.3 Step 3 – Identify the Inputs to the Decision

Existing information regarding the nature and extent of contamination in the vicinity of SWMU 360 comes from previous investigations performed by Baker. The results of these assessments are described in the Baker report *Final SWMU 360 RCRA Facility Investigation Report (October, 2005).* However, in order to determine the potential for future corrective action or additional actions, additional data is required to characterize and define the extent of contamination at the SWMU.

The type of data and sources used to resolve the decision statement include the following:

Kinds of Information	Sources of Information
Nature and extent of contaminated soil	Existing analytical data from soil samples
Nature and extent of contaminated groundwater	Existing analytical data and new analytical data from groundwater samples from monitoring wells and DPT sampling
Groundwater flow/hydrogeologic characteristics	Existing and new groundwater elevation data and slug test data
Engineering properties of soil (e.g., permeability, dry bulk density, grain size)	Geotechnical data from new Shelby tube samples

The criterion for determining the presence of contamination will be based on analytical results and applicable regulatory driven criteria as described in Section 3.1.2. Groundwater samples will be analyzed for VOCs using a fixed-based laboratory. Soil samples will be analyzed for VOCs, soil oxidant demand, grain size, and hydraulic conductivity using fixed-based analytical and geotechnical laboratories.

3.1.4 Step 4 – Define the Boundaries of the Study

Soil samples will be collected within the SWMU area, and groundwater samples will be collected at the locations shown in **Figure 4-1**. Soil samples will be collected to evaluate remedial alternatives for the soil. The estimated depth of groundwater sampling ranges from 20 to 45 feet.

Temporal changes in the extent of contamination are expected to be limited. Loss of contaminant mass does occur through natural attenuation processes (e.g., dilution, biodegradation, dispersion). As a result, data collection is not time dependent and the decision regarding the nature and extent of contamination will be based on existing conditions at the time of the investigations.

Practical constraints to sample collection are minor to moderate. Some access issues exist near Building 1817, the Armory Building 1855, and Buildings 1828 and 1827. Weather conditions (such as heavy rain or lightning) can delay the field activities, but is not a serious constraint.

3.1.5 Step 5 – Develop a Decision Rule

The decision rule developed for the RFI at SWMU 360 is as follows:

- If a given concentration at a given sampling point exceeds the regulatory driven criteria for that contaminant, then that sampling point will be considered to be within the contaminant plume.

3.1.6 Step 6 – Specify Tolerable Limits on Decision Errors

Specification of tolerable limits on the decision errors will not be performed at this time. The sampling scheme is flexible and will include points inside and outside the suspected contaminant source area/plume so that the extent of contamination should be sufficiently defined. Specification

of tolerable limits on the decision errors may be developed at a later date as determined by the planning team.

3.1.7 Step 7 – Optimize the Design for Obtaining Data

There are two fundamental goals for Step 7, and both rely on review of existing data and information:

- To evaluate the decision rule
- To design and optimize the sampling and analysis program

The decision rule developed in Step 5 has been shown to be valid following review of existing data. In this case, a simple statistical hypothesis test, broadly classified as a one-sample test was used. The test involved comparison of individual analytical data to a known value (regulatory driven criteria and established background/secondary criteria).

Existing information/data has been reviewed to evaluate and develop the data collection strategy for the field program. The referenced document is *Final SWMU 360 RCRA Facility Investigation Report (October, 2005)*. The development of alternate sampling plans is not practical given the nature of the RFI. In addition, the flexibility of the Site-Specific Work Plan optimizes resources in that the location of sampling points is determined by field conditions and DPT sample results.

4.0 RFI Tasks and Responsibilities

4.1 Project Management

Project management activities include such items as daily technical support and oversight; budget and schedule review and tracking; preparation and review of invoices; personnel resource planning and allocation; and coordination with NAVFAC Atlantic, MCB, Camp Lejeune, and subcontractors.

4.2 Subcontractor Procurement

This task includes procurement, scheduling and coordination of subcontractors. The primary subcontractors required for the RFI include a drilling subcontractor, DPT subcontractor, fixed-base analytical and geotechnical laboratories, independent data validator, utility locator and surveyor. Miscellaneous subcontractors may also be procured for various support services.

4.3 Field Activities

The field activities for the RFI at SWMU 360 will include the following subtasks:

- Mobilization/Demobilization
- Soil and Groundwater sampling using Direct Push Technology
- Soil sampling using hollow stem auger drilling
- Monitoring Well Installation and Development
- Monitoring Well Sampling
- 'Slug' Testing
- Laboratory Analytical Program
- Quality Assurance/Quality Control (QA/QC)
- Sample Handling
- Investigative Derived Waste (IDW) Management
- Surveying

The following subsections present a discussion of the proposed field activities.

4.3.1 Mobilization/Demobilization

Mobilization/demobilization consists of securing equipment and supplies necessary for the field activities and shipping or transporting those items both to and from the field. Travel time to and from the Base, construction of decontamination areas, location of IDW storage areas, field establishment of sampling locations, and underground utility clearance are also included under this task. Activity personnel will be consulted during mobilization efforts.

4.3.2 Direct Push Technology (DPT) Sampling

Soil Investigation

Five soil borings (SWMU360-IS34, SWMU360-IS35, SWMU360-IS36, SWMU360-IS37, and SWMU360-IS45) will be installed within the vicinity of monitoring well UST1817-MW01 to further define the impacted soils at SWMU 360 (**Figure 2-2**). Continuous soil samples will be collected from the soil borings at 4-foot intervals using DPT to characterize lithology and screen for the presence of VOCs. Surface (1 to 3 feet bgs) and subsurface soils with the highest flame ionization detector (FID) or photo-ionization detector (PID) reading will be submitted to the laboratory for VOC analysis. Each boring will be advanced from the ground surface down to the water table (estimated to be approximately 18 ft bgs). Soil sampling procedures are described in the Master FSAP. The soil samples collected from the four borings will be submitted to a fixed base laboratory with a standard turnaround time.

The soil investigation will also include the collection of soil total oxidant demand (TOD) and total organic carbon (TOC) data to support a CMS for the vadose zone soils impacted by PCE. During the DPT activities, soil samples will be collected with acetate liner sleeves from the four borings (SWMU360-IS34, SWMU360-IS35, SWMU360-IS36, and SWMU360-IS37). Once a 4-feet sleeve sample has been collected at the target depth from each of the four borings (as determined by the field screening), the acetate liner will be cut in-half and each half will be capped at both ends and duct taped. The soil samples will be submitted to a fixed-base laboratory for the TOD and TOC tests.

Groundwater Investigation

A total of eight (8) DPT borings (SWMU360-IS37, SWMU360-IS38, SWMU360-IS39, SWMU360-IS40, SWMU360-IS41, SWMU360-IS42, SWMU360-IS43, and SWMU360-IS44) will be advanced in the down-gradient and side-gradient areas of the groundwater plume. The direct push sampling locations are shown on **Figure 4-1**.

Four borings will be advanced to just below the water table for the collection of shallow (approximately 22 to 26 ft bgs) groundwater samples, while the other four borings will be advanced for the collection of shallow and intermediate (approximately 38 to 42 ft bgs) groundwater samples. When the target depth is reached in a borehole, the screen on the sampler will be deployed and groundwater samples will be collected using polyethylene tubing and a peristaltic pump. New clean tubing will be used to collect groundwater samples from each sampling depth. Once the shallow sample has been collected, the rods and sampler will be removed from the borehole, and a decontaminated set of rods and sampler will then be advanced in the same borehole to collect groundwater samples from deeper zones.

Once the target depth of each borehole has been reached and all samples have been collected, the borehole will be abandoned using a grout mixture with Portland cement conforming to ASTM requirements and NCDENR guidelines.

A summary of the sampling and analytical program is presented the Site-specific QAPP. Groundwater samples will be analyzed for VOCs, and soil samples will be analyzed for VOCs, grain size, and soil oxidant demand. These parameters were selected based on COPCs identified in the Final RFI Report (2005).

4.3.3 Shelby Tube Sampling for Geotechnical Parameters

Three undisturbed soil samples will be collected using Shelby tubes within the vicinity of SWMU 360 for the determination of vertical permeability and grain size. One soil boring will be advanced near the SWMU source (southwest corner of Building 1817) while two additional samples will be collected from new monitor well borings, discussed in Section 4.3.4. The three samples will be collected from the depths of 2 ft to 4 ft bgs, 8 ft to 10 ft bgs, and 14 ft to 16 ft bgs. Once collected, the undisturbed Shelby tube samples will be submitted to a fixed-base geotechnical laboratory.

4.3.4 Monitoring Well Installation and Development

Once the DPT groundwater analytical data has been reviewed, appropriate monitoring well locations will be identified. Four (4) Type II shallow monitoring wells and two (2) Type III (double cased) intermediate wells will be installed. The four Type II shallow monitoring wells (SWMU360-MW09, SWMU360-MW10, SWMU360-MW11, and SWMU-360MW12) will be installed using rotary hollow-stem augers in accordance with Navy CLEAN SOPs, CH2M HILL SOPs, and the Master Plans (CH2M HILL, 2005). Standard split-spoon soil samples will be collected from each well boring for lithological descriptions and field screening.

Type III intermediate monitoring wells (SWMU360-MW09IW and SWMU360-MW10IW) will be installed using hollow-stem auger and mud rotary drilling techniques in accordance with Navy CLEAN SOPs, CH2M HILL SOPs, and the Master Plans (CH2M HILL, 2005). In order to limit potential cross-contamination during construction, the Type III intermediate wells will be constructed utilizing a permanent casing to isolate the surficial aquifer unit. The boring for the surface casing will be advanced using rotary hollow-stem augers. Once the target depth for the surface casing is reached, a steel casing will be added in the boring and grouted in place. After the grout has cured for a minimum of 24-hours, the well boring will be advanced through the surface casing down to the intermediate aquifer zone using mud rotary drilling techniques.

Boreholes for shallow monitoring wells will be advanced to anticipated depths of 25 feet to 28 feet bgs, while intermediate monitoring wells will be advanced to anticipated depths of approximately 45 feet bgs. The screened interval of each well will be placed on the basis of the lithology data collected during the borehole installations. In general, layers having assumed higher permeability than adjacent layers will be selected for screening. This is consistent with well installations at other MCB Camp Lejeune Installation Restoration Program (IRP) sites and with the Master Plans (CH2M HILL, June 2004). Precise well construction depths will be determined in the field following review of the boring logs. Boring logs and well completion diagrams will be provided in the RFI Addendum Report.

The monitoring wells will be constructed within each borehole using 2-inch diameter, flush threaded, Schedule 40 polyvinyl chloride (PVC) riser and either 10-feet (shallow wells) or 5-feet (intermediate wells) of ten-slot (0.010-inch) PVC screen. Ten-slot screen was selected due to the fine silt and clay content of the soil generally present at MCB Camp Lejeune. A Type II silica sand filter pack will be placed in the annular space between the well screen and borehole wall, from the bottom of the borehole to approximately 2 feet above the top of the well screen. Bentonite pellets will be placed on top of the filter pack and hydrated to form a seal approximately 4 feet thick.

After hydration of the bentonite pellets, the remaining annular space of the borehole will be grouted to within a few inches of the ground surface. Grout will consist of cement and no more

than 3 percent sodium bentonite, will be placed using a tremmie pipe, and will be pumped from the bottom of the annular space to land surface. Pumping will continue until the grout returns at the surface are within 5 percent of the weight of the grout being pumped into the well annulus to insure the grout is not diluted by groundwater standing in the borehole.

A watertight, locking, expansion cap will be installed on top of the 2-inch diameter casing. Each monitoring well will be completed at the surface with either an 8-inch diameter steel, manhole type, protective cover with concrete pad or a steel, stick-up protective cover with concrete pad (depending on the location of the well). The drilling and well installation activities will be conducted by a North Carolina licensed well driller under the supervision of a CH2M HILL engineer or hydrogeologist in accordance with the Well Construction Standards provided in the North Carolina Administrative Code (NCAC) 15A Subchapter 2C Section 0100.

Each new monitoring well will be developed within 48 hours after installation depending on scheduled field activities. Wells will be developed in accordance with Navy CLEAN SOPs, CH2M HILL SOPs, and the Master Plans (CH2M HILL, 2005). Well development will include surging and over pumping with a submersible pump across the length of the well screen. With respect to the volume of groundwater removed, adequate well development is normally achieved when the column of water in the well is free of visible sediment. With respect to groundwater geochemical parameters, adequate development is achieved when the pH, specific conductance, and temperature of the groundwater have stabilized and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs). Stabilization occurs when pH measurements remain constant within 0.1 standard unit (SU), specific conductance varies no more than 10 percent, and the temperature is constant for three consecutive readings.

4.3.5 Monitoring Well Purging and Sampling

All 12 existing wells (SWMU360-MW01, SWMU360-MW01IW, SWMU360-MW02, SWMU-360MW02IW, SWMU360-MW03, SWMU360-MW03IW, SWMU360-MW04, SWMU-360MW05, SWMU360-MW06, SWMU360-MW07, SWMU-360MW08, and UST1817-MW01) and the 6 newly installed wells (SWMU360-MW09, SWMU360-MW09IW, SWMU360-MW10, SWMU360-MW10IW, SWMU360-MW11, and SWMU-360MW12) will be sampled. Monitoring well sampling will take place no sooner than 48-hours after completion of well development in order to allow an adequate amount of time for the wells to equilibrate. The wells will be purged and sampled using peristaltic pumps and low-flow purging/sampling methods in accordance with Navy CLEAN SOPs, CH2M HILL SOPs, and the Master Plans. New disposable tubing will be used for each well. Specific sampling procedures are presented in the Master Plans and summarized below:

- The well cap will be removed and escaping gasses will be measured at the wellhead using a PID. This will determine the need for respiratory protection.
- After proper respiratory protection has been donned, as necessary, the static water level will be measured. The total depth of the monitoring well will not be measured, as not to stir up any sediment. The total well depth will be obtained from Well Construction Records. The water volume in the well will then be calculated.
- The sampling device intake will be slowly lowered until the bottom end is two to three feet below the top of the well screen or the top of the water level, whichever is greater. Next, the water level probe will be placed into the monitoring well just above the water.

- Purging will begin. The pumping rate will be set to create a sustainable flow (approximately 0.3 liters/minute or less) without causing a significant drop in water level in the well. The static water level will be periodically measured throughout purging to verify that a significant drop in water level has not occurred.
- Water Quality Parameters (WQPs), including pH, specific conductance, temperature, oxidation-reduction potential (ORP), turbidity, and dissolved oxygen will be measured frequently.
- Purging will be complete when three successive readings of pH, specific conductance, and temperature have stabilized within 10 percent (0.1 Standard Units for pH), turbidity is less than 10 NTUs, or there is no further discernable upward or downward trend. However, a minimum of one well volume will be removed prior to sampling. If a well is purged dry, the well will be allowed to recharge (preferably to 70 percent of the static water level) prior to sampling.
- Upon WQP stabilization, groundwater samples will be collected and placed into the appropriate sample container(s).

4.3.6 Slug Testing

Rising head slug tests will be performed in the groundwater monitoring wells SWMU360-MW01, SWMU360-MW01IW, SWMU360-MW09, SWMU360-MW09IW, SWMU360-MW10, and SWMU360-MW10IW. The screened intervals of the shallow wells tested will only be partially submerged below the water table, while the screened intervals of the intermediate wells will be completely submerged.

The slug test will consist of submerging a poly bailer or solid cylinder (PVC or stainless-steel) of known volume (slug) in a test well, allowing the static water level time to equilibrate, rapidly removing the slug, and recording the changes in head over time. The test will be allowed to continue until the water level returns to within 10 percent of the original static water level.

Equipment used for the slug test will include a data logger and pressure transducer, a nylon rope, and a bailer or solid PVC or stainless-steel slug. Prior to the initial slug test and between each well tested, all downhole equipment will be decontaminated according to the procedures described in this Work Plan.

Slug testing will be completed using the following procedure:

1. Remove the well cap or cover and monitor for volatile organic vapors using the appropriate instrument listed in the *Health and Safety Plan*.
2. Measure the depth to water in the well and the total well depth using a clean electronic water level indicator. Calculate the groundwater elevation and the height of the water column. If the well screen is not fully submerged in the water column, then the data reduction methods must be modified accordingly. If the pressure transducer and slug cannot be fully submerged in the water column, then the well should be evaluated for slug response. If a non-fully submerged slug will result in adequate drawdown, then the test should be performed. Otherwise, the well should not be used to perform a slug test.
3. Lower the pressure transducer into the well and suspend in the water column in the screened interval.
4. Lower the slug into the well and suspend in the water column above the pressure transducer.

5. Enter the appropriate test parameters into the data logger and set the zero reference point after the water column has stabilized to near original static conditions, 15 minutes or 0.01 ft. The transducers should be programmed to record water level data on a logarithmic time scale with the maximum time interval of 2 minutes (the minimum time interval should be automatically determined by the datalogger, but should not exceed 0.05 seconds).

6. Start the pressure transducer and immediately remove the slug from the water column. Be careful not to bump the pressure transducer.

7. Record the change in head over time until readings have stabilized. The water level should be allowed to recover a sufficient amount of time to allow the rate of inflow into the well to be controlled by the formation rather than by storage in the filter pack.

Reduce the data by plotting the change in head versus time on semi-logarithmic paper using the Bouwer and Rice method of analysis (Bouwer, 1989) or other appropriate data reduction method.

4.3.7 Field Quality Assurance/Quality Control

Specific Quality Assurance/Quality Control (QA/QC) requirements are presented in the Master QAPP, which is contained in the Master Project Plans. The Master QAPP describes the different levels of sample analysis and the associated QC procedures required with each. Adherence to established USEPA chain-of-custody (COC) procedures during the collection, transport, and analyses of the samples will be maintained throughout the project. Laboratory analyses of the samples will conform to accepted QA requirements.

The following QA/QC samples will be collected/prepared during the field activities to ensure precision, accuracy, representativeness, completeness, and comparability:

- Equipment rinsate blanks
- Field blanks
- Field duplicates
- Matrix Spike/Matrix Spike Duplicates (MS/MSDs)

Equipment rinsate blanks will be collected by running laboratory-supplied de-ionized water over/through the sampling equipment and placing it into the appropriate sample containers for laboratory analyses. Equipment rinsate blanks will be collected from selected disposable sampling equipment (i.e., roll of tubing, stainless steel spoon, etc.); one equipment rinsate blank will be collected each day for reusable sampling equipment. The results will be used to verify that the sampling equipment has not contributed to contamination of the samples.

One field blank will be collected from each source of water used in decontamination. The field blanks will be collected by pouring the water from the original container or spigot directly into the sample bottle set. Field blanks will not be collected in dusty environments. The results will be used to verify that the water used in decontamination has not contributed to contamination of the samples.

Field duplicate samples will consist of one unique sample, split into two aliquots, and analyzed independently. Duplicate soil samples analyzed for parameters other than VOCs will be homogenized and split. Samples for VOC analyses will not be mixed, but select segments of the

soil will be collected. Duplicate water samples will be collected simultaneously. The duplicate samples will be analyzed to verify the reproducibility of the laboratory results and degree of variability of reported concentrations. Duplicate samples will be collected at a frequency of 10 percent; the samples will be taken from locations anticipated to be contaminated.

MS/MSD samples will be prepared in the field to address aliquoting reproducibility and to provide information on matrix reproducibility otherwise unobtainable from samples reported below analytically reproducible and statistically valid levels. MS/MSD samples will be prepared at a frequency of 5 percent for each group of samples of a similar matrix; the samples will be taken from locations anticipated to be contaminated.

4.3.8 Sample Handling and Analysis

Samples for chemical analyses will be placed into laboratory-prepared sample containers with the appropriate preservatives and stored on ice in a cooler at approximately 4° Celsius (or less) until shipped to the laboratory.

Sample preservation details are presented in the Master Project Plans. The type of container used for each sampling effort, as well as a summary of preservation requirements is described in the Master QAPP.

Proper COC documentation will be maintained for all samples from the time of collection until they are shipped to the analytical laboratory. The COC forms will contain the following information: project number (CTO), sampler names, sample numbers, number of containers, methods of preservation, date and time of sample collection, analysis requested, date and time of transportation to the laboratory, method of transportation, and any other information pertinent to the samples. Specific COC procedures are presented in the Master Project Plans.

Samples will either be hand delivered to the laboratory via courier or shipped via overnight courier.

4.3.9 Investigation Derived Waste Management

IDW will be managed in accordance with Section 4.20 of the Master Project Plans. IDW will consist of health and safety disposables, potentially contaminated soil, decontamination fluids, and groundwater. Health and safety disposables, such as sampling gloves, will be placed in plastic bags and disposed in an on-site dumpster. Soil IDW generated as part of the field activities will be containerized in Department of Transportation (DOT) approved 55 gallon drums. Water IDW will be placed in poly-tanks or 55 gallon drums. The drums and poly-tanks will be transported to and staged at the designated 90-day storage area at Building 977 pending final disposition.

4.3.10 Survey

The DPT sample locations and monitoring wells will be surveyed by a subcontractor licensed in the State of North Carolina for topographic elevation relative to mean sea level (MSL) and horizontal position within the North Carolina State Plane Coordinate System. The vertical accuracy of the survey will be within 0.01 feet and the horizontal accuracy will be within 0.1 feet. Surveying procedures are presented in the Master Project Plan.

4.4 Data Management and Validation

It is anticipated that data management activities will consist primarily of entering field and laboratory data onto computerized spreadsheets using database software and tabulating field and analytical results for preparation of the report.

An independent data validator will be subcontracted for data validation. The laboratory analytical results will be evaluated to assess the technical adequacy and usability of the data. The data will be technically reviewed based on specifications set forth in the Naval Energy and Environmental Support Activity (NEESA) and USEPA guidance documents.

4.5 Data Evaluation

The laboratory analytical results will be compared to the North Carolina 2L standards, NC DENR Soil to Groundwater screening criteria, and USEPA Region IX Preliminary Remediation Goals (PRGs). Because the area south of the SWMU is used for military housing, residential PRGs will be used as comparison criteria.

4.6 Risk Assessment

The ecological risk assessment will not be reevaluated, due to the lack of ecological receptors. The HHRA in the Final RFI Report (2005) will be reviewed considering the additional samples collected. It is anticipated that the HHRA will not need to be reevaluated unless sample concentrations are significantly different than the existing data.

4.7 Report Preparation

An RFI Report Amendment will be prepared detailing the additional delineation effort and results. The report will include, but not be limited to, the following:

- Information to supplement and/or verify the environmental setting of the SWMU including geology and hydrogeology
- A summary of the investigation/sampling activities
- Characterization of the source(s)
- Evaluation of the nature and extent of contamination
- Human health risk assessment review
- Conclusions and recommendations

A revised draft report amendment will be submitted to MCB, Camp Lejeune and NC DENR for comments and approval. Response to comments and necessary revisions will be made to the revised draft report before issuing a final report.

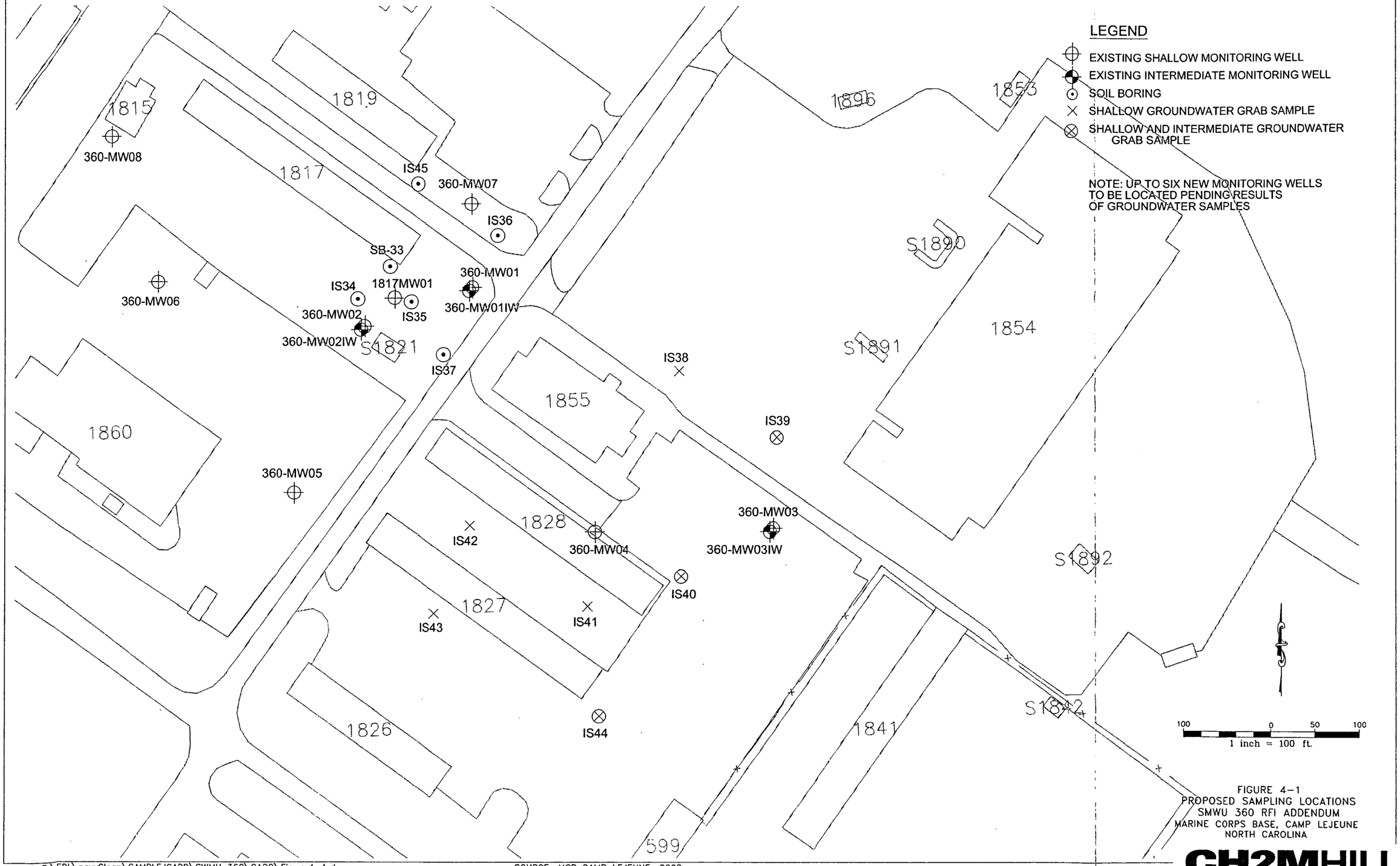


FIGURE 4–1
PROPOSED SAMPLING LOCATIONS
SMWU 360 RFI ADDENDUM
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

P:\EBL\navyClean\CAMPLEJCADD\SWMU 360\CADD\Figure4-1.dwg

SOURCE: MCB CAMP LEJEUNE, 2000.

CH2MHILL

5.0 Evaluating 56 Septic Systems

5.1 Records Search

MCB Camp Lejeune has identified 56 septic systems to be abandoned, listed in Figure 5-1. Record searches will be undertaken regarding each one's potential for receiving hazardous waste. It is assumed that this information is readily available and can be collected within an average 6-hour period for each unit. After reviewing site locations and design and as-built drawings, if a septic system is determined to have received household sanitary waste only (i.e., it serviced only a residential unit), it will not be classified as a SWMU under RCRA, and a site drawing will not be produced.

If a septic system was associated with an office, industrial, or operations structure, it may be classified as a SWMU. Record drawings and interviews with MCB personnel will be used to evaluate if the septic system handled industrial or process waste, or if it managed only sanitary waste. An attempt will be made to locate the septic tank and drain field for a site drawing.

5.2 SWMU Assessment Report

This task includes reporting activities associated with the records search for the 56 septic systems. Draft and final reports will be prepared. The SAR will be prepared according to the requirements provided in the Base's Hazardous Waste Part B Permit. As required under the permit, the SAR will contain the following items for each site associated with a non-residential structure:

- Location map with ground surface contours
- Designation/Type of Unit
- General Dimensions of units, capacity, if known
- Dates operated
- Description of wastes handled, if known
- Information on any releases of hazardous waste or hazardous material
- Recommended site management option, i.e., No Further Action or Confirmatory Sampling Investigation.

In addition, supporting information such as building plans showing drain lines or non-industrial building uses will be presented in an appendix. For example, if the septic system serviced a non-residential building, a floor plan or mechanical drawing showing drain lines only from lavatories or break room sinks would indicate no hazardous materials were drained to the septic system.

The SAR may be broken up into two or three volumes depending on site location or other criteria. Each volume of the draft report will be prepared for concurrent NAVFAC, MCB Camp Lejeune, and NC DENR review. Responses to comments will be prepared, and final volumes will be produced.

1968	TOILET STONE ST MCB CAMP LEJEU
2640	TOILET
S769	TICKET BOOTH AT ENTRANCE
S806	TOILET @ LOT 201
BA300	TOILET AT MILE HAMMOCK BAY
BA301	TOILET AT MILE HAMMOCK BAY
GP 26	LATRINE
SH 16	TOILET
TC 815	LATRINE
TC 950	LATRINE
TC1010	LATRINE
TC1012	LATRINE
TC1013	LATRINE
TC1015	LATRINE
TC1016	LATRINE
TC1040	LATRINE
TC1041	LATRINE
TC1042	LATRINE
TC1044	LATRINE
TC1045	LATRINE
TC1050	LATRINE
TC1052	LATRINE
TC1054	LATRINE
TC1140	LATRINE
TC1141	LATRINE
AS149	SEPTIC TANK
AS2861	SEPTIC TANK
GSRA 001	STRUCTURE AT GSRA
GSRA 004	STRUCTURE AT GSRA
GSRA 011	STRUCTURE AT GSRA
GSRA 014	STRUCTURE AT GSRA
GSRA 016	STRUCTURE AT GSRA
GSRA 033	STRUCTURE AT GSRA
GSRA 042	STRUCTURE AT GSRA
GSRA 049	STRUCTURE AT GSRA
GSRA 051	STRUCTURE AT GSRA
GSRA 056	STRUCTURE AT GSRA
GSRA 057	STRUCTURE AT GSRA
GSRA 074	STRUCTURE AT GSRA
GSRA 075	STRUCTURE AT GSRA
GSRA 079	STRUCTURE AT GSRA
GSRA 085	STRUCTURE AT GSRA
GSRA 128	STRUCTURE AT GSRA
GSRA 133	STRUCTURE AT GSRA
GSRA 139	STRUCTURE AT GSRA
GSRA 147	STRUCTURE AT GSRA
UN 02/04/2005	SEPTIC TK/DN FLD SH16

UN1071	SEPTIC TK/DN FLD (BA AREA)
UN1144	SEPTIC TANK DRAIN FILED (824)
UN1145	SEPTIC TANK DRAIN FLD (849)
UN1146	SEPTIC TANK FLD (827)
UN1270	SEPTC TK/DR FLD UN 1187
UN140	SEPTIC TANK DRAIN FLD (45)
UN210	SEP TANK/DRN FLD (CHB)
UN232	SEPTIC TANK DRAIN FLD (FC19)
UN236	SEPTIC TANK (AS536)

FIGURE 5-1
Septic Systems to Evaluate
SWMU 360 Amended RFI Work Plan (CTO-100)
MCB Camp Lejeune, North Carolina

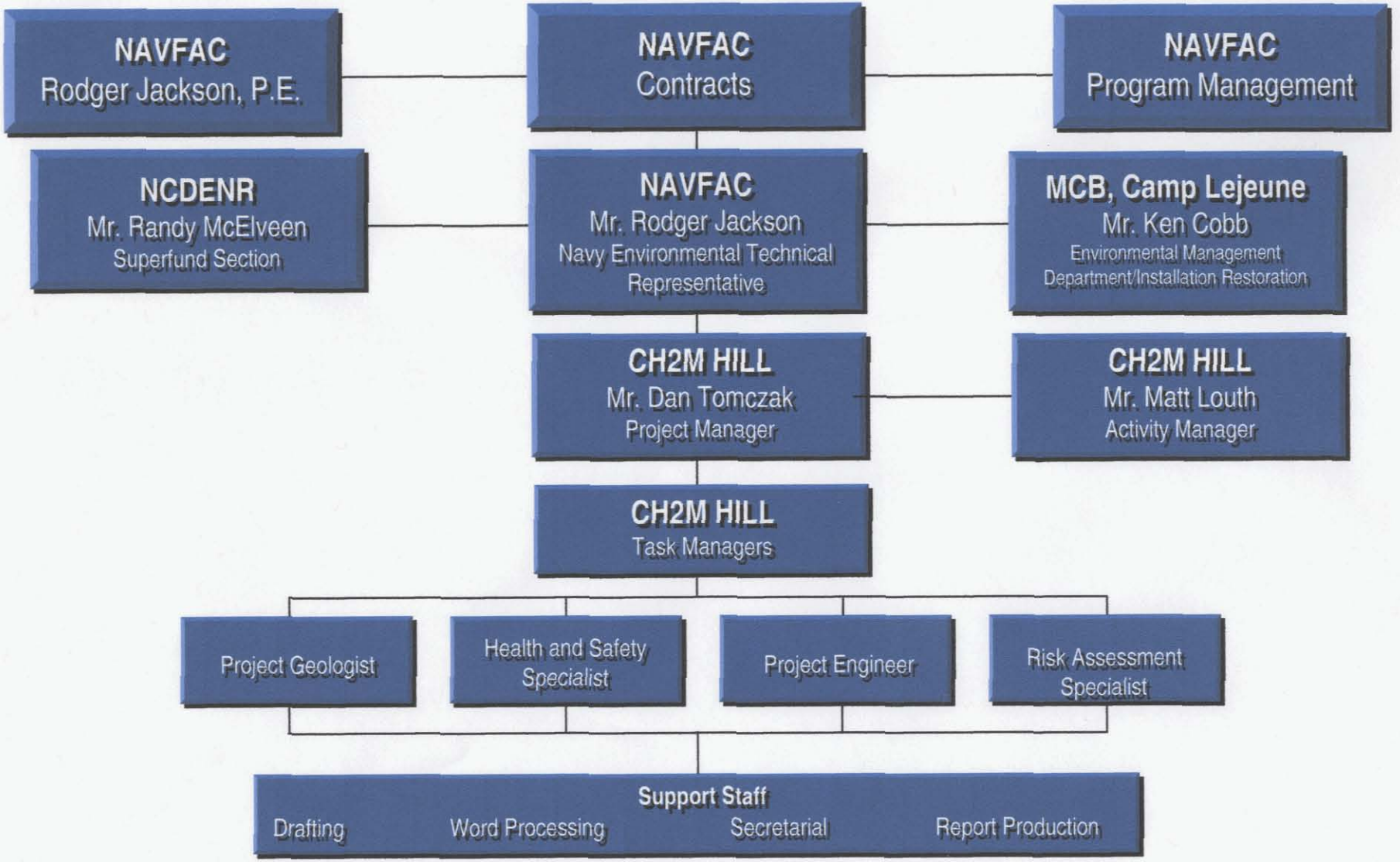
6.0 Project Management and Staffing

The proposed management and staffing for the amended RFI at SMWU 360 is shown on **Figure 6-1**. CH2M Hill's primary participants for this project (CTO-0100) are as follows:

- Mr. Matt Louth - Activity Coordinator
- Mr. Dan Tomczak - Project Manager
- Task Managers

Mr. Tomczak and the Task Managers will have the overall responsibility for conducting the field activities and completing the reports associated with this CTO. They will be supported by geologists, engineers, scientists, biologists, and clerical personnel, as needed. The Task Managers will report to Mr. Tomczak and Mr. Louth who will then relay pertinent issues and maintain close contact with NAVFAC Atlantic and the Base.

Figure 6-1
Project Team Organization
SWMU 360 Amended RFI Work Plan (CTO-0100)
MCB Camp Lejeune, North Carolina



7.0 Project Schedule

The project schedule is presented in **Figure 7-1**. The schedule presents the anticipated completion and/or submittal dates for specific tasks or documents.

FIGURE 7-1
PROPOSED PROJECT SCHEDULE
SWMU 360 AMENDED RFI WORK PLAN, CTO - 0100
MCB, CAMP LEJEUNE, NORTH CAROLINA

TASK NAME	DURATION (days)	Start Date
Septic Tanks Records Review	30	1 day after Final Work Plan submittal
Draft SAR	60	1 day after Records Review completion
Agency Review	40	1 day after Draft SAR submittal
Final SAR	30	30 days after comments received
RFI Field Work	15	1 day after Final Work Plan submittal
Laboratory Analysis/Data Validation	60	3 days after start of field work
Draft RFI Report Amendment	90	90 days after completion of fieldwork
Agency Review	40	1 day after Draft Report submittal
Final RFI Amended Report	30	30 days after comments received
Draft CMS Report	90	1 day after completion of Draft RFI Amendment
Agency Review	40	1 day after Draft Report submittal
Final CMS Report	30	30 days after comments received

8.0 References

CH2M HILL, 2005. Master Project Plans, Marine Corps Base Camp Lejeune, North Carolina. 2005

Baker Environmental, Inc. (Baker). 2005. *Final SWMU 360 RCRA Facility Investigation Report.* October, 2005.

Bouwer, H. and R.C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells. *Water Resources Research.* V.12. pp.423-428.

Bouwer, Herman. 1989. The Bouwer and Rice Slug Test - An Update. *Ground Water.* V. 27, no.3. pp. 304-309.

United States Environmental Protection Agency. 2000a. *Guidance for Data Quality Objectives Process.* 2000.

United States Environmental Protection Agency. 2000b. *Data Quality Objectives Process for Hazardous Waste Site Investigations.* 2000.

Site Specific Quality Assurance Project Plan
RCRA Facility Investigation Addendum
SWMU 360

Marine Corps Base
Camp Lejeune, North Carolina

Contract Task Order 0100

November 2005

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

LANTDIV CLEAN III Program
Contract N62470-02-D-3052

Prepared by

CH2MHILL

Charlotte, North Carolina

Table of Contents

Acronyms and Abbreviations

AM	Activity Manager
COC	Chain of Custody
DPT	Direct Push Technology
DQO	Data Quality Objective
ER	Equipment Rinse blank
FB	Field Blank
FTL	Field Team Leader
MCB	Marine Corps Base
MS/MSD	Matrix Spike/Matrix Spike Duplicate
PM	Project Manager
QA/QC	Quality Assurance/ Quality Control
QAPP	Quality Assurance Project Plan
RFI	RCRA Field Investigation
RTL	Review Team Leader
SSC	Site Safety Coordinator
SWMU	Solid Waste Management Unit
TB	Trip Blank

1.0 Introduction

This site-specific *Quality Assurance Project Plan* (QAPP) is meant to serve in conjunction with the Marine Corps Base (MCB) Camp Lejeune Master Project QAPP (CH2M HILL, 2005). The specific information contained in this site-specific QAPP supplements the general information contained in the Master QAPP. This document applies only to the amended RCRA Facility Investigation (RFI) at Solid Waste Management Unit (SWMU) 360. The QAPP describes the data quality objectives, specific quality assurance (QA) and quality control (QC) activities, and laboratory activities necessary to achieve the data quality objectives (DQOs) of the project. Subcontractors will be required to review both the Master QAPP and the site-specific QAPP. Subcontractors will be expected to adhere to the procedures specified in these documents. All field activities will be conducted by CH2M HILL or subcontractors under the direct supervision of CH2M HILL.

Sections 1 and 2 of the Site-Specific Work Plan provide a detailed project description and site history for SWMU 360.

2.0 Project Organization and Responsibilities

This section identifies key team members for each project; lists the QA/QC responsibilities associated with each position; and describes communication procedures that will be followed throughout the specific project.

2.1 Project Team Members

The organizational structure and responsibilities are designed to provide project QA/QC for the field investigation activities at SWMU 360. Each position is described in the MCB Camp Lejeune Master QAPP. The project team for the CSI investigations are:

Project Manager (PM)	Dan Tomczak
Activity Manager (AM)	Matt Louth
Senior Consultant and Review Team Leader (RTL)	Sam Shannon
RFI Task Leader	Dan Tomczak
Lead Data Manager	Felicia Arroyo
Field Team Leader (FTL) & Site Safety Coordinator (SSC)	Dan Tomczak
Project Geologist	James Frank
Health and Safety Manager	Michael Goldman
Project Accountant	Katya Maltseva
Project Delivery Leader	JoLee Gardner

2.2 Subcontractors

Subcontractors will be used for the RFI activities at SWMU 360. The following services will be provided by subcontractors:

- Utility location
- Soil and groundwater sample collection using direct push technology (DPT)
- Fixed base analytical and geotechnical laboratory services
- Land surveying services
- Data validation services

Procurement of subcontractors will be performed in accordance with the Navy CLEAN Contract Procurement Manual.

2.3 Project Communication

Communications among all project personnel will be conducted in accordance with the MCB Camp Lejeune Master QAPP.

3.0 Sample Identification and Custody

An electronic sample tracking program will be used to manage the flow of information from the field sampling team to the laboratory and to internal and external data users. The tracking program is used to produce sample labels and chain of custody (COC) forms and to manage the entry of sampling-related data, such as station locations and field measurements.

The method of sample identification used depends on the type of sample collected and the sample container.

- The field analysis data are recorded in field logbooks or on data sheets, along with sample identity information, while in the custody of the sampling team.
- Labels for samples sent to a laboratory for analysis will be produced electronically. If they cannot be produced electronically, they must be written in indelible ink. The following information typically is included on the sample label:
  - Site name or identifier
  - Sample identification number
  - Date and time of sample collection
  - Sample matrix or matrix identifier
  - Type of analyses to be conducted

Each analytical sample will be assigned a unique number of the following format:

Site # - Media-Station # -QA/QC – Year/Round or Depth Interval

An explanation of each identifier is provided below:

Site #	SWMU 360
Media	SS – Surface or subsurface soil
	GW – Groundwater
	WT – Water (rinsate, decontamination fluid, ambient potable water)
Station	IS – in situ soil or groundwater sample collected by DPT
QA/QC	FB = Field blank
	DUP = Duplicate sample (following sample type/number)
	TB = Trip blank
	ER = Equipment rinsate
Depth/Round	The number will reference the depth interval of the sample. For example, "0-1" = 0 to 1 feet below ground surface (bgs), "1-2" = 1 to 2 feet bgs, "2-3" = 2 to 3 feet bgs, etc.

Site #	SWMU 360
Media	SS – Surface or subsurface soil
	GW – Groundwater
	WT – Water (rinsate, decontamination fluid, ambient potable water)
Station	IS – in situ soil or groundwater sample collected by DPT

All matrix spike/matrix spike duplicate (MS/MSD) samples will be entered in the same line on the chain of custody as the field sample. The total number of sample containers submitted will be entered on the chain of custody and "MS/MSD" will be indicated in the comments section.

Using this sample designation format, the sample designation SWMU360-SS-IS01D -2-3 refers to:

SWMU360-IS01-0-1	SWMU 360
SWMU360-IS01-0-1	Soil sample collected using DPT from location 01
SWMU360-IS01-0-1	Collected from the depth of 0 to 1 ft bgs

The sample designation SWMU360-GW02-8-12 refers to:

SWMU360-GW02-8-12	SWMU 360
SWMU360-GW02-8-12	Groundwater sample collected using DPT from location 02
SWMU360-GW02-8-12	Collected from the depth of 8 to 12 ft bgs

For QA/QC samples that include TB, ER, and FB, the date of collection is included in the sample designation. For example, the sample designation SWMU360-TB081505 refers to:

SWMU360-TB081505	SWMU 360
SWMU360-TB081505	Trip blank for the day of August 15, 2005

This sample designation format will be followed throughout the RFI for SWMU 360. Table 3-1 lists all of the sample designations and QA/QC samples for the soil and groundwater sampling at SWMU 360. Required deviations to this format will be documented in the field logbook.

Sample custody and COC records will be maintained in accordance with the MCB Camp Lejeune Master QAPP.

Table 3-1
Sample Analysis Summary
Additional Sampling for RFI Addendum for SWMU 360
CTO-100, Mod 2
MCB Camp Lejeune, North Carolina

Well/Station ID	Sample ID	Sample Depth (ft bgs)	Soil VOCs (SW846 8260)	Soil Total Oxidant Demand	Total Organic Content	Geotechnical Parameters	Groundwater VOCs (SW846 8260)
SWMU360-SB33	SWMU360-SB33-2-4	2-4				1	
SWMU360-IS34	SWMU360-IS34-1-3	1-3	1		1		
	SWMU360-IS34-X-Y	X-Y	1	1			
SWMU360-IS35	SWMU360-IS35-1-3	1-3	1				
	SWMU360-IS35-X-Y	X-Y	1	1	1		
SWMU360-IS36	SWMU360-IS36-1-3	1-3	1		1		
	SWMU360-IS36-X-Y	X-Y	1	1			
SWMU360-IS37	SWMU360-IS37-1-3	1-3	1				
	SWMU360-IS37-X-Y	X-Y	1	1	1		
	SWMU360-GW37-22-26	22-26					1
	SWMU360-GW37-38-42	38-42					1
SWMU360-IS38	SWMU360-GW38-22-26	22-26					1
SWMU360-IS39	SWMU360-GW39-22-26	22-26					1
	SWMU360-GW39-39-42	38-42					1
SWMU360-IS40	SWMU360-GW40-22-26	22-26					1
	SWMU360-GW40-38-42	38-42					1
SWMU360-IS41	SWMU360-GW41-22-26	22-26					1
SWMU360-IS42	SWMU360-GW42-22-26	22-26					1
SWMU360-IS43	SWMU360-GW43-22-26	22-26					1
SWMU360-IS44	SWMU360-GW44-22-26	22-26					1
	SWMU360-GW44-38-42	38-42					1
SWMU360-IS45	SWMU360-IS45-1-3	1-3	1				
	SWMU360-IS45-X-Y	X-Y	1				
SWMU360-MW01	SWMU360-MW01	18-28					1
SWMU360-MW01IW	SWMU360-MW01IW	40-45					1
SWMU360-MW02	SWMU360-MW02	18-28					1
SWMU360-MW02IW	SWMU360-MW02IW	40-45					1
SWMU360-MW03	SWMU360-MW03	18-28					1
SWMU360-MW03IW	SWMU360-MW03IW	40-45					1
SWMU360-MW04	SWMU360-MW04	18-28					1
SWMU360-MW05	SWMU360-MW05	15-25					1
SWMU360-MW06	SWMU360-MW06	17-27					1
SWMU360-MW07	SWMU360-MW07	15-25					1
SWMU360-MW08	SWMU360-MW08	16.9-26.9					1
SWMU360-MW09	SWMU360-MW09-8-10	8-10				1	
	SWMU360-MW09	17-27					1
SWMU360-MW09IW	SWMU360-MW09IW	40-45					1
SWMU360-MW10	SWMU360-MW10-14-16	14-16				1	
	SWMU360-MW10	17-27					1
SWMU360-MW10IW	SWMU360-MW10IW	40-45					1
SWMU360-MW11	SWMU360-MW11	17-27					1
SWMU360-MW12	SWMU360-MW12	17-27					1
Total Soil/Groundwater Samples			10	4	4	3	29
Field Duplicate Samples			1				3
Matrix Spike Samples			1				2
Matrix Spike Duplicate Samples			1				2
Field Blanks							2
Equipment Rinse Blanks			2				4
Trip Blanks			2				4
Total Number of Samples:			**17**	**4**	**4**	**3**	**46**

Site Specific Health and Safety Plan for SWMU 360

Marine Corps Base
Camp Lejeune, North Carolina

Contract Task Order 0100

November 2005

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Under the

NAVFAC
CLEAN III Program
Contract N62470-02-D-3052

Prepared by

CH2MHILL

Charlotte, North Carolina

Introduction

The health and safety of site personnel and the public are a primary concern during investigative and remedial activities at potentially hazardous sites. This Site Specific Health and Safety Plan (HASP) template is to be used in the formation of site specific HASP's.

NOT TO SCALE

ROUTE TO HOSPITAL
SMWU 360 RFI ADDENDUM WORK PLAN
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: USGS 7/1/91

CH2MHILL

EBL\NAVY CLEAN\CAMPLEJCADD\SMWU 360\CADD\Hospital-Loc.dwg

CH2M HILL SITE SPECIFIC HEALTH AND SAFETY PLAN

(Reference CH2M HILL SOP 19, *Health and Safety Plans*)

This health and safety plan will be kept on the site during field activities and will be reviewed and updated as necessary. The plan adopts, by reference, the standards of practice (SOP) in the CH2M HILL *Corporate Health and Safety Program* as appropriate. The site safety coordinator (SC-HW) is to be familiar with these SOPs and the content of this plan. Site personnel must sign Attachment 1. In addition, this plan adopts procedures in the work plan for the project.

1 PROJECT INFORMATION AND DESCRIPTION

CLIENT OR OWNER: Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

PROJECT NO: 330653.FI.SG

CH2M HILL PROJECT MANAGER: Louise Palmer

OFFICE: CLT

SITE NAME: Marine Corps Base, Camp Lejeune; SWMU 360

SITE ADDRESS: Jacksonville, North Carolina

DATE HEALTH AND SAFETY PLAN PREPARED: 11/09/05

DATE(S) OF INITIAL VISIT: Baker RFI 2003

DATE(S) OF SITE WORK: December 15, 2005 though January 30, 2006

SITE ACCESS: good

SITE SIZE: approximately 1 acre or less.

SITE TOPOGRAPHY: flat

SITE DESCRIPTION AND HISTORY: SWMU 360 is located on in the Hadnot Point Industrial Area between Duncan Street and "O" Street and one block northeast of McHugh Boulevard. SWMU 360 was a former 300-gallon waste oil UST near Building 1817. The UST was removed in 1997. Samples of the soil confirmed that a petroleum release had occurred, along with chlorinated solvents. The actual SWMU is located in the eastern portion of the compound, and a new wash pad was built near the UST excavation area. An RFI was conducted in 2003, resulting in no contaminants of concern in soil related to human health. In groundwater, contaminants of concern were PCE, TCE, and cis-1,2-DCE. Vinyl chloride was not detected at the site; however, it was detected 250 feet upgradient of the site.

The groundwater plume was not bounded during the RFI, and an amended RFI is planned to complete the delineation and to collect remediation parameters for the subsurface soil. Sampling will be conducted at the site, side-gradient, and downgradient of the site.

2 PROJECT ORGANIZATION AND TASKS TO BE PERFORMED UNDER THIS PLAN

2.1 PROJECT ORGANIZATION

CLIENT: Rodger Jackson
Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

CH2M HILL: Activity Manager: Matt Louth / VBO
Project Manager: Louise Palmer / CLT
Health and Safety Manager: Mike Goldman / ATL
Field Team Leader: Dan Tomczak / RDU
Field Staff: James Frank / RDU (field engineer)
Matt Westendorf / CLT (sample technician)

CONTRACTORS and SUBCONTRACTORS: To be named

2.2 DESCRIPTION OF TASKS (Reference CH2M HILL SOP HS-19, *Written Plans*)

Refer to site-specific addenda (i.e., work plan, field sampling plan) for detailed task information. A health and safety risk analysis has been performed for each task and is incorporated into this HASP through task-specific hazard controls and requirements for monitoring and protection. Tasks in addition to those listed below and in the Master HASP require an approved amendment before additional work begins.

2.2.1 HAZWOPER-REGULATED TASKS

- Utility location
- DPT sampling of soil and groundwater
- Hollow stem auger drilling
- Groundwater level measurement
- Surveying

2.2.2 NON-HAZWOPER-REGULATED TASKS

Under specific circumstances, the training and medical monitoring requirements of federal or state Hazwoper regulations are not applicable. It must be demonstrated that the tasks can be performed without the possibility of exposure in order to use non-Hazwoper-trained personnel. **Prior approval from the HSM is required before these tasks are conducted on regulated hazardous waste sites.**

- None

2.3 TASK HAZARD ANALYSIS

Engineering and administrative controls are to be implemented by the party in control of the site or the hazard (i.e., CH2M HILL, subcontractor, or contractor). CH2M HILL employees and subcontractors must, at a minimum, remain aware of hazards affecting them regardless of who is responsible for controlling the hazards. Specialty subcontractors are responsible for the safe operation of their equipment (e.g., drill rig, heavy equipment). CH2M HILL employees are not to operate, or assist in the operation of, any subcontractor or contractor equipment.

		Tasks								
potential Hazard (Refer to SOP, or HSP Section)	**Engineering Controls, Administrative Controls, and Work Practices**	**Drilling, Geoprobe Installation, Well Installation and Abandonment**	**Groundwater Monitoring, Aquifer Testing, and Video Surveying of Wells**				**Surveying**			
Flying debris/objects	Wear safety eyewear and hardhat	X								
Noise > 85dBA	Wear ear plugs/muffs	X								
Electrical	Locate underground and overhead utilities prior to task	X	X				X			
Suspended Loads	Wear hardhat, Be aware of location of overhead hazards	X								
Buried Utilities, drums, tanks	Locate underground utilities prior to task. Stop if object is encountered	X								
Slip, trip, fall	Be sure of footing, especially in wet or muddy conditions	X	X				X			
Back injury	Be careful when lifting and use proper lifting techniques	X	X							
Visible lightning	Discontinue task if lightening is observed	X	X				X			
Drilling (Geoprobe)	Be careful of equipment and pinch points	X								

3.1 HAZARDS POSED BY CHEMICALS BROUGHT ON THE SITE

This section discusses hazards posed by chemicals commonly used during RI/FS and other environmental investigation activities. Additional chemicals may be needed for future tasks.

3.1.1 HAZARD COMMUNICATION

(Reference CH2M HILL SOP HS-05, *Hazard Communication*)

The project manager is to request Material Safety Data Sheets (MSDSs) from the client or from the contractors and the subcontractors for chemicals to which CH2M HILL employees potentially are exposed. The SC-HW is to do the following:

- Give employees required site-specific HAZCOM training.
- Confirm that the inventory of chemicals brought on the site by subcontractors is available.
- Before or as the chemicals arrive on the site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, if any.

The chemical products listed below will be used on the site. Refer to Master HASP for MSDSs.

Chemical	Quantity	Location
Methane	1 liter, compressed	Support Zone
Isobutylene	1 liter, compressed	Support Zone
Pentane	1 liter, compressed	Support Zone
Hydrochloric Acid	<500 mL	Support Zone / sample bottles
Nitric Acid	<500 mL	Support Zone / sample bottles
Sulfuric Acid	<500 mL	Support Zone / sample bottles
Sodium Hydroxide	<500 mL	Support Zone / sample bottles
Methanol	< 1 Gallon	Support / Decon Zones
Isopropanol	< 1 Gallon	Support / Decon Zones
pH buffers	<500 mL	Support Zone
MSA sanitizer	< 1 Liter	Support / Decon Zones
Alconox/Liquinox	< 1 Liter	Support / Decon Zones

3.1.2 SHIPPING AND TRANSPORTATION OF CHEMICAL PRODUCTS

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods*)

Nearly all chemicals brought to the site are considered hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive the CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

3.2 CONTAMINANTS OF CONCERN

Contaminant	Location and Highest Concentration (ppm)	Exposure Limit[a]	IDLH[b]	Symptoms and Effects of Exposure	PIP[c] (eV)
PCE	Original UST area, 1817MW01, 5,100 ug/L	25 ppm	150 Ca	Eye, nose, and throat irritation; nausea; flushed face and neck; vertigo; dizziness; sleepiness; skin redness; headache; liver damage	9.32
TCE	Original UST area, 1817MW01, 460 ug/L	25 ppm	1,000 Ca	Headache, vertigo, visual disturbance, eye and skin irritation, fatigue, giddiness, tremors, sleepiness, nausea, vomiting, dermatitis, cardiac arrhythmia, paresthesia, liver injury	9.45
Cis-1,2-DCE	Original UST area, 1817MW01, 750 ug/L	200 ppm	1000	Irritation eyes, respiratory system; central nervous system depression	9.75

Footnotes:
a: Appropriate value of PEL, REL, or TLV listed
b: IDLH = immediately dangerous to life and health (units are the same as specified "Exposure Limit" units for that contaminant)
c: PIP = photoionization potential
GW - Groundwater
SD - Sediment
SW - Surface Water
J - Estimated concentration
D - Compound identified in analysis at a secondary dilution factor
B - Analyte found in associated blank as well as in sample

3.3 POTENTIAL ROUTES OF EXPOSURE

DERMAL: Contact with contaminated media. This route of exposure is minimized through proper use of PPE, as specified in Section 5.	INHALATION: Vapors and contaminated particulates. This route of exposure is minimized through proper respiratory protection and monitoring, as specified in sections 5 and 6, respectively.	OTHER: Inadvertent ingestion of contaminated media. This route should not present a concern if good hygiene practices are followed (e.g., wash hands and face before eating, drinking, or smoking).

4 PERSONNEL

4.1 FIELD TEAM CHAIN OF COMMAND AND COMMUNICATION PROCEDURES

4.1.1 CLIENT

Client Contact	Base Contact
Rodger Jackson	Ken Cobb
NAVFAC Engineering Command	Camp Lejeune - EMD
Code: EV23	Building 12
6506 Hampton Blvd	Marine Corps Base
Norfolk, Virginia 23508-1278	Camp Lejeune, NC 28542-0004
757-322-4589	(910) 451-9122
757-322-4805 fax	(910) 451-5997
rodger.jackson@navy.mil	Kenneth.W.Cobb@usmc.mil

4.1.2 CH2M HILL

Activity Manager/Phone: Matt Louth / VBO (757) 671-8311 ext 417
Project Manager/Phone: Louise Palmer (704) 329-0073 ext. 296
Health and Safety Manager (HSM)/Phone: Mike Goldman (770) 604-9182 ext 396
Field Team Leader/Phone: Dan Tomczak. RDU (919) 875-4311 ext 19
Site Safety Coordinator/Phone: Dan Tomczak. RDU (919) 875-4311 ext 19

The SC-HW is responsible for contacting the field team leader and the project manager. In general, the project manager either will contact or will identify the client contact. The Health and Safety Manager (HSM) should be contacted as appropriate. The SC-HW or the project manager must notify the client and the HSM when a serious injury or a death occurs or when health and safety inspections by OSHA or other agencies are conducted. Refer to Master HASP sections 11 and 12 for emergency procedures and phone numbers.

4.1.3 SUBCONTRACTORS

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner)*

When specified in the project documents (e.g., contract), this plan may cover CH2M HILL subcontractors. However, this plan does not address hazards associated with tasks and equipment that the subcontractor has expertise in (e.g., operation of drill rig). Specialty subcontractors are responsible for health and safety procedures and plans specific to their work. Specialty subcontractors are to submit plans to CH2M HILL for review and approval before the start of fieldwork. Subcontractors must comply with the established health and safety plan(s). CH2M HILL must monitor and enforce compliance with the established plan(s).

Subcontractor: None covered
Subcontractor Contact:
Telephone:

4.1.4 CONTRACTORS

(Reference CH2M HILL SOP HS-55, *Subcontractor, Contractor, and Owner*)

This plan does not cover contractors that are contracted directly to the client or the owner. CH2M HILL is not responsible for directing contractor personnel and is not to assume responsibility through their actions. When the contractor is in control of the site, ask the contractor to conduct a briefing of their health and safety practices and to describe how they apply to CH2M HILL's activities. Request a copy of the contractor's health and safety plan.

Contractor: None covered
Contact Name:
Telephone:

Table 5 - PPE Specifications [a]

	Level		Head	Respirator [b]
General site entry Surveying	D	Work clothes; steel-toe, leather work boots; work glove.	Hardhat [c] Safety glasses Ear protection [d]	None required
Hand augering, hollow stem auger drilling oversight, Geoprobe boring	Modified D	Work clothes or cotton coveralls **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Safety glasses Ear protection [d]	None required
Groundwater sampling Soil boring	Modified D	**Coveralls:** Uncoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Safety glasses Ear protection [d]	None required.
Tasks requiring upgrade	C	**Coveralls:** Polycoated Tyvek® **Boots:** Steel-toe, chemical-resistant boots OR steel-toe, leather work boots with outer rubber boot covers **Gloves:** Inner surgical-style nitrile & outer chemical-resistant nitrile gloves.	Hardhat [c] Splash shield [c] Ear protection [d] Spectacle inserts	APR, full face, MSA Ultratwin or equivalent; with GME-H cartridges or equivalent[e].

Reasons for Upgrading or Downgrading Level of Protection

Upgrade[f]	Downgrade
• Request from individual performing tasks. • Change in work tasks that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 5) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

[a] Modifications are as indicated. CH2M HILL will provide PPE only to CH2M HILL employees.

[b] No facial hair that would interfere with respirator fit is permitted.

[c] Hardhat and splash-shield areas are to be determined by the SSC.

[d] Ear protection should be worn when conversations cannot be held at distances of 3 feet or less without shouting.

[e] Cartridge change-out schedule is at least every 8 hours (or one work day), except if relative humidity is > 85%, or if organic vapor measurements are > midpoint of Level C range (refer to Section 5)--then at least every 4 hours. If encountered conditions are different than those anticipated in this HSP, contact the HSM.

[f] Performing a task that requires an upgrade to a higher level of protection (e.g., Level D to Level C) is permitted only when the PPE requirements have been approved by the HSM, and an SSC qualified at that level is present.

6.1 Air Monitoring Specifications

(Reference CH2M HILL SOP HS-06, *Air Monitoring*

Instrument	Tasks	Action Levels[a]		Frequency [b]	Calibration
FID: OVA model 128 or equivalent	All intrusive tasks	<1 ppm 1 to 10 ppm >10 ppm	Level D Level C Evacuate work area and contact HSM	Initially and periodically during task	Daily
PID: OVM with 10.6eV lamp or equivalent	All intrusive tasks	<1 ppm 1 to 10 ppm >10 ppm	Level D Level C Evacuate work area and contact HSM	Initially and periodically during task	Daily
CGI: MSA model 260 or 261 or equivalent	All intrusive tasks	0-10% : 10-25% LEL: >25% LEL:	No explosion hazard Potential explosion hazard Explosion hazard; evacuate or vent	Continuous during advancement of boring or trench	Daily
O_2Meter: MSA model 260 or 261 or equivalent	All intrusive tasks	>25%[c] O_2: 20.9%[c] O_2: <19.5%[c] O_2:	Explosion hazard; evacuate or vent Normal O_2 O_2 deficient; vent or use SCBA	Continuous during advancement of boring or trench	Daily

[a] Action levels apply to sustained breathing-zone measurements above background.

[b] The exact frequency of monitoring depends on field conditions and is to be determined by the SSC; generally, every 5 to 15 minutes if acceptable; more frequently may be appropriate. Monitoring results should be recorded. Documentation should include instrument and calibration information, time, measurement results, personnel monitored, and place/location where measurement is taken (e.g., "Breathing Zone/MW-3", "at surface/SB-2", etc.).

[c] If the measured percent of O_2 is less than 10, an accurate LEL reading will not be obtained. Percent LEL and percent O_2 action levels apply only to ambient working atmospheres, and not to confined-space entry. More-stringent percent LEL and O_2 action levels are required for confined-space entry (refer to Section 2).

[d] Refer to SOP HS-10 for instructions and documentation on radiation monitoring and screening.

[e] Noise monitoring and audiometric testing also required.

6.2 Calibration Specifications

(Refer to the respective manufacturer's instructions for proper instrument-maintenance procedures)

Instrument	Gas	Span	Reading	Method
PID: OVM, 10.6 or 11.8 eV bulb	100 ppm isobutylene	RF = 1.0	100 ppm	1.5 lpm reg T-tubing
PID: MiniRAE, 10.6 eV bulb	100 ppm isobutylene	CF = 100	100 ppm	1.5 lpm reg T-tubing
PID: TVA 1000	100 ppm isobutylene	CF = 1.0	100 ppm	1.5 lpm reg T-tubing
FID: OVA	100 ppm methane	3.0 ± 1.5	100 ppm	1.5 lpm reg T-tubing
FID: TVA 1000	100 ppm methane	NA	100 ppm	2.5 lpm reg T-tubing
Dust Monitor: Miniram-PDM3	Dust-free air	Not applicable	0.00 mg/m^3 in "Measure" mode	Dust-free area OR Z-bag with HEPA filter
CGI: MSA 260, 261, 360, or 361	0.75% pentane	N/A	50% LEL ± 5% LEL	1.5 lpm reg direct tubing

6.3 Air Sampling

Sampling, in addition to real-time monitoring, may be required by other OSHA regulations where there may be exposure to certain contaminants. Air sampling typically is required when site contaminants include lead, cadmium, arsenic, asbestos, and certain volatile organic compounds. Contact the HSM immediately if these contaminants are encountered.

Method Description

None Anticipated

Personnel and Areas

Results must be sent immediately to the HSM. Regulations may require reporting to monitored personnel. Results reported to:

HSM: Michael Goldman/ATL

7 APPROVAL

This site-specific health and safety plan has been written for use by CH2M HILL only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

7.1 ORIGINAL PLAN

WRITTEN BY: Louise Palmer **DATE:** 11/09/2005

APPROVED BY: DATE: Michael Goldman **DATE:** November 11, 2005

7.2 REVISIONS

REVISIONS MADE BY: Louise Palmer **DATE:** 12/07/2005

REVISIONS TO PLAN: Table 2.3

REVISIONS APPROVED BY: Michael Goldman **DATE:** December 9, 2005

8 ATTACHMENTS

Attachment 1: Employee Signoff

12 EMERGENCY CONTACTS

If an injury occurs, notify the injured person's personnel office as soon as possible after obtaining medical attention for the injured person. Notification MUST be made within 24 hours of the injury.

24-Hour CH2M HILL Emergency Beeper – 1 (888) 444-1226

Medical Emergency – 911 or		**CH2M HILL Medical Consultant**
		Dr. Jerry Berke
Hospital ER (On-Base)#:	(910) 451-4840	Health Resources, Woburn, MA
	(910) 451-4841	(888) 631-0129
	(910) 451-4842	(After hours calls will be returned within 20 minutes)
Onslow County ER (Off-Base)#:	(910) 577-2240	
Ambulance (On-Base)#:	(910) 451-3004	
	(910) 451-3005	
Ambulance (Public) #:	(910) 451-9111	
LEPC (Poison Control) #:	(800) 222-1222	
Fire/Spill Emergency – 911 or		**Local Occupational Physician**
		Occupational Medicine Specialists
Base Fire Response #:	(910) 451-9111	4815 Oleander Dr.
		Wilmington, NC 28403
		(910) 451-1111
Security & Police – **911 or**		**Corporate Director Health and Safety**
		Name: Millie Grinell/DEN
Base Security #:	(910) 451-2555	Phone: (715) 682-9334
		24-hour emergency beeper: 888-444-1226
On-Scene Coordinator		**Environmental Management Division (EMD)**
Name: Fire Chief		Name: Bob Lowder
Phone:	(910) 451-5815	Phone: (910) 451-9607
Utilities Emergency		**Health and Safety Manager (EMD)**
Water		Name: Michael Goldman/ATL
Gas: Contact Base EMD		Phone: (770) 604-9182 x396
Electric		
Designated Safety Coordinator (DSC) see Site-Specific HASP		**Regional Human Resources Department**
Name:		Name: Mary Jo Jordan/GNV
Phone:		Phone: (352) 355-2867
Project Manager see Site Specific HASP		**Corporate Human Resources Department**
Name:		Name: John Monark/COR
Phone:		Phone: (303) 771-0900
Federal Express Dangerous Good Shipping		**Workers' Compensation and Auto Claims**
Phone: (800) 238-5355		Sterling Administration Services
CH2M HILL Emergency # for Shipping Dangerous Goods		Phone: (800) 420-8926 After hours: (800) 497-4566
Phone: (800) 255-3924		Report fatalities AND report vehicular accidents involving pedestrians, motorcycles, or more than two cars

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: TBD	**Evacuation Assembly Area(s):** TBD by the SC-HW; will probably be the local hotel where the field team is staying

Facility/Site Evacuation Route(s): follow main roads towards access gates and off the Base

Route to Hospital: (Refer to Figure 12-1) Depends on location within base area

12.2 GOVERNMENTAL AGENCIES INVOLVED IN PROJECT

Contact the project manager. Generally, the Project Manager will contact relevant government agencies.

Nearest On-Base Hospital.

EMPLOYEE SIGNOFF

The employees listed below have been given a copy of this health and safety plan, have read and understood it, and agree to abide by its provisions.

EMPLOYEE NAME	EMPLOYEE SIGNATURE AND DATE