01.04-11/27/96-01748

[redacted]

PHASE I INVESTIGATION
OPERABLE UNIT NO. 16 (Sites 89 and 93)

MCB CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0356

NOVEMBER 27, 1996

Prepared for:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND

Norfolk, Virginia

Under:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared by:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

Page

APPENDICES

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
COC	Chain-of-Custody
CTO	Contract Task Order
cis-DCE	cis-1,2-Dichloroethene
trans-DCE	trans-1,2-Dichloroethene
DoN	Department of the Navy
DQO	Data Quality Objective
DRMO	Defense Reauthorization and Marketing Office
°F	degrees Fahrenheit
FFA	Federal Facilities Agreement
ft	feet
IDW	investigation derived waste
IRP	Installation Restoration Program
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
MCB	Marine Corps Base
MCL	maximum contaminant level
MS/MSDs	matrix spike/matrix spike duplicates
NC DEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCWQS	North Carolina Water Quality Standard
NEESA	Navy Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center
No.	Number
NPL	National Priorities List
OU	operable unit
PCB	polychlorinated biphenyl
PCE	Tetrachloroethene
PID	photoionization detector
ppb	parts per billion
ppm	parts per million
pvc	polyvinyl chloride

LIST OF ACRONYMS
(Continued)

QA/QC	quality assurance/quality control
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remediation Investigation/Feasibility Study
SOPs	standard operating procedures
SPT	standard penetration test
SVOA	semivolatile organic analysis
SVOC	semivolatile organic compounds
TAL	Target Analyte List
TCA	1,1,2,2-tetrachloroethane
TCE	trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristics Leaching Procedure
TPH	total petroleum hydrocarbon
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOA	volatile organic analysis
VOC	volatile organic compound

1.0 INTRODUCTION

Marine Corps Base (MCB) Camp Lejeune was place on the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) National Priorities List (NPL) effective November 4, 1989 (54 Federal Register 41015, October 4, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment, Health and Natural Resources (NC DEHNR), the United States Department of the Navy (DoN) and the Marine Corps entered into a Federal Facilities Agreement (FFA) for MCB Camp Lejeune in 1991. The primary purpose of the FFA was to ensure that environmental impacts associated with past and present activities at the MCB are throughly investigated, and that appropriate CERCLA response and Resource Conservation Recovery Act (RCRA) corrective action alternatives are developed and implemented as necessary to protect public health and welfare, and the environment (MCB Camp Lejeune FFA, 1989).

The fiscal year 1997 Site Management Plan for MCB, Camp Lejeune, a primary document referenced in the FFA, identifies 42 sites that require Remedial Investigation/Feasibility Study (RI/FS) activities. These 42 sites have been divided into 18 Operable Units (OUs). This report describes the Phase I investigation conducted at OU No. 16, which is comprised of Sites 89 and 93. The location of OU No. 16 is provided on Figure 1-1.

1.1 Scope and Objectives

The scope of the Phase I field investigation was to evaluate the nature and extent of the threat to public health and the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants. The Phase I investigation was conducted through the sampling of groundwater, surface water, and sediment, evaluating the resultant analytical and geologic data, and performing a qualitative assessment of the findings.

The objective of the Phase I investigation was to gather data and to delineate the extent of groundwater contamination and the impact to Edwards Creek. This data is to be used to provide recommendations for Phase II of the investigation.

1.2 Report Organization

This report is divided into six sections, including Section 1.0 Introduction. Section 2.0 presents the site characteristics. The field investigation which details procedures and sampling strategies is presented in Section 3.0. Section 4.0 presents the findings of the Phase I investigation. The conclusions and recommendations for this document are contained in Section 5.0, and references are provided in Section 6.0. The appendices referenced throughout the document are included at the end of the report and include Appendices A through C .

1.3 Site Description and History

The sections below summarizes information concerning the site description and history. Further information of this type can be found in the final Project Plans (Baker, 1996).

1.3.1 Site 89

Site 89 is located near the intersection of "G" and Eighth Streets within the Defense Reauthorization and Marketing Office (DRMO) area of Camp Geiger (Figure 1-2). The site originally contained an underground storage tank (STC-868) which was a steel 550-gallon waste oil tank located between building STC-867 (a soil storage facility) and an elevated wash rack. The orientation of the former underground storage tank (UST) in relation to these buildings is shown on Figure 1-3. Edwards Creek is the nearest surface water body, located approximately 525 feet south of the former UST basin.

UST STC-868 was installed in 1983 and was reportedly used until 1993 for the storage of waste oil. The tank was removed in 1993 and an initial investigation was conducted. Details of the investigation are included in Section 1.4. The major finding of this initial investigation at Site 89 was the detection several chlorinated solvents in the groundwater. The presence of chlorinated compounds during the initial investigation demonstrated that impact to the groundwater involved compounds not normally associated with a petroleum UST site. Historical records research of the area which is now occupied by the DRMO show that the site operated as a base motor pool until approximately 1988. These findings led to the inclusion of Site 89 into MCB Camp Lejeune's Installation Restoration (IR) Program. The IR Program focuses on non UST sites and provides the framework for more complex and detailed environmental investigations at the base. The current area of Site 89 has been expanded to include more area than only the former UST site. The site presently includes the entire DRMO and additional area outside the DRMO fence, including the wooded areas to the south and east.

1.3.2 Site 93

Site 93 is located near the intersection of Ninth and "E" Streets within Camp Gieger. The buildings in this area were constructed during the Korean War. Building TC-942 currently functions as a supply room for the Marine Infantry School. Items such as field jackets, ponchos, and canteens are stored in the building. Other buildings in the area serve as classrooms for the school and barracks. Site 93 originally had a 550-gallon oil storage UST associated with it. The tank was located at the southwest corner of Building TC-942 (See Figure 1-4).

The UST at Site 93 was permanently closed by removal in December 1993. There is no documentation available concerning the installation date or usage of the UST. Based on the elevated concentrations of oil and grease at the time of tank removal, a release is suspected to have occurred. After the removal of the tank, a subsequent investigation was conducted in June 1995 by R.E. Wright Associates, Inc.. The investigation included the installation of five monitoring wells around the former UST excavation and the collection of soil and groundwater samples. The results of the sampling are included in Section 1.5. Since the time of the UST investigation, the area has been expanded to determine if there are any other sources for the observed contamination. The site now includes the area north, south, east, and west of Buildings TC-940 and TC-942, and the area where the UST was located.

1.4 Previous Investigations and Findings

The following sections provide information on the previous investigations carried out at each of the two sites. The information is summarized in this document for the purpose of providing relevant

background information which has been used to assess the sites. For further details, concerning previous investigative work, the reader is referred to the Final Project Plans.

1.4.1 Site 89

UST STC-868 was installed in 1983 and was reportedly used until 1993 for the storage of waste oil. The tank was removed in 1993 and an initial investigation was conducted by installing two monitoring wells. Based on elevated levels of both total petroleum hydrocarbons (TPH) and oil and grease at the time of tank removal, a release was suspected to have occurred.

An additional one well site check was conducted in June 1994 by R.E. Wright Associates, Inc. to determine if a release had occurred. This investigation included one soil boring southeast of the tank excavation area which was converted to a monitoring well. One soil sample was analyzed for oil and grease and halogenated solvents. Groundwater samples were collected from the new and existing monitoring wells and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and Toxicity Characteristic Leaching Procedure (TCLP) metals. The results from this sampling effort is summarized below:

- The soil sample detected 1,400,000 micrograms per kilogram of oil and grease, however, halogentated solvents were below the detection limits for all parameters.
- Three groundwater samples indicated concentrations of several chlorinated solvents. The maximum concentrations were as follows:
  - cis-1,2-dichloroethene 2,130 µg/L
  - trans-1,2-dichloroethene 1,580 µg/L
  - 1,1,2,2-tetrachloroethane 8,600 µg/L
  - trichloroethene 1,500 µg/L
- SVOCs and TCLP metals were below the method detection limits in all samples.

1.4.2 Site 93

One 550-gallon UST was removed from this site in December 1993. Based on elevated levels of oil and grease at the time of the tank removal, a release was suspected to have occurred.

A subsequent investigation was conducted in June 1995 by R.E. Wright Associates, Inc. which included the installation of five monitoring wells around the former UST excavation and the collection of soil and groundwater samples. Soil samples were analyzed for oil and grease and halogenated solvents. Groundwater samples were analyzed for VOCs, SVOCs, and TCLP metals. The results of the sampling are summarized below:

- Oil and grease results from the soil samples ranged from 56,100 to 8,126,000 µg/kg.
- Napthalene and tetrachloroethene were detected in the soil samples at 0.049 and 20 µg/kg, respectively.
- Groundwater samples detected cis-1,2-dichloroethene and chlorobenze at 250 µg/L and 90 µg/L, respectively. Tetrachloroethene and trichloroethene were detected at

90 µg/L and 30 µg/L, respectively. Several SVOCs were detected at concentrations below regulatory limits. Total cadmium concentrations in each well and lead concentrations in one well exceeded regulatory levels. The presence of these metals are suspected to be a result of existing natural conditions, and not site operations.

The results of these initial investigations at Sites 89 and 93 indicated that soil and groundwater had been impacted due to previous operations. These findings then required that further investigative activities be initiated. The Phase I investigation has been completed to collect additional data, summarize the information, and provide recommendations as to what additional activities, if any, are required at each of these sites.

2.0 SITE CHARACTERISTICS

This section of the report describes the physical setting of OU No. 16 including the topography, drainage characteristics, geology, hydrogeology, and general groundwater flow patterns. The sections which follow describe the site characteristics of OU No. 16 in its entirety, including both Sites 89 and 93 because of their close proximity to one another.

2.1 Topography and Surface Features

Sites 89 and 93 are located within the Camp Geiger area of MCB Camp Lejeune. Site 89 is located near the intersection of "G" and Eighth Streets within the DRMO while Site 93 is located near the intersection of "E" and Ninth Streets. The majority of the area in and around Sites 89 and 93 is flat and covered by buildings, streets, parking areas, and some grass. Ground surface elevations are approximately 5 to 20 feet above mean sea level (msl). In general, the ground surface is higher in the northern and western portions of the site and gently slopes to the south and the east. Figure 2-1, provides an illustration of the area with contour lines depicting the approximate elevation of the land surface. As shown on the figure, the area within the sites is relatively flat with topography in the central portion of the OU influenced by Edwards Creek.

2.2 Surface Water Hydrology

Surface water features at the sites consist of a series of drainage swales and Edwards Creek which is located in the central and southern portions of OU No. 16. The majority of the drainage swales parallel the streets and capture storm water run off from the sites. These swales direct surface runoff towards Edwards Creek and only flow during storm events. During heavy storm events, water ponds in some low lying areas. As shown on Figure 2-1, topography at the site directs the majority of surface drainage towards Edwards Creek. The NC DEHNR stream classifications for Edwards Creek are SC (aquatic life propagation and survival, fishing, wildlife, and secondary recreation), HQW (high quality water), and NSW (nutrient sensitive water).

2.3 Site Geology

The sections which follow describe the site specific geology based on the Phase I Investigation. The site geology is also placed in context of the regional geology, as described in the "Hydrogeologic Framework of U.S. Marine Corps Base at Camp Lejeune, North Carolina", Cardinell, et al., 1993. The geology at Sites 89 and 93 is described together because of their close proximity to each other.

A fairly consistent depositional sequence was observed in the borings throughout Sites 89 and 93. This observed sequence is similar to the generalized North Carolina coastal plain sequence shown in Table 2-1. Table 2-1 shows that the Yorktown, Eastover, and Pungo River Formations lie between the Undifferentiated and Belgrade Formations. The Yorktown, Eastover, and Pungo River Formations, however, have not been identified at Camp Lejeune.

During this study, the Undifferentiated and River Bend Formations were encountered. The Belgrade Formation did not appear to be consistent at OU No. 16, however, a description of this unit has been included in this report. Based upon the regional geology and the soil borings completed at Sites 89 and 93, it appears that the shallow temporary wells installed during this investigation are screened in the Undifferentiated Formation (surficial aquifer) and the intermediate wells are screen in the

upper portions of the River Bend Formation (Castle Hayne aquifer). The sections below provide a description of each of these units.

The Undifferentiated Formation is comprised of loose to medium dense sands and soft to medium stiff clay. This formation is comprised of several units of Holocene and Pleistocene ages and can consist of a fine to coarse sand, with lesser amounts of silt and clay. At Sites 89 and 93, this formation typically extends to a depth between 20 and 30 feet below ground surface (bgs). The silt and clay lenses present within this formation may be correlated to the regional geology as the Belgrade Formation, or Castle Hayne confining unit. This unit, however, did not appear consistent at Sites 89 and 93.

The Belgrade Formation is comprised of fine sand with some shell fragments, silt, and clay of the Miocene age. Identifying this formation at OU No. 16 was difficult due to its inconsistency. Overall, the Undifferentiated Formation (surficial aquifer) appears to lie immediately above the River Bend Formation (upper portion of the Castle Hayne aquifer), with little to no presence of the Belgrade Formation (Castle Hayne confining unit). The inconsistent nature of the Belgrade Formation suggests that a significant hydraulic connection exists between the Undifferentiated Formation (surficial aquifer) and the upper portions of the River Bend Formation (Castle Hayne aquifer). At best, the Belgrade Formation at OU No. 16 can be classified as a semi-confining unit or a "retarding layer", as it is laterally discontinuous and does not exhibit completely confining conditions on the River Bend Formation below (Castle Hayne aquifer).

Beneath the Undifferentiated Formation and the limited Belgrade Formation lies the River Bend Formation (upper potion of the Castle Hayne aquifer). This unit, which is predominantly composed of dense to very dense shell and fossil fragments interbedded with calcareous sands is present at OU No. 16 approximately 25 to 50 feet bgs.

Figure 2-2 provides the locations of four geologic cross-sections that have been prepared to illustrate the subsurface conditions at Sites 89 and 93. Cross-sections B-B' and C-C' traverse the sites from north to south and cross-sections A-A' and D-D' traverse east to west. The following paragraphs summarize the information displayed by each of the cross-sections.

Figure 2-3 displays the subsurface conditions along section A-A'. The subsurface soil is comprised of two distinct layers. The near surface soils are comprised of mostly fine to medium sand with some silt and clay. This is considered to be the Undifferentiated Formation (surficial aquifer). A layer of clay, fine sand, and silt is present in borings TW06, TW01, TW04, and TW13 near the surface to approximately 10 feet below ground surface. Although inconsistent across the sites, this unit may be the Belgrade Formation (Castle Hayne confining unit). The second distinct layer observed in this cross-section begins approximately 20 feet below ground surface and is considered to be the River Bend Formation (upper portion of the Castle Hayne aquifer). The material at this depth is comprised of shell and fossil fragments with a little silt and clay. At borings TW13IW and TW18IW, a green to dark green fine sand with little silt and trace clay was encountered in the bottom of the borings at approximately 45 feet below ground surface.

Figure 2-4 represents cross-section B-B' which runs north to south across the sites. In general, the subsurface soils along cross-section B-B' are comprised of fine to coarse sands with lesser amounts of silt and clay. Lenses of finer and coarser textured soils are occasionally present over the length of the cross-section. This variability in gradation is evident in borings TW01 and TW14 where

lenses of fine sand and silt were encountered, and again at TW05 where a lens of medium to coarse sand is present in the boring at approximately 8 feet below ground surface.

Cross-section C-C' is displayed on Figure 2-5. This cross-section runs north to south in the wooded area east of Site 89. The cross-section includes well clusters TW11, TW20, and TW18. Two distinct layers are present in the cross-section: a near surface layer, representing the Undifferentiated Formation (surficial aquifer) and a second layer representing the River Bend Formation (upper portion of the Castle Hayne aquifer). The near surface material is comprised of fine sand with a little silt and clay and the second layer comprised of shell and fossil fragments.

Figure 2-6 displays the subsurface information along cross-section D-D'. This cross-section begins at Site 93 and runs east through Site 89 and into the wooded area east of the railroad tracks. Again, two distinct layers are present in the subsurface material representing the Undifferentiated Formation (surficial aquifer) and the River Bend Formation (upper portion of the Castle Hayne aquifer). The near surface material is generally comprised of fine sand with little to some silt and clay. At approximately 20 to 25 feet bgs the second layer is encountered. This unit contains shell and fossil fragments with trace to little silt and clay interbedded with calcareous sand. This unit extends to approximately 40 to 45 feet below ground surface where a fine sand with little to some silt and trace clay is encountered.

In the near surface material a thin layer of fine to coarse sand with trace gravel and silt was encountered in the majority of the borings. However, this material is absent in the eastern portion of the cross section being replaced by a mostly clay soil.

2.4 Site Hydrogeology

As shown on Table 2-1, the surficial aquifer resides within the Undifferentiated Formation, the Belgrade Formation resides within the Castle Hayne confining unit, and the Castle Hayne aquifer resides within the River Bend Formation. The 1993 USGS document referenced above reports that the thickness of the surficial aquifer to be 18 to 23 feet and the thickness of the Castle Hayne confining layer as 4 to 7 feet in the vicinity of OU No. 16 (based on supply well boring logs). This places the elevation of the Castle Hayne confining unit from 0 to 8 feet above msl. These thicknesses and elevations are comparable to what has been observed at OU No. 16.

At the time of drilling, groundwater was generally encountered from 5 to 10 feet bgs. A complete picture of the groundwater flow regime in the form of a potentiometric map has not been presented in this report. Instead, only relative groundwater elevations are shown on Figures 2-7 and 2-8 for the surficial (shallow wells) and the Castle Hayne aquifers (intermediate wells), respectively. Groundwater elevations collected from the temporary monitoring wells were not used for an accurate presentation of groundwater flow due to the fact that measurements were recorded on different days depending on the progress of temporary well installation and sampling efforts. It is reasonable to consider the elevations presented on the figures as a guide depicting the local groundwater flow regime.

The groundwater elevation data suggest that the flow patterns observed for the surficial and Castle Hayne aquifers display a similar trend. Overall, elevations are higher in the northern portion of the OU, with decreasing values in the direction of Edwards Creek and in the wooded area east. This suggests a groundwater flow direction to the east with pronounced localized flow to the south as Edwards Creek serves as a groundwater discharge boundary. Edwards Creek appears to effect flow

within the surficial aquifer more so than the Castle Hayne aquifer. It is reasonable to assume that the New River, located east of the OU, will effect the groundwater flow of the Castle Hayne aquifer, causing groundwater at depth to move east, toward the river.

Groundwater head differentials between the shallow and intermediate wells were evaluated to determine if a vertical component of flow underlies the OU. Elevations in shallow temporary wells are greater than the associated elevation in the intermediate temporary wells in those wells located north of Edwards Creek. This data demonstrate a downward component of groundwater movement from the surficial aquifer to the Castle Hayne aquifer north of Edwards Creek. This information supports the assumption that complete confining conditions of the Castle Hayne aquifer in this area are not likely. The geologic and hydrogeologic information collected thus far further suggest that there is a definite, and in some places a significant, hydraulic connection between the surficial aquifer and the underlying Castle Hayne aquifer. Accordingly, this system produces suitable conditions for the vertical migration of contaminants.

Another generalization that can be made concerning the groundwater flow pattern involves the temporary wells installed within the DRMO area (TW15, TW15IW, TW16, and TW16IW). These wells all exhibit slightly lower groundwater elevations than nearby points, suggesting a depression of the potentiometric surface in this area. Lower groundwater elevations in this region of OU 16 may be a result of reduced amounts of infiltration as this portion of the site is mostly covered by asphalt and concrete.

2.5 Identification of Water Supply Wells

Water supply wells within a one-mile radius of the sites were identified by reviewing base information. A total of 12 supply wells were identified to be within a one-mile radius of Sites 89 and 93. The location of the wells relative to the sites are shown on Figure 2-9 . Table 2-2 provides detailed information concerning each of these wells including total depth, well screen interval, and whether the well is active or inactive. The supply wells near OU No. 16 range in depths from 70 feet bgs to 250 feet bgs. Two of the supply wells, TC-1000 and TC-1001, fall just beyond the boundary of the 1-mile radius shown on Figure 2-9. These wells are included in the figure and on Table 2-2 as additional information.

3.0 FIELD INVESTIGATION

Section 3.0 provides a description of the field activities and sample analysis associated with the investigation at Sites 89 and 93. General activities and standard operating procedures followed the guidelines set forth in the Final Project Plans. This section discusses the specific field activities and graphically depicts or tabulates appropriate investigative points.

3.1 Field Activities

The investigative activities completed at sites 89 and 93 varied depending upon the individual site histories and previous investigative work. However, the objective of estimating the impact to groundwater remained consistent for both sites. The Phase I field investigation provided the necessary data to estimate the effects of previous site activities on the groundwater at OU No. 16. This was accomplished through the acquisition of environmental samples which were analyzed on-site and by a fixed based laboratory. The following explains which tasks were completed at the sites. Further discussion of the field activities presented on a site by site basis follow.

Site 89

- Temporary Well Installation
- Groundwater Sampling
- Surface Water and Sediment Sampling
- Land Survey
- Well Abandonment
- Decon Procedures
- Investigative Derived Waste Management

Site 93

- Temporary Well Installation
- Groundwater Sampling
- Land Survey
- Well Abandonment
- Decon Procedures
- Investigative Derived Waste Management

3.1.1 Subsurface Soil Sampling

Standard drilling methods were employed at both sites to complete soil borings for temporary monitoring well installation. Soil samples were collected via split-spoon sampling methods in general accordance with the procedures outlined in the American Society for Testing and Materials (ASTM) Standard Method for Penetration Test and Split-Barrel Sampling of Soils (Designation D 1586). Split-spoons of 24-inch (nominal) length were used throughout the investigation. In most cases, samples were collected continuously from the surface (i.e., ground surface to a depth of twelve inches) at two-foot intervals starting at one foot below ground surface. Continuous sample collection proceeded until the water table. Below this depth, samples were collected at various intervals depending upon site conditions.

Each sample was classified in the field by a geologist using the Unified Soil Classification System (USCS) in accordance with the visual-manual methods described by the American Society for Testing and Materials (ASTM, 1993a). The field descriptions were recorded in a field logbook and later transposed onto boring log records. Soil classification included characterization of soil type, grain size, color, moisture content, relative density, plasticity, and other pertinent information such as any indication of contamination. The Standard Penetration Test (SPT) blow counts were also recorded. In addition, a photoionization detector (PID) was used to screen the samples to detect the presence of any VOCs. The test boring records and well construction records are presented in Appendix A. Sample information such as boring number, sample identification, time and date of sample collection, field sampling team, and analytical parameters were recorded for each of the soil samples.

All drilling and soil sampling activities were performed in Level D personnel protective equipment. Soil cuttings generated during the investigation were collected, handled, and stored according to the procedures outlined in Section 3.1.8.

3.1.1.1 Site 89

Thirty soil borings were advanced at Site 89. The soil samples were collected from these borings for lithologic classification only. There were no environmental soil samples collected at Site 89. Fourteen of the borings were shallow depth borings used for the installation of the shallow temporary monitoring wells. These borings ranged in depth from 10 to 20 feet bgs. Sixteen of the borings were drilled to depths ranging from 37 to 47 feet bgs. These borings were used to install the intermediate wells at Site 89.

3.1.1.2 Site 93

A total of fifteen soil borings were drilled at Site 93. The soil samples collected from these borings were used for lithologic classification only. Of the fifteen borings drilled at Site 93, eight were considered shallow depth and seven were considered intermediate depth. The shallow borings ranged in depths from 15 to 25 feet bgs. The intermediate depths ranged from 50 to 54 feet bgs.

3.1.2 Temporary Monitoring Well Installation

A total of 44 temporary monitoring wells were installed at Sites 89 and 93 as part of the Phase I investigation. This included 14 shallow and 16 intermediate wells at Site 89 and 7 shallow and 7 intermediate wells at Site 93. The wells were installed using a standard truck or track mounted drill rig, depending upon site access. Use of a standard drill rig enabled the field crew to install intermediate wells which were approximately 50 feet below ground surface. The wells were situated spatially across the sites to provide samples from potentially impacted groundwater, and to characterize the nature and extent of possible contamination. Occasionally, existing permanent monitoring wells were used in conjunction with the newly installed temporary wells to collect groundwater samples and to evaluate groundwater flow patterns. Placement of the temporary wells was based on review of aerial photographs, previous investigations, site conditions, locations of underground utilities, the location of existing monitoring wells, and the overall scope and objectives of the project. Locations of the temporary monitoring wells presented in the Final Project Plans provided initial guidance, however, results of on-site laboratory data were used on a daily bases for decisions on final well locations. These decisions were a cooperative effort involving the Baker Site

Manger, the Baker Project Manger, Naval Facilities Engineering Command, Atlantic Division (LANTDIV), and MCB Camp Lejeune personnel.

All of the monitoring wells were constructed of one-inch diameter, Schedule 40, flush-joint and threaded, polyvinyl chloride (PVC) casing. The wells utilized either a 10-foot or a 15-foot screened interval of No. 10 (i.e., 0.0010 inch) slot screen sections. The screened sections of the wells were covered with a piece of cloth material known as a "well sock", which reduces the amount of fine grained material that moves through the screen and into the monitoring well. The boreholes were backfilled to the surface with natural material and left as "stick-up" for subsequent groundwater sampling. The well identification of each temporary well was written with a permanent marker to identify the location during sampling and surveying activities. Typical temporary monitoring well construction details are shown on Figure 3-1. Well construction records are provided on the Test Boring and Well Construction Records in Appendix A.

The following sections discuss the installation of the temporary wells on a site by site basis, providing information concerning the total number of shallow and intermediate wells, their associated depths and their locations.

3.1.2.1 Site 89

At Site 89, 30 temporary wells were installed between August 2, 1996 and August 19, 1996. The wells were installed after completing a soil boring to the appropriate depth as discussed in Section 3.1.1. Thirteen shallow wells ranged in depths of 10 to 19 feet bgs. In general, the shallow wells were installed approximately 10 feet below the water table encountered during drilling. The intermediate wells were installed to identify the absence or presence of a semi-confining layer (known as the "Castle Hayne confining unit") at the site and to characterize the groundwater at this depth. Fifteen intermediate wells were installed ranging in depths from 35 to 47 feet bgs. Screened intervals for these wells ranged from 30 to 47 feet bgs (refer to Appendix A and Table 3-1 for test boring and well construction records). Figure 3-2 shows the locations of the temporary wells installed at Site 89.

3.1.2.2 Site 93

Fourteen temporary wells were installed at Site 93. This included seven shallow and seven intermediate wells. The wells at Site 93 were installed between July 29, 1996 and August 5, 1996. The wells were installed after completing a soil boring to the appropriate depth as discussed in Section 3.1.1. Shallow wells at Site 93 ranged in depth from 14.5 to 24.5 feet bgs. In general, the shallow wells were installed approximately 10 feet below the water table encountered during drilling. The intermediate wells were installed to identify the absence or presence of a the Castle Hayne Confining Unit and to characterized the groundwater at this depth. The intermediate wells ranged in depths from 50 to 53.5 feet below ground surface. Screened intervals for these wells ranged from 45 to 53.5 feet bgs (refer to Appendix A and Table 3-2 for test boring and well construction records). Figure 3-3 shows the locations of the temporary wells installed at Site 93.

3.1.3 Groundwater Sampling

Groundwater samples were collected to assess whether contamination, that may have resulted from previous activities at Sites 89 and 93 was present in the aquifer below. Based upon previous investigative results and historical records, the contaminants of potential concern were primarily

volatile organic compounds. Prior to groundwater purging, a water level measurement from each well was obtained. The total well depth was also recorded from each well to the nearest 0.1-foot. Water level and well depth measurements were used to calculate the volume of water in each well and the volume of water necessary to purge the well.

A minimum of three to five well volumes were purged from each well prior to sampling. Measurements of pH, specific conductance, temperature, turbidity, and dissolved oxygen (D.O.) were taken after each well volume was purged to ensure that the groundwater characteristics had stabilized before sampling These measurements were recorded in a field logbook and are provided on a site by site basis on Tables 3-3 and 3-4. Purge water was contained and handled as described in Section 3.1.8.

During the groundwater sampling event, a low flow well purging and sampling technique was employed. The sampling methodology was developed in response to conversations with USEPA Region IV personnel in Athens, Georgia. A peristaltic pump (GeoPump), with the intake set two to three feet into the static water column, was used to purge each of the wells. While purging groundwater from each of the monitoring wells, a flow rate of less than 0.25 gallons per minute (gpm) was maintained. The groundwater samples were collected directly from the pump discharge. Dedicated sections of polyethylene and silicon pump-head tubing were used during purging and sampling activities at each well. Rinsate blanks were collected from the polyethylene and silicon tubing to verify that proper procedures had been followed.

The collection of groundwater samples included specific sample information such as well number, sample identification, time and date of sample collection, sampling team, and analytical parameters. These items were recorded in a field logbook and on the sample labels. Chain-of-custody documentation (provided in Appendix B) accompanied the samples to the laboratory.

3.1.4 Surface Water and Sediment Sampling

Surface water and sediment samples were collected from Edwards Creek at Site 89. The samples were collected from various reaches of the stream, considering both the upstream and downstream effects of Site 89. Figure 3-4 shows the locations of the surface water and sediment sample locations within Edwards Creek. The following sections describe the sampling locations, sampling procedures, analytical program and quality assurance and quality control program.

3.1.4.1 Surface Water Sampling Procedures

Sampling of the surface water and sediments was completed at the downstream sample locations first and then proceeded upstream. Each of the sampling stations were demarcated along the shoreline with wooden stakes with the sample identification.

At each of the surface water sampling stations, samples were collected by dipping the laboratory prepared containers directly into the water. Samples analyzed for volatiles were obtained first, and samples for the additional analytical fractions were collected immediately following. During sample collection care was taken to avoid excessive agitation that may result in loss of the VOCs. Water quality readings (i.e., pH, dissolved oxygen, salinity, specific conductance, temperature, and turbidity) were taken at sampling stations 89-EC-SW01 through 89-EC-SW05. The results of these readings are provided on Table 3-5. Surface water samples 89-EC-SW01 through 89-EC-SW05 were analyzed by both the fixed based laboratory and the on-site laboratory. The on-site laboratory

performed only EPA Method 8240 for VOCs. The samples shipped to the fixed based laboratory were analyzed for target compound list (TCL) volatile organic analysis (VOAs), semivolatile organic analysis (SVOAs) and target analyte list (TAL) metals according to contract laboratory (CLP) protocol. Surface water sample 89-EC-SW05 was sampled for the same parameters but also included analyses for pesticides/polychlorinated biphenyls (PCBs). Samples 89-EC-SW06 through 89-EC-SW11 were analyzed by the on-site laboratory for VOCs only.

3.1.4.2 Sediment Sampling Procedures

Ten sediment samples were collected subsequent to the surface water samples to minimize sediment suspension that might falsely contaminate the samples. The sediment samples were collected from stations 89-EC-SD01 through 89-EC-SD05. Two sediment samples were collected at each of these locations for a total of ten samples. The first sample was collected below the water surface from the stream bed to approximately six inches below ground and the second sample was collected from six inches to 12 inches below ground. The samples were collected by manually pushing a sediment corer, equipped with a disposable acetate sleeve into the streambed. The sediment was extruded from the disposable sampling tube and placed into the appropriate sample containers. The sediment samples were analyzed for TCL VOAs, SVOAs, and TAL metals according to CLP protocol. Sediment sample 89-EC-SD05 was analyzed for the same parameters but also included analyses for pesticides/PCBs.

3.1.5 Land Survey

A land survey was conducted by Lanier Surveying, a licensed professional surveyor in the State of North Carolina. The surveying was completed under the direction of the Baker Site Manager. Both Sites 89 and 93 were surveyed as part of this investigation. The survey of the sites included the temporary monitoring wells, surface water/sediment sample locations, buildings, and other relevant features such as trees, drainage swales, utilities, and parking areas. All of the points were surveyed for vertical and horizontal control using North Carolina State Plane Coordinates.

3.1.6 Well Abandonment

Upon completion of the groundwater sampling and surveying activities, all of the temporary monitoring wells were abandon. The PVC pipe was removed from the ground manually by pulling it to the surface using pipe wrenches for leverage. The boreholes were then backfilled to the surface with soil cuttings.

3.1.7 Decontamination Procedures

All of the equipment used during the field activities was decontaminated before and after each use to prevent cross-contamination of samples, with the exception of disposable sampling equipment. The disposable sampling equipment was appropriately discarded subsequent to its initial use. Disposable equipment included polyethylene and silicon tubing used for groundwater sampling. The drill rig and all associated drilling and sampling tools were steam cleaned prior to initiating drilling activities and between borings. Meters and instruments used for measuring dissolved oxygen, pH, temperature, specific conductivity, and turbidity were rinsed with distilled water after each use.

3.1.8 Investigation Derived Waste Management

Field investigation activities associated with CTO-0356 resulted in the generation of various investigation derived waste (IDW). The IDW included soil cuttings, purge water, and solutions used to decontaminate non-disposable sampling equipment. The general management techniques utilized for the IDW were:

- Collection and containerization of IDW material
- Temporary storage of IDW while awaiting confirmatory analytical data
- Final disposal of aqueous and solid IDW material

The management of the IDW was performed in accordance with guidelines developed by the USEPA Office of Emergency and Remedial Response, Hazardous Site Control Division (USEPA, 1992). Both the IDW soils and water at Sites 89 and 93 were determined to be nonhazardous and were returned to the site.

3.2 Sample Acquisition and Analytical Program

The following sections provide information on the numbers of samples collected at each of the sites, the type of media sampled and the requested analytical procedures. Tables have been prepared which detail the analytical tests and figures are provided which show the sample locations relative to the sites.

3.2.1 Subsurface Soil Sample Acquisition and Analyses

Soil samples were not collected from Sites 89 and 93 for environmental testing. The samples were collected for lithologic classification of the soils only. Soils were examined and classified in the field by the geologist on-site. The locations of the borings were positioned across the sites in an effort to provide complete coverage while taking account for numerous underground utilities. The locations of the borings are represented by the temporary monitoring well locations presented on Figures 3-2 and 3-3.

3.2.2 Groundwater Sample Acquisition and Analyses

Groundwater samples were collected from Sites 89 and 93 from the temporary wells. These samples were analyzed in the field with a mobile laboratory for VOCs according to EPA Method 8240. In addition, select samples were collected and analyzed for TCL VOAs according to CLP procedures at a fixed based laboratory. Table 3-6 and 3-7 provide information on the groundwater sample analysis for both sites 89 and 93.

3.2.3 Surface Water and Sediment Sample Acquisition and Analyses

A total of 11 surface water and ten sediment samples were collected from Edwards Creek at Site 89. Figure 3-4 depicts the locations of the surface water and sediment sampling locations. Surface water samples were assigned the pre-fix "SW" and sediment sample locations were assigned the pre-fix "SD" in the sample identification number.

Surface water and sediment samples 89-EC-SW/SD01 to 89-EC-SW/SD04 were sampled for TCL VOAs, SVOAs, and TAL metals according to CLP protocol. Surface water and sediment sample

89-EC-SW/SD05 was sampled for the same parameters and but also included analyses for pesticides/PCBs. Surface water samples 89-EC-SW06 through 89-EC-SW11 were additional samples collected and analyzed on-site for VOCs according to EPA Method 8240. The requested sample analyses are presented on Tables 3-8 and 3-9. During collection of surface water samples 89-EC-SW01 through 89-EC-SW05, water quality parameters including temperature, pH, dissolved oxygen, conductivity, and salinity were recorded at each sample station. The results of these measurements are discussed in Section 3.1.4 and shown on Table 3-5.

3.2.4 Quality Assurance Quality Control

Quality Assurance/Quality Control (QA/QC) samples were collected during the Phase I Investigation. Field QA/QC samples were collected at each of the sites according to the procedures outlined in the USEPA Region IV standard operating procedures (SOPs). These samples were obtained to 1) ensure that decontamination procedures were effective (equipment rinsate samples); 2) evaluate field methodologies (duplicate samples); 3) establish field background conditions (field blanks); 4) evaluate whether cross-contamination occurred during sampling and shipping (trip blanks); and 5) evaluate laboratory analysis (matrix spike/matrix spike duplicates).

Data Quality Objectives (DQOs) for the QA/QC samples were implemented in accordance with DQO Level IV as defined in the Environmental Compliance Branch SOPs and Quality Assurance Manual, USEPA Region IV (USEPA, 1991). This DQO level is equivalent to the Naval Facilities Engineering Service Center (NFESC) DQO Level D, as specified in the "Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Programs" document (NEESA, 1988). Five types of QA/QC samples were collected and analyzed at Site 89 including: duplicate samples, equipment rinsate samples, field blanks, trip blanks, and matrix spike/matrix spike duplicates. These QA/QC samples were primarily related to the surface water and sediment samples collected from Edwards Creek at Site 89 which were analyzed for TCL VOAs, TCL SVOAs, TCL pesticides/PCBs, and TAL Metals. At Site 93 only trip blanks were collected for the groundwater samples analyzed by the fixed based laboratory.

The definition of each type of QA/QC sample is provided in the Environmental Compliance Branch SOPs and Quality Assurance Manual, USEPA Region IV (USEPA, 1991). A brief summary of the QA/QC samples collected during this investigation is provided below.

- Duplicate Sample: Duplicates were collected in quantities equal to or greater than ten percent of the total number of samples collected. The duplicate samples were collected at the same time, using the same techniques as the planned original environmental samples. Further details can be found in Appendix C.

- Equipment Blanks: Rinsate blanks were prepared for manual sampling equipment utilized to collect environmental samples. Rinsate samples were analyzed for parameters associated with the sampling event.

- Field Blanks: Field blanks were collected to provide analytical data on the water used in the field for decontamination purposes.

- Trip Blanks: Trip blanks are prepared prior to the sampling event, placed in the actual sample container, and kept with the investigative samples throughout the sampling event. Results of the trip blanks analyses can be found in Appendix C.

- Matrix Spike/Matrix Spike Duplicates: Matrix spike/matrix spike duplicates (MS/MSDs) were collected during the surface water and sediment sampling events at a number equal to or greater than five percent of the total number of environmental samples collected during the study.

3.2.5 Data Management and Tracking

The management and tracking of data, from time of field collection to receipt of validation report, is of primary importance to the overall quality of laboratory analytical results. Sample identification of samples collected for on-site analysis were recorded in a field log book and on the sample container. These samples were immediately transported to the on-site laboratory and logged into a data base prior to analysis. Sample identification of those samples analyzed at the fixed based lab were recorded on chain-of-custody (COC) forms, provided in Appendix B. Chain-of-custody forms were reviewed by data management personnel to verify that appropriate laboratory analyses had been requested. Upon receipt of laboratory analytical results, a further comparison was performed to verify that each sample received by the laboratory was analyzed for the correct parameters.

The management and tracking of data from the time of sample collection until receipt of the analytical results was completed to determine the following items:

- Identify and correct chain-of-custody discrepancies prior to laboratory analysis
- Verify the receipt of all samples by the laboratory
- Confirm that requested sample analyses were performed
- Ensure the delivery of a complete data set

4.0 FINDINGS OF THE PHASE I INVESTIGATION STUDY

This section of the report presents the findings of the Phase I investigation Study at OU 16. It includes results of the groundwater sampling at Sites 89 and 93 and surface water/sediment sampling at Site 89. The analytical results for QA/QC samples also are presented in this section.

Presentation of the analytical data in this section includes a comparison of the site data to established standards and/or criteria. The standards and criteria chosen for evaluation are media specific and help to provide a reasonable assessment of site conditions. An explanation and justification for using each of the standards and criteria are presented in Section 4.1.

4.1 Screening Standard Comparisons

The qualitative assessment for the media sampled at the site was completed using state and federal standards and criteria to evaluate the contaminant levels detected. The sections below are presented to define the screening standards applied to each of the media.

4.1.1 Groundwater

The screening standard applied to groundwater is based on the following sources:

- North Carolina Water Quality Standards (NC WQS, 1994) - NC WQSs are the maximum allowable concentrations, resulting from any discharge of contaminants to the lands or waters of the state, that may be tolerated without threatening human health or otherwise rendering the groundwater unsuitable for its intended purposes.

- USEPA Maximum Contaminant Levels (MCLs), February, 1996 - MCLs are enforceable standards for public water supplies, designed to protect human health and promulgated under the Safe Drinking Water Act. MCLs also account for the technical feasibility of removing contamination from a public water supply. MCLs are based on laboratory or epidemiological studies and are applied to analyses of drinking water supplies consumed by a minimum of 25 persons. MCLs establish limits under which 70 kg adults, drinking 2 liters of water a day for 70 years, can avoid detrimental health effects.

4.1.2 Surface Water

The surface standard applied to surface water is based on the following sources:

- NC WQS for surface water, June 1, 1994 (human health standard) - The NC WQS for surface water are the standard concentrations that, either alone or in conjunction with other wastes in surface waters, will neither render waters injurious to aquatic life, wildlife, or public health, nor impair the waters for any designated use.

4.1.3 Sediment

The screening standard applied to sediment samples is based on the following source:

- Literature source titled, "Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations and Estuarine Sediments." Long et. al., 1995

4.2 Non-Site Related Analytical Results

Some of the organic compounds detected in the environmental media may be attributable to non-site related conditions. Two primary sources of non-site related analytical results include laboratory contaminants introduced during analysis and field activities such as sampling. A brief discussion of non-site related analytical results is provided in the section which follows.

4.3 Laboratory Contaminants

Field blank and trip blank samples provide a measure of contamination that has been introduced into a sample set during the collection, transportation, preparation, or analysis of samples. To remove non-site related constituents from further consideration, the concentrations of chemicals detected in blanks were compared with concentrations of the same chemicals detected in environmental samples.

As the scope of the Phase I investigation was limited to estimating the extent of contamination through on-site screening, limited QA/QC samples were collected. The QA/QC for the groundwater samples included trip blanks that accompanied confirmatory samples to the fixed based laboratory and field blanks of the potable water source used during drilling operations. The trip blank samples did not detect any contaminants. The field blank samples collected from the potable water source used during drilling operations detected low concentrations of chloroform. This compound was common in all the groundwater samples collected from borings in which water was used while drilling. As the chloroform was present in the potable water source used for drilling, its detection in the environmental samples was not considered to be site related. The results of the chloroform detections were not reported on the analytical tables or figures which depict the results of the sampling program at OU 16.

A duplicate sample and a matrix spike/matrix spike duplicate (MS/MSD) sample was collected from one station at the surface water and sediment sampling points in Edwards Creek. These QA/QC samples were analyzed by the fixed base laboratory. The duplicate sample results were in general agreement with the associated environmental sample and the MS/MSD sample results were within the acceptable ranges. In summary, the QA/QC samples collected as part of the Phase I investigation demonstrate that the data is reliable and useful for assessing the site's conditions.

4.4 Site Analytical Sample Results

This section presents the results of the groundwater, surface water, and sediment investigations performed as part of the Phase I investigation. The data are presented for both sites by media: groundwater, surface water, and sediment. The results are discussed and presented in corresponding tables which show all of the positive detections and a summary table which includes comparison to

the appropriate "screening standard". The positive detections are also included on figures in this section to illustrate the spatial relationships of the data.

4.4.1 Site 89

Investigative activities at Site 89 included surface water and sediment samples collected from Edwards Creek, and groundwater sampling in the area in and around the DRMO and east into the wooded area. Each of the media sampled are presented separately, beginning with the surface water samples from Edwards Creek.

4.4.1.1 Surface Water

A total of eleven surface water samples were collected at Site 89. Samples 89-EC-SW01 through 89-EC-SW04 were analyzed according the CLP protocol for TCL VOAs, TCL SVOAs, and TAL metals. Sample 89-EC-SW05 was analyzed for all fractions including TCL Pesticides/PCBs. In addition, each of these five samples were analyzed for VOCs by the on-site laboratory according to EPA Method 8240. Samples 89-EC-SW05 through 89-EC-SW11 were analyzed by the on-site laboratory for VOCs only, these sample locations were not sent to the fixed based laboratory.

The analytical results for the volatile fraction of the surface water samples from the on-site analysis is presented on Table 4-1. Table 4-2 presents the analytical results obtained by the fixed based laboratory. The fixed based results include TCL VOAs, TCL SVOAs, and TAL metals. All of the results are summarized on Table 4-3.

The data demonstrate consistent concentrations of VOCs in Edwards Creek south of Site 89. Six separate VOCs were detected in the surface water samples including, trans-1,2-dichloroethene (trans-1,2-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE), tetrachloroethene (PCE), 1,1,2,2-tetrachloroethane (TCA), and vinyl chloride. Concentrations of the VOCs ranged from a low of 0.1 µg/L of PCE to a high of 150J µg/L of 1,1,2,2-TCA. The most frequently detected compound was TCE which was detected in 9 of the 11 surface water samples analyzed on-site and all 5 of the surface water samples analyzed by the fixed based laboratory. The sample stations recording the highest number of maximum detections were sample stations 89-EC-SW02 and 89-EC-SW04. These stations are located south and downgradient of the DRMO area. Sample station 89-EC-SW06, located to the west of the DRMO area and at the headwaters of Edwards Creek, was the only station that did not detect any VOCs in the surface water. In general, sample results were consistent throughout Edward's Creek, showing little to no decrease of concentrations in the downstream direction.

Sample station 89-EC-SW08 located just south of Edwards Creek in a surface water drainage swale (See Figure 4-1) detected PCE at 0.4 µg/L . The low concentration of only one VOC at this sampling point suggests that the surface water discharging into Edwards Creek from the south is not contributing contaminants to the stream.

It should be noted that surface water samples were obtained from Edwards Creek as part of a SI study performed by Baker in 1991 (Baker, 1991). The surface water samples collected as part of this investigation detected only one VOC at a very low concentration some distance downstream of the DRMO area near Site 44. The RI/FS investigation for Site 44 in 1995 involved further surface water sampling along Edwards Creek and identified several VOCs in the stream (Baker, 1995). In addition to the previous sampling of Edwards Creek, surface water samples were collected from the

drainage swale located on the east side of the DRMO (see Figure 4-1) in May 1996. This swale was constructed to alleviate drainage problems within the DRMO. The swale usually contains some standing water and appears to continually discharge small volumes of groundwater. During storm events this swale discharges significant amounts of surface water to Edwards Creek. The surface water samples collected from this drainage swale and at its discharge point into Edwards Creek, have detected similar concentrations of VOCs as those currently observed in Edwards Creek.

The detection of VOCs in Edwards Creek and the drainage swale which borders the eastern edge of the DRMO, coupled with the detection of a low concentration of PCE in the water discharging into Edwards Creek from the south, suggest that the source of the VOC contamination impacting Edwards Creek is located in the vicinity of the DRMO.

There were no SVOAs or pesticides/PCBs detected in the surface water samples collected from Edwards Creek. Some metals were detected in the samples, however, at the detected concentrations, their presence is most likely attributed to natural conditions. The presence of metals in the surface water is not considered to be a result of site operations, and therefore these results have not been included on a figure. As mentioned above they are presented on Table 4-2 and summarized on Table 4-3.

4.4.1.2 Sediment

A total of 10 sediment samples were collected at five sample locations within Edwards Creek. Two samples were taken at each station, one from zero to six inches and a second from six to twelve inches. Samples 89-EC-SD01 through 89-EC-SD04 were analyzed at the fixed based laboratory for TCL VOAs, TCL SVOAs, and TAL metals. Sample number 89-EC-SD05 was analyzed for these same fractions, but also included an analysis for TCL pesticides/PCBs. Table 4-4 presents the results of the analytical data for the sediment samples. The results are summarized on Table 4-5 and presented on Figures 4-2 through 4-5.

VOCs were only detected at sample station 89-EC-SD03. Six separate VOCs were detected at this point in both the zero to six inch sample depth and the six inch to twelve inch sample depth. The compounds included vinyl chloride, DCE (total), TCA, 1,1,2-TCA, 1,1,2,2-TCA, and toluene. Concentrations of the VOCs ranged from 13 µg/kg of 1,1,2-TCA to 2,400 µg/kg of TCA. The majority of the maximum detections were found at the zero to six inch sample depth.

Semivolatile organic compounds (SVOCs) were detected at each of the five sediment sample stations in Edwards Creek. The type of compounds detected are ubiquitous in forested environments due to decomposition of organic material. Further, the concentrations detected are similar to what is normally expected in environments where soil has a high organic content. The results of the SVOCs shown on Figure 4-3 are not considered to be related to site operations at OU No. 16.

Analysis for pesticide/PCBs was performed at station 89-EC-SD05. There were no PCBs detected in the sample, however, several pesticide compounds were detected. The compounds detected at this sampling station were commonly used in the past at MCB, Camp Lejeune. Their presence in the sediment samples are most likely due to overland runoff and to organic matter present in the sediment samples. Pesticides tend to be very stable in the environment with little degradation occurring, therefore they are commonly detected in soil and sediment samples throughout the base at concentrations similar to what was observed at Site 89. The reported concentrations of pesticides

are not assumed to be related to previous site operations. The results of the pesticide analyses are shown on Figure 4-4.

Each of the five sediment sample stations were analyzed for TAL metals. As shown on Figure 4-5, each of the sample stations detected the presence of metals in the samples. Metals are naturally occurring in soil. The detected concentrations of the metals observed in the sediment samples are similar to concentrations observed in other samples throughout the base. Their presence is most likely a result of natural conditions and are not considered to be related to site activities.

4.4.1.3 Groundwater

The groundwater investigation at Site 89 entailed the collection of groundwater samples from three permanent monitoring wells and 30 temporary monitoring wells. Each of the groundwater samples collected were analyzed by an on-site laboratory according the EPA Method 8240. In addition, four samples were analyzed by the fixed based laboratory for full TCL VOAs using CLP protocols. The positive detections for the on-site analyses are included on Table 4-6. Four groundwater samples were split and sent to the fixed based laboratory for comparison purposes. These results are provided on Table 4-7. All of the groundwater analytical results for Site 89 are summarized on Table 4-8.

Six separate VOCs were detected in the groundwater samples collected at Site 89 including, vinyl chloride, trans-1,2-DCE, cis-1,2-DCE, 1,1,1-TCA, TCE, and PCE. Concentrations ranged from 0.2 µg/L of 1,1,1-TCA to 818 µg/L of cis-1,2-DCE. The most frequently detected compound was TCE, which was detected in 22 of the 34 samples. The highest concentration of TCE was 744.3 µg/L, detected in monitoring well 89-MW02.

Two groundwater samples taken from temporary wells TW08 and TW09 were split and sent to the fixed based laboratory for confirmation analysis. Results of these analysis were similar to the results obtained from the fixed based laboratory, indicating that the data used to assess OU No. 16 is reliable. VOCs were detected in temporary monitoring well TW08 at concentrations similar to what was detected by the on-site laboratory. Temporary well TW09 did not detect any VOCs in the analysis performed by either of the labs.

Figure 4-6 presents the results of the VOCs detected in the groundwater samples collected from the shallow temporary wells and Figure 4-7 presents results for the intermediate wells at Site 89. Both figures present the results of the analysis as performed by the on-site laboratory. As shown on Figure 4-6, the majority of the shallow groundwater contamination at Site 89 is concentrated in the area of the DRMO. Contamination of the shallow groundwater appears highest in the area of the DRMO and to the south in the direction of Edwards Creek. Areas to the west and north (upgradient) of the DRMO also appear to be impacted, but at lower concentrations compared to down gradient locations. Shallow groundwater in the wooded area east of the DRMO does not appear to be impacted.

Figure 4-7 presents the results of the groundwater samples collected from the intermediate wells at Site 89. As shown on the figure, VOCs at the intermediate depth exist in the area of the DRMO as was the case for the shallow samples; however, groundwater contamination in this zone appears to have migrated east and downgradient of the site into the wooded area, affecting a larger area (see Figure 4-7). The furthest sample point east of Site 89 is TW23IW which is approximately 1,100 feet from the assumed source area (the DRMO). Four VOCs were detected in the sample from TW23IW,

two of which exceeded both the Federal MCLs and the NC WQSs. In this sample, cis-1,2-DCE was detected at 84 µg/L, slightly greater that the state and federal standard of 70 µg/L. TCE also was detected at TW23IW at a concentration of 123.9 µg/L. This concentration is approximately two orders of magnitude greater than the federal and state groundwater standards. The presence of TCE at this concentration suggest that further definition of groundwater contamination east of the site is necessary.

The boundary of the effected area in the intermediate wells appears to have been defined to the north and west of the DRMO. VOCs in wells TW11IW to the north, and TW08IW, TW15IW, and TW16IW to the west all show decreased contaminant concentrations. The boundary of groundwater contamination to the south appears to be largely effected by Edwards Creek. As was discussed in Section 2.0, Edwards Creek seems to be a groundwater discharge boundary for upper portions of the surficial aquifer. This assumption is supported by the estimated groundwater elevations obtained during the installation of the temporary monitoring wells, and the existence of VOCs in Edwards Creek. Contaminant concentrations in the groundwater samples decrease significantly at Edwards Creek. Samples collected from temporary well TW18, located south of Edwards Creek exhibited low concentrations of VOCs in the shallow sample with no detections in the associated intermediate groundwater sample. Samples collected at well TW13 located just north of Edwards Creek detected significant concentrations of VOCs in the shallow samples with a decreased concentration in the intermediate groundwater sample. As VOCs exist in the intermediate wells immediately north of Edwards creek and are present at low concentrations in the shallow wells south of the stream, it is likely that the stream has a significant impact on contaminant migration to the south, especially in the surficial aquifer. An understanding of the relationship of the surface water feature with the groundwater is important in developing a conceptual hydrogeologic model of the site as it is effecting both groundwater flow and contaminant migration. At the present time it seems that Edwards Creek is retarding the migration of contaminants to the south.

In summary, the data collected during the Phase I investigation provides a reasonable estimate of the areal extent of groundwater contamination north and west of the site. The migration of the plume east of the site is evident by the data collected and has not been completely defined. Therefore, further investigative work is necessary to establish the eastern boundary of groundwater contamination. In addition, impact in the area of Edwards Creek may require limited investigation to establish the relationship between the stream and contaminant migration to the south.

4.4.2 Site 93

The investigation at Site 93 involved the installation temporary monitoring wells and associated groundwater sampling. The area investigation centered around Building TC-942, with wells being placed in all four directions from the site.

4.4.2.1 Groundwater

The groundwater investigation at Site 93 involved the collection of groundwater samples from one existing permanent monitoring well and 14 temporary monitoring wells. Each of the groundwater samples collected were analyzed according the EPA Method 8240. In addition, four samples were analyzed by the fixed based laboratory for full TCL VOAs using CLP protocols. The positive detections for the on-site analyses are included on Table 4-9. Results of the fixed based laboratory results are shown on Table 4-10. All of the analytical results are summarized on Table 4-11.

Figure 4-8 presents the results of the volatile organic compounds detected in the shallow groundwater samples.

Five VOCs were detected in the shallow groundwater samples collected at Site 93 including trans-1,2-DCE, cis-1,2-DCE, 1,1,1-TCA, TCE, and PCE. Concentrations ranged from 0.1 µg/L of TCE and PCE to 175 µg/L of cis-1,2-DCE at temporary well TW01. The most frequently detected compound was TCE which was detected in 10 of the 20 samples collected from Site 93.

Figure 4-9 presents the analytical results of the intermediate wells at Site 93. Only three VOCs were detected in the intermediate wells including cis-1,2-DCE, TCE, and PCE. The concentrations of the compounds ranged from 0.1 µg/L of TCE and PCE to 4 µg/L of cis-1,2-DCE.

The majority of the groundwater contamination at Site 93 appears to be concentrated in the shallow groundwater in the area near the former UST. This is supported by the fact that the highest concentrations of VOCs were located at the permanent monitoring well 93-MW05 and directly south at temporary well TW01. Groundwater contamination was not present north or east of the former UST. In addition, the intermediate groundwater samples detected only low concentrations of VOCs. Contamination of the shallow groundwater was evident to the south and west of the site, but decreased readily in these directions. Figure 4-8 provides an estimate of the area that has been impacted by groundwater contamination at Site 93. The estimated area of shallow groundwater contamination is local to the former UST site and extends approximately 650 feet west of the site to TW07.

5.0 CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the findings of the Phase I Investigation at OU 16, Sites 89 and 93. The conclusions and recommendations developed from the data collected at the sites are presented separately. The conclusions consider each of the media involved at the sites while recommendations focus on the next phase of investigative work.

5.1 Conclusions

The Phase I investigation has confirmed the presence of VOCs in the surface water, sediment, and groundwater at Site 89 and the presence of VOCs in the groundwater Site 93. Exact sources of the contamination are unknown but are assumed to be former site operations in the area of the DRMO for Site 89 and the former UST for Site 93.

5.1.1 Surface Water

VOCs are present in the portion of Edwards Creek downgradient of the DRMO facility. Six individual VOCs were detected in the surface water samples. Contaminant concentrations were relatively consistent in each of the samples obtained, showing little to no decrease in concentrations in the downstream direction. The concentrations ranged from 0.1 µg/L of PCE to 150J µg/L of TCA. TCE was the compound most frequently detected in the surface water samples.

5.1.2 Sediment

A total of five sediment sample stations were positioned within the bed of Edwards Creek. Of these, only one station (89-EC-SD03) detected VOCs. The sample detected six separate VOCs including vinyl chloride, DCE, TCA, 1,1,2-TCA, 1,1,2,2-TCA and toluene. The maximum detections of these compounds were found at depths ranging from zero to six inches below grade.

SVOCs, pesticides, and metals were also detected in the sediments of Edwards Creek. The detected concentrations of the SVOCs and metals do not appear to be related to site operations and are most likely due to natural processes. Detections of pesticides are attributed to the routine application of these compounds at MCB Camp Lejeune in the past. Based upon the historical evidence of pesticide application and the detected concentrations, their presence is not attributed to any local source, but instead to general basewide application.

5.1.3 Groundwater

Groundwater contamination at Site 89 is present in the surficial aquifer and the upper portions of the Castle Hayne aquifer. Concentrations of VOCs in the groundwater are significantly higher than allowable state and federal standards. Contaminants detected include vinyl chloride, trans-1,2-DCE, cis-1,2-DCE, 1,1,1-TCA, TCE, and PCE. The highest concentrations of VOCs occurred within the DRMO area at permanent monitoring well 89-MW02. Complete definition of the horizontal and vertical extent of VOC contamination in groundwater at Site 89 has not been completed.

Groundwater contamination at Site 93 appears to be limited to the surficial aquifer and centered around Building TC-942. The horizontal extent of contamination at Site 93 has been reasonably estimated through the Phase I Investigation. VOCs in the groundwater are present in the area of the former UST at Building TC-942 and extend approximately 650 feet to the west. Concentrations of

VOCs in the intermediate wells at Site 93 were relatively low, and did not exceed the state or federal standards.

In summary, the areal extent of groundwater contamination at Site 89 is more extensive, both horizontally and vertically as compared to Site 93. At Site 89, the concentrations of VOCs which exceed state and federal standards extend well east of the site and south into Edwards Creek. Concentrations greater than state and federal standards were detected in wells screened in both the shallow and intermediate zones. The extent of contamination north and west of the DRMO facility has been roughly estimated, however, further work will be required to delineate extent of the contamination. The area east and south of the DRMO facility will require significant investigative efforts to establish the horizontal and vertical extent of the groundwater contamination. The majority of the future work at OU No. 16 will occur in this area of the site.

5.2 Recommendations

The recommendations for OU No. 16 (Sites 89 and 93) are presented below. The recommendations are general in nature and do not include specific design considerations or sampling strategy. These items are beyond the current scope of work for this CTO. Details concerning future investigative work at the site must be presented in formal work plans submitted to LANTDIV and MCB Camp Lejeune.

The contamination at OU 16 appears to be concentrated in two areas. One being in the area of Building TC-942, and the other at the DRMO; however, the vertical and horizontal extent of groundwater contamination has not been thoroughly defined at Site 89. The extent of contamination at Site 89 must be confirmed through further investigative work and sampling efforts. This may be accomplished by completing the following items:

- Installation of permanent shallow (Type II) monitoring wells around the perimeter of the estimated contaminant plume, and into the wooded area east of the DRMO facility. Permanent shallow monitoring wells will also be required northwest and west beyond 89-MW42B and 89-TW08 to further evaluate upgradient conditions.

- Installation of both intermediate and deep (Type III) wells at points within the estimated contaminant plume boundary and in the direction of contaminant migration. The wells should be installed east and southeast of the site. Some wells will be necessary south of Edwards Creek to verify contaminants have not migrated beyond the stream. Intermediate wells will extend to approximately 50 feet bgs, while deep wells may extend another 40 to 50 feet into the aquifer.

- Collection of soil samples during shallow, intermediate, and deep monitoring well installation. In addition to environmental testing, geotechnical analyses should be conducted on these samples to assist in the preparation of groundwater migration and transport models and in the selection and design of a remedial alternative.

- Groundwater sampling from shallow, intermediate, and deep permanent monitoring wells for the contaminants of concern (i.e., VOCs).

- Measurement of groundwater elevations to establish the local groundwater flow regime in the shallow aquifer and an examination of potential head differences

between shallow and deeper monitoring wells. In addition, the relationship between Edwards Creek and groundwater flow must be clearly defined. Installation of staff gauges in Edwards Creek will be required to establish relationships between the hydrogeologic framework and the influence of the New River to the east.

- Completion of aquifer tests (slug tests) to establish the hydraulic conductivity of the both the surficial and Castle Hayne aquifers. A comparison of vertical and horizontal conductivity values should be made.

- Upon completion of aquifer tests and the establishment of local groundwater flow patterns, estimates of groundwater flow velocity can be made and corresponding contaminant transport.

- Installation of permanent wells at Site 93 should only involve shallow (Type II) monitoring wells, as VOCs were not detected above relevant water quality standards in the intermediate zone. The shallow wells should be positioned around the estimated area of groundwater contamination discussed is Section 4.0 to confirm the boundary of the impacted area.

Although additional work will be required at Site 93 to confirm the boundary of shallow groundwater contamination, the majority of the investigative work at OU No. 16 will involve Site 89. It is estimated that a total of approximately 6 shallow and 10 intermediate/deep wells will be necessary to establish the vertical and horizontal extent of groundwater contamination at Site 89. Once the plume geometry has been established both horizontally and vertically at each site, preparation of a remedial action plan can commence. The plan should focus on groundwater contamination involving VOCs, as this appears to be the contaminant of concern at both sites.

Prior to initiating the Phase II investigation, specific remedial alternatives applicable to OU No. 16 should be defined. Once these alternatives are selected, specific data requirements used in evaluating each of the alternatives should be identified. These data requirements will then be incorporated as an integral part of the Phase II field investigation. Work plans can be prepared, and the field work structured to ensure that all of the necessary information be obtained. Therefore, the Phase II investigation should be implemented and completed with two main objectives in mind: 1) Complete definition of the vertical and horizontal extent of VOC contamination at OU No. 16. This would include defining affected surface water, sediment, and groundwater. 2) Obtain the necessary field data to execute a thorough evaluation of applicable remedial alternatives. This would include acquiring site specific field data that will be used for remedial design, in addition to the information necessary for preparing an accurate and useful model of the geologic and hydrogeologic system at OU No. 16.

6.0 REFERENCES

American Society for Testing and Materials (ASTM). 1993. Standard Test Method for Description and Identification of Soils (Visual Manual Procedure). ASTM D-2488-93. American Society for Testing and Materials, Philadelphia, Pennsylvania.

Atlantic Division, Naval Facilities Engineering Command. January 1988. Camp Lejeune Complex Master Plan and Capital Improvements Plan Upgrade. Prepared for the Commanding General, Marine Corps Base, Camp Lejeune, North Carolina.

Baker 1996. Draft Final Project Plans OU No. 16 Sites 89 and 93 Marine Corps Base Camp Lejeune North Carolina.

Baker 1995. Final Remedial Investigation/Feasibility Study Site 44 Jones Street Dump. Marine Corps Base Camp Lejeune North Carolina.

Baker 1991. Final Site Inspection Report Site 44 Jones Street Dump. Marine Corps Base Camp Lejeune North Carolina.

Cardinell, A.P., Berg, S.A., and Lloyd, O.B. 1993. Hydrogeologic Framework of U.S. Marine Corps Base at Camp Lejeune, North Carolina: U.S. Geological Survey Water Resources Investigation Report. Report No. 93-4049.

Federal Facilities Agreement (FFA) Between United States Environmental Protection Agency, Region IV: The North Carolina Department of Environment, Health and Natural Resources and North Carolina. North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment, Health, and Natural Resources, Raleigh, North Carolina.

Naval Energy and Environmental Support Activity (NEESA). 1988. Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program. Department of the Navy, Naval Energy and Environmetnal Support Activity, Port Hueneme, California. NEESA 20.2-047B.

USEPA. May 1996a. USEPA Region III Risk-Based Concentrations. Complied by: R.L. Smith. Soil Screening Levels - Transfer from Soil to Groundwater.

USEPA. May 1996b. Drinking Water Regulations and Health Advisories. Office of Water. EPA 822-R-96-001.

United States Environmental Protection Agency (USEPA). 1992. Guide to Management of Investigation-Derived Wastes. "Standard Default Exposure Factors" Interim Final. Office of Emergency and Remedial Response Hazardous Site Control Division. Washington, D.C. os-22OW. April 1992.

USEPA, U.S. Environmental Protection Agency. May 1, 1991. "Water Quality Criteria Summary" (Wall Chart). Office of Science and Technology. Health and Ecological Criteria Section. Washington, D.C.

United States Department of Navy for Marine Corps Base, Camp Lejeune and Marine Corps Air Station, New River, North Carolina. December 1989.

TABLES

TABLE 2-1

GEOLOGIC AND HYDROGEOLOGIC UNITS OF NORTH CAROLINA'S COASTAL PLAIN OPERABLE UNIT 16 (SITES 89 AND 93) PHASE I INVESTIGATION STUDY, CTO-0356 MCB, CAMP LEJEUNE, NORTH CAROLINA

Geologic Units			Hydrogeologic Units
System	Series	Formation	Aquifer and Confining Unit
Quaternary	Holocene/Pleistocene	Undifferentiated	Surficial aquifer
Tertiary	Pliocene	Yorktown Formation[1]	Yorktown confining unit
	Miocene		Yorktown Aquifer
		Eastover Formation[1]	Pungo River confining unit
		Pungo River Formation[1]	Pungo River Aquifer
		Belgrade Formation[2]	Castle Hayne confining unit
	Oligocene	River Bend Formation	Castle Hayne Aquifer
	Eocene	Castle Hayne Formation	
			Beaufort confining unit[3]
	Paleocene	Beaufort Formation	Beaufort Aquifer
Cretaceous	Upper Cretaceous	Peedee Formation	Peedee confining unit
			Peedee Aquifer
		Black Creek and Middendorf Formations	Black Creek confining unit
			Black Creek Aquifer
		Cape Fear Formation	Upper Cape Fear confining unit
			Upper Cape Fear Aquifer
			Lower Cape Fear confining unit
			Lower Cape Fear Aquifer
	Lower Cretaceous[1]	Unnamed deposits[1]	Lower Cretaceous confining unit
			Lower Cretaceous Aquifer[1]
Pre-Cretaceous basement rocks		--	--

Notes:

[1] Geologic and hydrologic units probably not present beneath MCB Camp Lejeune.
[2] Constitutes part of the surficial aquifer and Castle Hayne confining unit in the study area.
[3] Estimated to be confined to deposits of Paleocene age in the study area.

Source: Harned et al., 1989.

TABLE 2-2

WATER SUPPLY WELL INFORMATION
OPERABLE UNIT 16 (SITES 89 AND 93)
PHASE I INVESTIGATION STUDY, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Well Number	Well Diameter (inches)	Casing Material	Date Installed (year)	Status (on/off/closed)	Date Closed	Depth (bgs)	Screen Top Depth	Screen Bottom Depth	Pump Depth	Airline Depth	Approx. Direction and Distance
AS-131	--	--	--	On	NA	200	--	--	50	50	SE 3,960 ft
AS-203	--	--	--	On	NA	173	--	--	77	60	SE 3,168 ft
AS-190	--	--	--	On	NA	180	--	--	60	123	SW 3,960 ft
AS-191	--	--	--	On	NA	180	--	--	60	117	SSW 4,752 ft
AS-4140	--	--	--	On	NA	193	--	--	--	110	S 4,752 ft
TC-502	10	Steel	194	On	NA	184	110	184	50	50	NNW 3,960 ft
TC-600	8	Steel	1941	On		70	48	70	50	50	NNW 3,168 ft
TC-604	8	Steel	1942	On	NA	113	45	50	50	50	NW 4,752 ft
							60	65			
							82	87			
							97	102			
							109	113			
TC-700	18	Steel	1941	On	NA	76	27.5	76	50	50	NNW 2,376 ft
TC-1000	8	Steel	1942	On		153	86	96	60	60	W 5,544 ft
							116	136			
TC-1001	8	Steel	1942	On	NA	100	70	100	60	60	WSW 6,336 ft
TC-1251	--	Steel	1975	On	NA	155	95	140	70	80	SSE 1,188 ft
							160	170[1]			

TABLE 2-2 (Continued)

WATER SUPPLY WELL INFORMATION
OPERABLE UNIT 16 (SITES 89 AND 93)
PHASE I INVESTIGATION STUDY, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Well Number	Well Diameter (inches)	Casing Material	Date Installed (year)	Status (on/off/closed)	Date Closed	Depth (bgs)	Screen Top Depth	Screen Bottom Depth	Pump Depth	Airline Depth	Approx. Direction and Distance
TC-1253	--	Steel	1975	On	NA	250	120	140	82	81	W 1,584 ft
							160	170			
TC-1256	--	Steel	--	On	NA	204	124	134	70	80	W 3,960 ft
							154	164			
							182	192			

Notes:

(1) Discrepancy between total depth and screen interval

NA = Not applicable
-- = Data unavailable

TABLE 3-1

SUMMARY OF WELL CONSTRUCTION DETAILS
OPERABLE UNIT 16 (SITE 89)
PHASE I INVESTIGATION STUDY, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Well Number	Date Installed	Top of Casing Elevation (ft. above msl)[1]	Ground Surface Elevation (ft. above msl)	Boring Depth (ft, bgs)[2]	Well Depth (ft, bgs)	Screen Interval Depth (ft, bgs)
89-TW04	7/31/96	13.92	11.84	15.0	15.0	5.0-15.0
89-TW04IW	7/31/96	14.2	11.84	50.0	47.0	42.0-47.0
89-TW08	8/2/96	15.38	13.26	15.0	15.0	5.0-15.0
89-TW08IW	8/2/96	15.19	13.36	42.0	42.0	37.0-42.0
89-TW09	8/3/96	16.94	14.45	15.0	15.0	5.0-15.0
89-TW09IW	8/3/96	17.12	14.45	40.0	38.0	33.0-38.0
89-TW10	8/3/96	16.14	13.78	15.0	15.0	5.0-15.0
89-TW10IW	8/3/96	14.81	13.78	44.0	44.0	39.0-44.0
89-TW11	8/4/96	17.72	15.15	15.0	15.0	5.0-15.0
89-TW11IW	8/4/96	17.63	15.25	42.0	38.0	33.0-38.0
89-TW12	8/4/96	13.62	11.98	10.0	10.0	5.0-10.0
89-TW12IW	8/4/96	13.35	11.68	47.0	47.0	42.0-47.0
89-TW13	8/5/96	14.00	13.28	20.0	19.0	9.0-19.0
89-TW13IW	8/4/96	14.29	13.18	47.0	44.0	39.0-44.0
89-TW15	8/6/96	17.47	16.21	15.0	15.0	5.0-15.0
89-TW15IW	8/6/96	16.70	16.25	47.0	44.5	39.5-44.5
89-TW16	8/6/96	17.02	15.02	15.0	15.0	5.0-15.0
89-TW16IW	8/6/96	15.46	15.46	47.0	45.0	40.0-45.0
89-TW17IW	8/7/96	--	--	42.0	40.0	35.0-40.0
89-TW18	8/12/96	17.11	15.19	15.0	15.0	5.0-15.0
89-TW18IW	8/12/96	15.04	14.89	47.0	45.0	40.0-45.0
89-TW19	8/13/96	17.59	15.67	15.0	15.0	5.0-15.0
89-TW19IW	8/13/96	17.71	15.47	42.0	40.0	35.0-40.0
89-TW20	8/13/96	20.34	17.92	15.0	15.0	5.0-15.0
89-TW20IW	8/13/96	20.84	17.56	47.0	45.0	40.0-45.0
89-TW21	8/14/96	18.36	16.17	15.0	14.0	4.0-14.0
89-TW21IW	8/14/96	18.49	16.27	42.0	40.0	35.0-40.0
89-TW22	8/14/96	20.97	18.12	15.0	15.0	5.0-15.0
89-TW22IW	8/15/96	20.69	18.12	47.0	45.0	40.0-45.0
89-TW23IW	8/19/96	15.39	12.10	37.0	35.0	30.0-35.0

Notes:

[1] msl = mean sea level
[2] ft, bgs = feet, below ground surface

TABLE 3-2

SUMMARY OF WELL CONSTRUCTION DETAILS
OPERABLE UNIT 16 (SITE 93)
PHASE I INVESTIGATION STUDY, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Well Number	Date Installed	Top of Casing Elevation (ft. above msl)[1]	Ground Surface Elevation (ft. above msl)	Boring Depth (ft, bgs)[2]	Well Depth (ft, bgs)	Screen Interval Depth (ft, bgs)
93-TW01	7/29/96	16.48	14.44	15.0	15.0	5.0-15.0
93-TW01IW	7/29/96	16.70	14.54	54.0	53.5	48.5-53.5
93-TW02	7/30/96	18.74	16.59	15.0	15.0	5.0-15.0
93-TW02IW	7/30/96	18.72	16.69	52.0	50.0	45.0-50.0
93-TW03	7/30/96	15.93	13.08	15.0	14.5	4.5-14.5
93-TW03IW	7/30/96	14.74	12.98	54.0	50.0	45.0-50.0
93-TW05	7/31/96	19.72	16.58	15.0	15.0	5.0-15.0
93-TW05IW	7/31/96	18.88	16.68	52.0	50.0	45.0-50.0
93-TW06	8/1/96	19.45	17.72	15.0	14.5	4.5-14.5
93-TW06IW	8/1/96	19.08	17.72	52.0	50.0	45.0-50.0
93-TW07	8/2/96	20.08	17.82	15.0	15.0	5.0-15.0
93-TW07IW	8/2/96	19.87	17.52	52.0	50.0	45.0-50.0
93-TW14	8/5/96	17.69	15.58	25.0	24.5	14.5-24.5
93-TW14IW	8/5/96	17.73	15.58	50.0	50.0	45.0-50.0

Notes:

[1] msl = mean sea level
[2] ft, bgs = feet, below ground surface

TABLE 3-3

SUMMARY OF FIELD PARAMETERS
FOR GROUNDWATER SAMPLING
OPERABLE UNIT 16 (SITE 89)
PHASE I INVESTIGATION, CTO-0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number / Date of Measurement	Measuring Time	Well Volume	Purge Volume (gals.)	Field Parameters: Specific Conductance at 25°C (µmhos/cm)	Temperature at 25°C (°C)	pH (S.U.)	Turbidity (T.U.)	Dissolved Oxygen (mL/L)
89-TW18	1331	1	0.5	0.5	329	6.36	106	3.95
08/13/96	1400	2	1	1	313	6.19	34.5	3.6
	1435	3	1.5	1.5	303	6.17	12.2	2.5
89-TW18IW	1215	1	3	404	19	7.64	>200	1.6
08/13/96	1235	2	6	425	19	7.63	28	1.2
	1300	3	9	430	19.5	7.64	13	1.6
89-TW19	1720	1	.7	660	22.2	6.70	77	--
08/13/96	1725	2	1.4	--	--	--	48	--
	1730	3	2.8	650	22.2	6.70	40	--
	1740	N/A	N/A	645	22.2	6.53	27.5	--
	1745	N/A	N/A	--	--	--	19.5	--
	1750	N/A	N/A	655	22.4	6.81	21.5	--
89-TW19IW[1] 08/13/96	1650	1	2.5	555	21.4	9.29	>200	5.2
89-TW20	0950	1	.5	105	19.8	5.47	>200	3.0
08/14/96	1005	2	1	105	19.9	5.30	>200	3.0
	1015	3	1.5	96	19.8	5.31	>200	3.2
	1025	4	2	93	19.9	5.30	>200	3.4
	1035	N/A	N/A	--	--	--	170	--
	1040	N/A	N/A	--	--	--	>200	--
	1050	N/A	N/A	--	--	--	>200	--
	1100	N/A	N/A	--	--	--	170	--
	1105	N/A	N/A	--	--	--	79	--
	1110	N/A	N/A	--	--	--	76	--
	1115	N/A	N/A	--	--	--	48	--
89-TW20IW	0840	1	.2	583	19.4	7.36	47	2.6
08/14/96	0850	N/A	N/A	531	19.4	7.18	71	2.6
	0900	N/A	N/A	505	19.3	7.14	135	2.8
	0910	N/A	N/A	507	19.4	7.11	115	2.5
	0920	N/A	N/A	500	20.2	7.55	67	2.6
	0925	N/A	N/A	--	--	--	100	--
89-TW21	1015	1	.7	79	20.7	5.73	34	3.0
08/15/96	1025	2	1.5	76	20.6	5.47	7	3.0
	1037	3	2.5	72	20.4	5.36	4	3.0

TABLE 3-3 (Continued)

SUMMARY OF FIELD PARAMETERS
FOR GROUNDWATER SAMPLING
OPERABLE UNIT 16 (SITE 89)
PHASE I INVESTIGATION, CTO-0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number / Date of Measurement	Measuring Time	Well Volume	Purge Volume (gals.)	Field Parameters: Specific Conductance at 25°C (µmhos/cm)	Temperature at 25°C (°C)	pH (S.U.)	Turbidity (T.U.)	Dissolved Oxygen (mL/L)
89-TW21IW	0820	1	2.5	500	18	703	>200	2.0
	0840	2	5	484	18.1	7.10	>200	1.8
	0900	3	7.6	485	18.2	7.20	>200	2.0
	0907	4	9	482	18.3	7.18	133	1.8
	0920	5	11	494	18.2	7.24	135	2.0
	0938	6	13	--	--	--	6.3	--
89-TW22	0955	1	3.5	81	20.9	6.31	20	1.85
	1004	2	1	80	20.9	6.11	9.5	5.0
	1015	3	1.5	80	21.2	5.52	8	5.2
89-TW22IW	0820	2	2.5	462	18.2	7.36	>200	1.4
08/16/96	0847	2	5	448	18.4	7.43	50	1.6
	0911	3	8.5	450	18.2	7.44	23	1.8
	0930	N/A	10	452	18.6	7.42	13	1.8
	0940	N/A	NA	--	--	--	10	--
89-TW23IW	0900	1	2.5	350	18.2	6.83	>200	0.6
08/21/96	0913	2	0.5	334	18.0	7.14	93	1
	0924	3	7.5	334	18.0	7.31	52	1.2
	0930	N/A	N/A	--	--	--	35	--
	0935	N/A	N/A	--	--	--	53	--
	0940	N/A	N/A	--	--	--	83	--

Notes:

(1) = Insufficient amount of water for readings
°C = Degrees Centigrade
S.U. = Standard Units
µmhos/cm = Micro ohms per centimeters
N.T.U. = Neophelometric Turbidity Units
-- = Not measured
N/A = Not applicable

TABLE 3-4

SUMMARY OF FIELD PARAMETERS
FOR GROUNDWATER SAMPLING
OPERABLE UNIT 16 (SITE 93)
PHASE I INVESTIGATION, CTO-0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number / Date of Measurement	Measuring Time	Well Volume	Purge Volume (gals.)	Field Parameters: Specific Conductance at 25°C (µmhos/cm)	Temperature at 25°C (°C)	pH (S.U.)	Turbidity (T.U.)	Dissolved Oxygen (mL/L)
93-TW01	0825	1	1	740	22.0	6.00	166.9	1.25
07/30/96	0835	2	2	556	22.1	6.15	50.9	1.25
	0843	3	3	488.1	21.8	6.13	28.4	1.5
	0852	4	4	462.5	21.8	6.14	16.8	1.5
	0859	5	5	464.3	22.7	6.07	19.4	1.25
	0903	6	6	456.0	22.1	6.12	12.0	1.25
93-TW01IW	0829	1	4	446.1	21.3	6.81	168.0	1.0
07/30/96	0849	2	8	422.6	21.4	6.89	102.6	1.6
	0915	3	12	415.0	22.3	7.15	64.0	1.0
	0933	4	16	417.0	22.0	7.46	43.7	1.2
	0955	5	20	416.3	22.0	7.55	39.5	1.0
	1016	6	24	416.5	22.5	7.61	14.4	1.0
93-TW02	1338	1	1	269.4	25.0	5.23	161.0	1.25
07/30/96	1343	2	2	265.8	24.8	5.05	26.4	1.20
	1348	3	3	268.7	23.8	5.10	15.8	1.25
93-TW02IW[1] 07/30/96	1330	0.5	2	--	--	--	--	--
93-TW03	0852	1	1	449.7	24.4	6.50	>200	3.5
07/31/96	0908	2	2	446.4	24.1	7.20	20.8	3.5
93-TW03IW	0902	1	4	482.3	21.8	7.31	>200	1.1
07/31/96	0920	2	8	438.3	21.7	7.40	173.8	1.2
	0933	3	12	448.7	22.5	7.55	170.5	1.25
93-TW05	0812	1	1	719	25.8	6.24	99.1	1.3
08/01/96	0816	2	2	711	25.0	6.51	172.5	1.0
	0822	3	3	720	24.7	6.81	39.8	--
	0829	4	4	726	25.0	6.85	13.2	--
93-TW05IW 08/01/96	0841	1	3.6	483.5	22.4	7.32	4.8	1.75
93-TW06	1707	1	0.75	144.3	24.8	5.62	98.0	1.25
08/01/96	1709	2	1.50	135.2	24.5	5.58	41.5	1.25
	1715	3	2.25	--	--	5.89	25.7	1.25

TABLE 3-4 (Continued)

SUMMARY OF FIELD PARAMETERS
FOR GROUNDWATER SAMPLING
OPERABLE UNIT 16 (SITE 93)
PHASE I INVESTIGATION, CTO-0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number				Field Parameters				
Date of Measurement	Measuring Time	Well Volume	Purge Volume (gals.)	Specific Conductance at 25°C (µmhos/cm)	Temperature at 25°C (°C)	pH (S.U.)	Turbidity (T.U.)	Dissolved Oxygen (mL/L)
93TW06IW	1712	1	3.5	425	23.2	6.56	170.2	1.0
08/01/96	1726	2	7.0	437.1	23.2	6.84	172.2	1.2
	1740	3	10.5	448.4	23.2	7.29	170.0	1.2
93-TW07	0823	1	1	132.6	23.9	5.60	165.4	1.2
08/03/96	0829	2	2	132.5	23.9	5.51	163.4	1.2
	0840	3	3	124.1	23.8	6.07	40.5	1.2
	0847	4	4	124.0	23.9	5.70	9.7	1.5
93-TW07IW	0835	1	3.5	461.1	21.7	6.60	26.7	1.5
08/03/96	0857	2	7.0	445.7	21.5	6.67	18.8	1.5
	0924	3	10.5	439.0	21.8	7.09	14.8	1.3
93-TW14	1538	1	1.2	519	36.7	7.39	172.2	1.25
08/05/96	1544	2	2.4	533	28.8	7.51	170.4	1.25
	1552	3	3.6	525	27.5	7.50	169.8	1.30
	1558	4	4.8	--	--	--	--	--
93-TW14IW	1548	1	3.6	479.6	22.2	7.68	25.5	1.75
	1608	2	7.20	477.1	22.4	7.51	35.0	2.10
	1624	3	10.8	490.1	21.9	7.70	39.3	1.25

Notes:

(1) = Insufficient amount of water for readings
°C = Degrees Centigrade
S.U. = Standard Units
µmhos/cm = Micro ohms per centimeters
N.T.U. = Neophelometric Turbidity Units
-- = Not measured
N/A = Not applicable

TABLE 3-5

SUMMARY OF FIELD PARAMETERS
FOR SURFACE WATER SAMPLING
OPERABLE UNIT 16 (SITE 89, EDWARDS CREEK)
PHASE I INVESTIGATION, CTO-0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample Identification		Field Parameters				
Date of Measurement	Measuring Time	Specific Conductance at 25°C (µmhos/cm)	Temperature at 25°C (°C)	pH (S.U.)	Salinity (ppt)	Dissolved Oxygen (mL/L)
89-EC-SW01 07/27/96	0945	440	28.1	6.70	0.2	3.3
89-EC-SW02 07/27/96	0845	327	25.2	6.86	0.2	4.5
89-EC-SW03 07/27/96	0815	243	25.4	6.78	0.2	5.2
89-EC-SW04 07/26/96	1240	229	29.0	6.03	0.10	5.0
89-EC-SW05 07/26/96	1133	291	26.8	7.13	0.10	4.2

Notes:

°C = Degrees Centigrade
S.U. = Standard Units
µmhos/cm = micro ohms per Centimeters
ppt = parts per thousand
mL/L = milliliters per liter

TABLE 3-6

GROUNDWATER SAMPLING SUMMARY
OPERABLE UNIT 16 (SITE 89)
PHASE I INVESTIGATION, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Location	Analytical Parameters	
	EPA 8240[1]	TCL VOA[2]
89-MW01	●	
89-MW02	●	
89-MW03	●	
89-TW04	●	
89-TW04IW	●	●
89-TW08	●	
89-TW08IW	●	
89-TW09	●	●
89-TW09IW	●	●
89-TW10	●	
89-TW10IW	●	
89-TW11	●	
89-TW11IW	●	
89-TW12	●	
89-TW12IW	●	
89-TW13	●	
89-TW13IW	●	
89-TW15	●	
89-TW15IW	●	
89-TW16	●	
89-TW16IW	●	
89-TW17IW	●	●
89-TW18	●	
89-TW18IW	●	
89-TW19	●	
89-TW19IW	●	
89-TW20	●	
89-TW20IW	●	
89-TW21	●	

TABLE 3-6 (Continued)

GROUNDWATER SAMPLING SUMMARY
OPERABLE UNIT 16 (SITE 89)
PHASE I INVESTIGATION, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Location	Analytical Parameters	
	EPA 8240[1]	TCL VOA[2]
89-MW42B	●	
89-TW21IW	●	
89-TW22	●	
89-TW22IW	●	
89-TW23IW	●	

Notes:

[1] On-site laboratory
[2] Fixed based laboratory

TCL = Target Compound List
VOA = Volatile Organic Analysis
● = Sample analyzed for indicated parameter

TABLE 3-7

GROUNDWATER SAMPLING SUMMARY
OPERABLE UNIT 16 (SITE 93)
PHASE I INVESTIGATION, CTO-0356
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample Location	Analytical Parameters	
	EPA 8240[1]	TCL VOA[2]
93-MW05	●	
93-TW01	●	●
93-TW01IW	●	
93-TW02	●	
93-TW02IW	●	●
93-TW03	●	
93-TW03IW	●	
93-TW05	●	
93-TW05IW	●	
93-TW06	●	
93-TW06IW	●	
93-TW07	●	●
93-TW07IW	●	
93-TW14	●	
93-TW14IW	●	

Notes:

(1) On-site laboratory
(2) Fixed based laboratory

TCL = Target Compound List
VOA = Volatile Organic Analysis
● = Sample analyzed for indicated parameter

TABLE 3-8

SURFACE WATER SAMPLING SUMMARY
OPERABLE UNIT 16 (SITE 89)
PHASE 1 INVESTIGATION, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Location	Analytical Parameters				
	TCL VOA	TCL SVOA	TCL Pesticide/PCB	TAL Metals	EPA 8240
89-EC-SW01	●	●		●	●
89-EC-SW02	●	●		●	●
89-EC-SW03	●	●		●	●
89-EC-SW04	●	●		●	●
89-EC-SW05	●	●	●	●	●
89-EC-SW06					●
89-EC-SW07					●
89-EC-SW08					●
89-EC-SW09					●
89-EC-SW10					●
89-EC-SW11					●

Notes:

TCL = Target Compound List
VOA = Volatile Organic Analysis
SVOA = Semivolatile Organic Analysis
TAL = Target Analyte List
● = Sample analyzed for indicated parameter

TABLE 3-9

SEDIMENT SAMPLING SUMMARY
OPERABLE UNIT 16 (SITE 89)
PHASE 1 INVESTIGATION, CTO-0356
MCB, CAMP LEJEUNE, NORTH CAROLINA

Sample Location	Analytical Parameters				
	Depth (ft)	TCL VOA	TCL SVOA	TCL Pesticide/PCB	TAL Metals
89-EC-SD01-06	0-0.5	•	•		•
89-EC-SD01-612	0.5-1.0	•	•		•
89-EC-SD02-06	0-0.5	•	•		•
89-EC-SD02-612	0.5-1.0	•	•		•
89-EC-SD03-06	0-.05	•	•		•
89-EC-SD03-612	0.5-1.0	•	•		•
89-EC-SD040-06	0-0.5	•	•		•
89-EC-SD04-612	0.5-1.0	•	•		•
89-EC-SD05-06	0-0.5	•	•	•	•
89-EC-SD05-612	0.5-1.0	•	•	•	•

Notes:

TCL = Target Compound List
VOA = Volatile Organic Analysis
SVOA = Semivolatile Organic Analysis
TAL = Target Analyte List
• = Sample analyzed for indicated parameter

TABLE 4-1
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
SURFACE WATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05	89-EC-SW06
SAMPLE DATE	08/15/96	08/15/96	08/15/96	08/15/96	08/15/96	08/01/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES						
TRANS-1,2-DICHLOROETHENE	ND	37	31	19	15	ND
CIS-1,2-DICHLOROETHENE	2	48	44	52	44	ND
TRICHLOROETHENE	3.8	7.3	6.4	32.9	27.3	ND
TETRACHLOROETHENE	0.2	0.2	0.2	0.2	0.1	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-1 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
SURFACE WATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-EC-SW07	89-EC-SW08	89-EC-SW09	89-EC-SW10	89-EC-SW11
SAMPLE DATE	08/01/96	08/01/96	08/15/96	08/15/96	08/15/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES					
TRANS-1,2-DICHLOROETHENE	21	ND	16	15	14
CIS-1,2-DICHLOROETHENE	27	ND	44	43	43
TRICHLOROETHENE	14.8	ND	28.5	27.9	27.6
TETRACHLOROETHENE	1.2	0.4	0.2	0.1	0.2

TABLE 4-2
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
VOLATILES					
CHLOROMETHANE	10 U	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	25	21	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U	10 U
ACETONE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
CARBON DISULFIDE	10 U	10 U	10 U	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U	10 U	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U	10 U	10 U
1,2-DICHLOROETHENE (TOTAL)	10 U	120	100	80	78
CHLOROFORM	10 U	10 U	10 U	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U	10 U	10 U
2-BUTANONE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
1,1,1-TRICHLOROETHANE	10 U	10 U	10 U	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	3 J	18	16	26	24
DIBROMOCHLOROMETHANE	10 U	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U	10 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
VOLATILES (cont)					
BROMOFORM	10 U	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
2-HEXANONE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
TETRACHLOROETHENE	10 U	10 U	10 U	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 UJ	150 J	130 J	72	80
TOLUENE	10 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U
STYRENE	10 U	10 U	10 U	10 U	10 U
XYLENE (TOTAL)	10 U	10 U	10 U	10 U	10 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
SEMIVOLATILES					
PHENOL	10 U	10 U	10 U	10 U	11 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	10 U	11 U
2-CHLOROPHENOL	10 U	10 U	10 U	10 U	11 U
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 U	11 U
1,4-DICHLOROBENZENE	10 U	10 U	10 U	10 U	11 U
1,2-DICHLOROBENZENE	10 U	10 U	10 U	10 U	11 U
2-METHYLPHENOL	10 U	10 U	10 U	10 U	11 U
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U	10 U	11 U
4-METHYLPHENOL	10 U	10 U	10 U	10 U	11 U
N-NITROSO-DI-N-PROPYLAMINE	10 U	10 U	10 U	10 U	11 U
HEXACHLOROETHANE	10 U	10 U	10 U	10 U	11 U
NITROBENZENE	10 U	10 U	10 U	10 U	11 U
ISOPHORONE	10 U	10 U	10 U	10 U	11 U
2-NITROPHENOL	10 U	10 U	10 U	10 U	11 U
2,4-DIMETHYLPHENOL	10 UJ	10 UJ	10 UJ	10 UJ	11 UJ
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	10 U	11 U
2,4-DICHLOROPHENOL	10 U	10 U	10 U	10 U	11 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 U	11 U
NAPHTHALENE	10 U	10 U	10 U	10 U	11 U
4-CHLOROANILINE	10 U	10 U	10 U	10 U	11 U
HEXACHLOROBUTADIENE	10 U	10 U	10 U	10 U	11 U
4-CHLORO-3-METHYLPHENOL	10 U	10 U	10 U	10 U	11 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
SEMIVOLATILES (cont)					
2-METHYLNAPHTHALENE	10 U	10 U	10 U	10 U	11 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	10 U	11 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	10 U	11 U
2,4,5-TRICHLOROPHENOL	25 U	26 U	25 U	26 U	28 U
2-CHLORONAPHTHALENE	10 U	10 U	10 U	10 U	11 U
2-NITROANILINE	25 U	26 U	25 U	26 U	28 U
DIMETHYLPHTHALATE	10 U	10 U	10 U	10 U	11 U
ACENAPHTHYLENE	10 U	10 U	10 U	10 U	11 U
2,6-DINITROTOLUENE	10 U	10 U	10 U	10 U	11 U
3-NITROANILINE	25 U	26 U	25 U	26 U	28 U
ACENAPHTHENE	10 U	10 U	10 U	10 U	11 U
2,4-DINITROPHENOL	25 U	26 U	25 U	26 U	28 U
4-NITROPHENOL	25 U	26 U	25 U	26 U	28 U
DIBENZOFURAN	10 U	10 U	10 U	10 U	11 U
2,4-DINITROTOLUENE	10 U	10 U	10 U	10 U	11 U
DIETHYLPHTHALATE	10 U	10 U	10 U	10 U	11 U
4-CHLOROPHENYL-PHENYLETHER	10 U	10 U	10 U	10 U	11 U
FLUORENE	10 U	10 U	10 U	10 U	11 U
4-NITROANILINE	25 UJ	26 UJ	25 UJ	26 UJ	28 UJ
4,6-DINITRO-2-METHYLPHENOL	25 UJ	26 UJ	25 UJ	26 UJ	28 UJ
N-NITROSODIPHENYLAMINE (1)	10 U	10 U	10 U	10 U	11 U
4-BROMOPHENYL-PHENYLETHER	10 U	10 U	10 U	10 U	11 U
HEXACHLOROBENZENE	10 U	10 U	10 U	10 U	11 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
SEMIVOLATILES (cont)					
PENTACHLOROPHENOL	25 UJ	26 UJ	25 UJ	26 UJ	28 UJ
PHENANTHRENE	10 U	10 U	10 U	10 U	11 U
ANTHRACENE	10 U	10 U	10 U	10 U	11 U
CARBAZOLE	10 U	10 U	10 U	10 U	11 U
DI-N-BUTYLPHTHALATE	10 U	10 U	10 U	10 U	11 U
FLUORANTHENE	10 U	10 U	10 U	10 U	11 U
PYRENE	10 U	10 U	10 U	10 U	11 U
BUTYLBENZYLPHTHALATE	10 U	10 U	10 U	10 U	11 U
3,3'-DICHLOROBENZIDINE	10 UJ	10 UJ	10 UJ	10 UJ	11 UJ
BENZO(A)ANTHRACENE	10 U	10 U	10 U	10 U	11 U
CHRYSENE	10 U	10 U	10 U	10 U	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	13 U	10 U	10 U	11 U
DI-N-OCTYLPHTHALATE	10 U	10 U	10 U	10 U	11 U
BENZO(B)FLUORANTHENE	10 U	10 U	10 U	10 U	11 U
BENZO(K)FLUORANTHENE	10 U	10 U	10 U	10 U	11 U
BENZO(A)PYRENE	10 U	10 U	10 U	10 U	11 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U	10 U	10 U	11 U
DIBENZO(A,H)ANTHRACENE	10 U	10 U	10 U	10 U	11 U
BENZO(G,H,I)PERYLENE	10 U	10 U	10 U	10 U	11 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
PESTICIDES/PCBS					
ALPHA-BHC	NA	NA	NA	NA	0.054 UJ
BETA-BHC	NA	NA	NA	NA	0.054 UJ
DELTA-BHC	NA	NA	NA	NA	0.054 UJ
GAMMA-BHC (LINDANE)	NA	NA	NA	NA	0.054 UJ
HEPTACHLOR	NA	NA	NA	NA	0.054 UJ
ALDRIN	NA	NA	NA	NA	0.054 UJ
HEPTACHLOR EPOXIDE	NA	NA	NA	NA	0.054 UJ
ENDOSULFAN I	NA	NA	NA	NA	0.054 UJ
DIELDRIN	NA	NA	NA	NA	0.11 UJ
4,4'-DDE	NA	NA	NA	NA	0.11 UJ
ENDRIN	NA	NA	NA	NA	0.11 UJ
ENDOSULFAN II	NA	NA	NA	NA	0.11 UJ
4,4'-DDD	NA	NA	NA	NA	0.11 UJ
ENDOSULFAN SULFATE	NA	NA	NA	NA	0.11 UJ
4,4'-DDT	NA	NA	NA	NA	0.11 UJ
METHOXYCHLOR	NA	NA	NA	NA	0.54 UJ
ENDRIN KETONE	NA	NA	NA	NA	0.11 UJ
ENDRIN ALDEHYDE	NA	NA	NA	NA	0.11 UJ
ALPHA-CHLORDANE	NA	NA	NA	NA	0.054 UJ
GAMMA-CHLORDANE	NA	NA	NA	NA	0.054 UJ
TOXAPHENE	NA	NA	NA	NA	5.4 UJ

QUALIFIER DEFINITIONS
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.
NA = Not analyzed.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
PESTICIDES/PCBS (cont)					
AROCLOR-1016	NA	NA	NA	NA	1.1 UJ
AROCLOR-1221	NA	NA	NA	NA	2.2 UJ
AROCLOR-1232	NA	NA	NA	NA	1.1 UJ
AROCLOR-1242	NA	NA	NA	NA	1.1 UJ
AROCLOR-1248	NA	NA	NA	NA	1.1 UJ
AROCLOR-1254	NA	NA	NA	NA	1.1 UJ
AROCLOR-1260	NA	NA	NA	NA	1.1 UJ

QUALIFIER DEFINITIONS
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.
NA = Not analyzed.

TABLE 4-2 (continued)
FIXED BASE DETECTION SUMMARY
SURFACE WATER
METALS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SW01	89-EC-SW02	89-EC-SW03	89-EC-SW04	89-EC-SW05
LAB_ID	9607G440-013	9607G440-014	9607G440-015	9607G440-009	9607G440-007
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/L	UG/L	UG/L	UG/L	UG/L
TOTAL METALS					
ALUMINUM, TOTAL	41.8	189	201	554	275
ANTIMONY, TOTAL	14.4 U	14.4 U	14.4 U	18.5	14.4 U
ARSENIC, TOTAL	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
BARIUM, TOTAL	17.9	23.6	25	22.4	20.6
BERYLLIUM, TOTAL	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
CADMIUM, TOTAL	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
CALCIUM, TOTAL	42500	46300	46900	41800	37300
CHROMIUM, TOTAL	3.3 U	3.3 U	3.3 U	3.6	3.3 U
COBALT, TOTAL	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
COPPER, TOTAL	2.6	3.9	2 U	4.7	5.7 U
IRON, TOTAL	803	1500	1510	1570	1220
LEAD, TOTAL	1.2 U	1.2 U	5.4	3.8	1.3 J
MAGNESIUM, TOTAL	3560	2560	2480	2450	2200
MANGANESE, TOTAL	28.2	50.4	47.9	31.9	25.7
MERCURY, TOTAL	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL, TOTAL	8.7 UJ	8.7 UJ	8.7 UJ	8.7 UJ	8.7 U
POTASSIUM, TOTAL	4270	2530	2300	2890	2240
SELENIUM, TOTAL	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
SILVER, TOTAL	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
SODIUM, TOTAL	38500	16600	15900	13400	11500
THALLIUM, TOTAL	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
VANADIUM, TOTAL	2.5 U	2.8	2.5 U	4.2	2.5 U
ZINC, TOTAL	17.2	13.3	9.2	17.7	9.3

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-3

SUMMARY OF SITE SURFACE WATER CONTAMINATION
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

Media	Fraction	Detected Contaminants or Analytes	Comparison Criteria (1)		Min.	Max.	Location of Maximum Detection	Detection Frequency	Detections Comparison	Above Criteria
			NC WQS (1)	Region IV WQS (2)					NC WQS (1)	Region IV WQS (2)
Surface water (on-site lab)	Volatiles	Trans-1,2-Dichloroethene	NE	NE	14	37	89-EC-SW02	8/11	NA	NA
		Cis-1,2-Dichloroethene	NE	NE	2	52	89-EC-SW04	9/11	NA	NA
		Trichloroethene	NE	NE	3.8	32.9	89-EC-SW04	9/11	NA	NA
		Tetrachloroethene	NE	NE	0.1	1.2	89-EC-SW07	10/11	NA	NA
Surface water (fixed based lab)	Volatiles	Vinyl Chloride	NE	NE	21	25	89-EC-SW02	2/5	NA	NA
		1,2-Dichloroethene (total)	NE	NE	78	120	89-EC-SW02	4/5	NA	NA
		Trichloroethene	NE	NE	35	26	89-EC-SW04	5/5	NA	NA
		1,1,2,2-Tetrachloroethane	NE	NE	72	150J	89-EC-SW02	4/5	NA	NA
Surface water (fixed based lab)	Semivolatiles	ND	NA	NA	NA	NA	NA	NA	NA	NA
Surface water (fixed based lab)	Pesticides	ND	NA	NA	NA	NA	NA	NA	NA	NA
Surface water (fixed based lab)	Metals	Aluminum	NE	NE	41.8	554	89-EC-SW04	5/5	NA	NA
		Barium	NE	NE	17.9	25	89-EC-SW03	5/5	NA	NA
		Chromium	20	NE	3.6	3.6	89-EC-SW04	1/5	0	NA
		Copper	NE	NE	2.6	5.7	89-EC-SW05	3/5	NA	NA
		Lead	25	NE	1.3J	5.4	89-EC-SW03	3/5	0	NA
		Manganese	NE	NE	25.7	50.4	89-EC-SW02	5/5	NA	NA
		Vanadium	NE	NE	2.8	4.2	89-EC-SW04	2/5	NA	NA
		Zinc	NE	NE	9.2	17.7	89-EC-SW04	5/5	NA	NA

(1) - Surface water concentrations compared to North Carolina Water Quality Standards for Surface water.
(2) - Surface water conentrations compared to USEPA Region IV Water Qualtity Standards.
Concentrations in ug/L
NA - Not Applicable
NE - None Established
ND - Not Detected

TABLE 4-4
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
VOLATILES						
CHLOROMETHANE	13 U	13 U	12 U	12 U	12 U	14 U
BROMOMETHANE	13 U	13 U	12 U	12 U	12 U	14 U
VINYL CHLORIDE	13 U	13 U	35	12 U	12 U	14 U
CHLOROETHANE	13 U	13 U	12 U	12 U	12 U	14 U
METHYLENE CHLORIDE	13 U	13 U	12 U	12 U	12 U	14 U
ACETONE	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ	14 UJ
CARBON DISULFIDE	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ	14 UJ
1,1-DICHLOROETHENE	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ	14 UJ
1,1-DICHLOROETHANE	13 U	13 U	12 U	12 U	12 U	14 U
1,2-DICHLOROETHENE (TOTAL)	13 U	13 U	1600	12 U	12 U	14 U
CHLOROFORM	13 U	13 U	12 U	12 U	12 U	14 U
1,2-DICHLOROETHANE	13 U	13 U	12 U	12 U	12 U	14 U
2-BUTANONE	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ	14 UJ
1,1,1-TRICHLOROETHANE	13 U	13 U	12 U	12 U	12 U	14 U
CARBON TETRACHLORIDE	13 U	13 U	12 U	12 U	12 U	14 U
BROMODICHLOROMETHANE	13 U	13 U	12 U	12 U	12 U	14 U
1,2-DICHLOROPROPANE	13 U	13 U	12 U	12 U	12 U	14 U
CIS-1,3-DICHLOROPROPENE	13 U	13 U	12 U	12 U	12 U	14 U
TRICHLOROETHENE	13 U	13 U	2400	12 U	12 U	14 U
DIBROMOCHLOROMETHANE	13 U	13 U	12 U	12 U	12 U	14 U
1,1,2-TRICHLOROETHANE	13 U	13 U	19	12 U	12 U	14 U
BENZENE	13 U	13 U	12 U	12 U	12 U	14 U
TRANS-1,3-DICHLOROPROPENE	13 U	13 U	12 U	12 U	12 U	14 U
BROMOFORM	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ	14 UJ

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
VOLATILES (cont)						
4-METHYL-2-PENTANONE	13 U	13 U	12 U	12 U	12 U	14 U
2-HEXANONE	13 U	13 U	12 U	12 U	12 U	14 U
TETRACHLOROETHENE	13 U	13 U	12 U	12 U	12 U	14 U
1,1,2,2-TETRACHLOROETHANE	13 U	13 U	1700	12 U	12 U	14 U
TOLUENE	13 U	13 U	7 J	12 U	12 U	14 U
CHLOROBENZENE	13 U	13 U	12 U	12 U	12 U	14 U
ETHYLBENZENE	13 U	13 U	12 U	12 U	12 U	14 U
STYRENE	13 U	13 U	12 U	12 U	12 U	14 U
XYLENE (TOTAL)	13 U	13 U	12 U	12 U	12 U	14 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
SEMIVOLATILES						
PHENOL	410 U	430 U	410 U	410 U	390 U	440 U
BIS(2-CHLOROETHYL)ETHER	410 U	430 U	410 U	410 U	390 U	440 U
2-CHLOROPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
1,3-DICHLOROBENZENE	410 U	430 U	410 U	410 U	390 U	440 U
1,4-DICHLOROBENZENE	410 U	430 U	410 U	410 U	390 U	440 U
1,2-DICHLOROBENZENE	410 U	430 U	410 U	410 U	390 U	440 U
2-METHYLPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
2,2'-OXYBIS(1-CHLOROPROPANE)	410 U	430 U	410 U	410 U	390 U	440 U
4-METHYLPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
N-NITROSO-DI-N-PROPYLAMINE	410 U	430 U	410 U	410 U	390 U	440 U
HEXACHLOROETHANE	410 U	430 U	410 U	410 U	390 U	440 U
NITROBENZENE	410 U	430 UJ	410 UJ	410 U	390 UJ	440 UJ
ISOPHORONE	410 U	430 U	410 U	410 U	390 U	440 U
2-NITROPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
2,4-DIMETHYLPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
BIS(2-CHLOROETHOXY)METHANE	410 U	430 U	410 U	410 U	390 U	440 U
2,4-DICHLOROPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
1,2,4-TRICHLOROBENZENE	410 U	430 U	410 U	410 U	390 U	440 U
NAPHTHALENE	410 U	430 U	410 U	410 U	390 U	440 U
4-CHLOROANILINE	410 U	430 U	410 U	410 U	390 U	440 U
HEXACHLOROBUTADIENE	410 U	430 U	410 U	410 U	390 U	440 U
4-CHLORO-3-METHYLPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
2-METHYLNAPHTHALENE	410 U	430 U	410 U	410 U	390 U	440 U
HEXACHLOROCYCLOPENTADIENE	410 U	430 U	410 U	410 U	390 U	440 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
SEMIVOLATILES (cont)						
2,4,6-TRICHLOROPHENOL	410 U	430 U	410 U	410 U	390 U	440 U
2,4,5-TRICHLOROPHENOL	1000 U	1100 U	1000 U	1000 U	970 U	1100 U
2-CHLORONAPHTHALENE	410 U	430 U	410 U	410 U	390 U	440 U
2-NITROANILINE	1000 U	1100 U	1000 U	1000 U	970 U	1100 U
DIMETHYLPHTHALATE	410 U	430 U	410 U	410 U	390 U	440 U
ACENAPHTHYLENE	410 U	430 U	410 U	410 U	390 U	440 U
2,6-DINITROTOLUENE	410 U	430 U	410 U	410 U	390 U	440 U
3-NITROANILINE	1000 UJ	1100 U	1000 UJ	1000 UJ	970 UJ	1100 UJ
ACENAPHTHENE	410 U	430 U	410 U	410 U	390 U	440 U
2,4-DINITROPHENOL	1000 UJ	1100 UJ	1000 UJ	1000 UJ	970 UJ	1100 UJ
4-NITROPHENOL	1000 U	1100 U	1000 U	1000 U	970 U	1100 U
DIBENZOFURAN	410 U	430 U	410 U	410 U	390 U	440 U
2,4-DINITROTOLUENE	410 U	430 U	470 UJ	410 U	390 U	440 U
DIETHYLPHTHALATE	410 U	430 U	410 U	410 U	390 U	440 U
4-CHLOROPHENYL-PHENYLETHER	410 U	430 U	410 U	410 U	390 U	440 U
FLUORENE	410 U	430 U	410 U	410 U	390 U	440 U
4-NITROANILINE	1000 UJ	1100 U	1000 U	1000 UJ	970 U	1100 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	1100 U	1000 U	1000 U	970 U	1100 U
N-NITROSODIPHENYLAMINE (1)	410 U	430 U	410 U	410 U	390 U	440 U
4-BROMOPHENYL-PHENYLETHER	410 U	430 U	410 U	410 U	390 U	440 U
HEXACHLOROBENZENE	410 U	430 U	410 U	410 U	390 U	440 U
PENTACHLOROPHENOL	1000 U	1100 U	1000 U	1000 U	970 U	1100 U
PHENANTHRENE	50 J	430 U	42 J	100 J	390 U	440 U
ANTHRACENE	410 U	430 U	410 U	410 U	390 U	440 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
SEMIVOLATILES (cont)						
CARBAZOLE	410 UJ	430 U	410 U	410 UJ	390 U	440 U
DI-N-BUTYLPHTHALATE	410 U	430 U	410 U	410 U	390 U	440 U
FLUORANTHENE	68 J	59 J	410 U	180 J	51 J	440 U
PYRENE	50 J	85 J	410 U	130 J	63 J	440 U
BUTYLBENZYLPHTHALATE	410 U	430 U	410 U	410 U	390 U	440 U
3,3'-DICHLOROBENZIDINE	410 U	430 U	410 U	410 U	390 U	440 U
BENZO(A)ANTHRACENE	410 U	430 U	410 U	48 J	390 U	440 U
CHRYSENE	410 U	51 J	410 U	120 J	390 U	440 U
BIS(2-ETHYLHEXYL)PHTHALATE	360 J	150 J	140 J	240 J	110 J	97 J
DI-N-OCTYLPHTHALATE	410 U	430 U	410 U	410 U	390 U	440 U
BENZO(B)FLUORANTHENE	53 J	430 U	410 U	140 J	44 J	440 U
BENZO(K)FLUORANTHENE	410 U	430 U	410 U	51 J	390 U	440 U
BENZO(A)PYRENE	410 U	430 U	410 U	65 J	390 U	440 U
INDENO(1,2,3-CD)PYRENE	410 U	430 U	410 U	59 J	390 U	440 U
DIBENZO(A,H)ANTHRACENE	410 U	430 U	410 U	410 U	390 U	440 U
BENZO(G,H,I)PERYLENE	50 J	430 U	410 U	55 J	390 U	440 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
PESTICIDES/PCBS						
ALPHA-BHC	NA	NA	NA	NA	2 UJ	NA
BETA-BHC	NA	NA	NA	NA	2 UJ	NA
DELTA-BHC	NA	NA	NA	NA	2 UJ	NA
GAMMA-BHC (LINDANE)	NA	NA	NA	NA	2 UJ	NA
HEPTACHLOR	NA	NA	NA	NA	2 UJ	NA
ALDRIN	NA	NA	NA	NA	2 UJ	NA
HEPTACHLOR EPOXIDE	NA	NA	NA	NA	2 UJ	NA
ENDOSULFAN I	NA	NA	NA	NA	2 UJ	NA
DIELDRIN	NA	NA	NA	NA	3.9 UJ	NA
4,4'-DDE	NA	NA	NA	NA	33 J	NA
ENDRIN	NA	NA	NA	NA	3.9 UJ	NA
ENDOSULFAN II	NA	NA	NA	NA	3.9 UJ	NA
4,4'-DDD	NA	NA	NA	NA	42 J	NA
ENDOSULFAN SULFATE	NA	NA	NA	NA	3.9 UJ	NA
4,4'-DDT	NA	NA	NA	NA	23 J	NA
METHOXYCHLOR	NA	NA	NA	NA	20 UJ	NA
ENDRIN KETONE	NA	NA	NA	NA	3.9 UJ	NA
ENDRIN ALDEHYDE	NA	NA	NA	NA	3.9 UJ	NA
ALPHA-CHLORDANE	NA	NA	NA	NA	2 J	NA
GAMMA-CHLORDANE	NA	NA	NA	NA	1.6 J	NA
TOXAPHENE	NA	NA	NA	NA	200 UJ	NA

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.
NA = Not analyzed.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD01-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
PESTICIDES/PCBS (cont)						
AROCLOR-1016	NA	NA	NA	NA	39 U	NA
AROCLOR-1221	NA	NA	NA	NA	78 U	NA
AROCLOR-1232	NA	NA	NA	NA	39 U	NA
AROCLOR-1242	NA	NA	NA	NA	39 U	NA
AROCLOR-1248	NA	NA	NA	NA	39 U	NA
AROCLOR-1254	NA	NA	NA	NA	39 U	NA
AROCLOR-1260	NA	NA	NA	NA	39 U	NA

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.
NA = Not analyzed.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
VOLATILES				
CHLOROMETHANE	12 U	12 U	20 U	12 U
BROMOMETHANE	12 U	12 U	20 U	12 U
VINYL CHLORIDE	12 U	230	20 U	12 U
CHLOROETHANE	12 U	12 U	20 U	12 U
METHYLENE CHLORIDE	12 U	12 U	20 U	12 UJ
ACETONE	12 UJ	12 UJ	20 UJ	12 U
CARBON DISULFIDE	12 UJ	12 UJ	20 UJ	12 UJ
1,1-DICHLOROETHENE	12 UJ	37 J	20 UJ	12 U
1,1-DICHLOROETHANE	12 U	12 U	20 U	12 U
1,2-DICHLOROETHENE (TOTAL)	12 U	1500	20 U	12 U
CHLOROFORM	12 U	12 U	20 U	12 U
1,2-DICHLOROETHANE	12 U	12 U	20 U	12 U
2-BUTANONE	12 UJ	12 UJ	20 UJ	12 U
1,1,1-TRICHLOROETHANE	12 U	12 U	20 U	12 U
CARBON TETRACHLORIDE	12 U	12 U	20 U	12 U
BROMODICHLOROMETHANE	12 U	12 U	20 U	12 U
1,2-DICHLOROPROPANE	12 U	12 U	20 U	12 U
CIS-1,3-DICHLOROPROPENE	12 U	12 U	20 U	12 U
TRICHLOROETHENE	12 U	120	20 U	12 U
DIBROMOCHLOROMETHANE	12 U	12 U	20 U	12 U
1,1,2-TRICHLOROETHANE	12 U	13	20 U	12 U
BENZENE	12 U	12 U	20 U	12 U
TRANS-1,3-DICHLOROPROPENE	12 U	12 U	20 U	12 U
BROMOFORM	12 UJ	12 UJ	20 UJ	12 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
VOLATILES (cont)				
4-METHYL-2-PENTANONE	12 U	12 U	20 U	12 U
2-HEXANONE	12 U	12 U	20 U	12 U
TETRACHLOROETHENE	12 U	12 U	20 U	12 U
1,1,2,2-TETRACHLOROETHANE	12 U	550	20 U	12 U
TOLUENE	12 U	12 U	20 U	12 U
CHLOROBENZENE	12 U	12 U	20 U	12 U
ETHYLBENZENE	12 U	12 U	20 U	12 U
STYRENE	12 U	12 U	20 U	12 U
XYLENE (TOTAL)	12 U	12 U	20 U	12 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
SEMIVOLATILES				
PHENOL	410 U	380 U	650 U	420 U
BIS(2-CHLOROETHYL)ETHER	410 U	380 U	650 U	420 U
2-CHLOROPHENOL	410 U	380 U	650 U	420 U
1,3-DICHLOROBENZENE	410 U	380 U	650 U	420 U
1,4-DICHLOROBENZENE	410 U	380 U	650 U	420 U
1,2-DICHLOROBENZENE	410 U	380 U	650 U	420 U
2-METHYLPHENOL	410 U	380 U	650 U	420 U
2,2'-OXYBIS(1-CHLOROPROPANE)	410 U	380 U	650 U	420 U
4-METHYLPHENOL	410 U	380 U	650 U	420 U
N-NITROSO-DI-N-PROPYLAMINE	410 U	380 U	650 U	420 U
HEXACHLOROETHANE	410 U	380 U	650 U	420 U
NITROBENZENE	410 UJ	380 UJ	650 U	420 UJ
ISOPHORONE	410 U	380 U	650 U	420 U
2-NITROPHENOL	410 U	380 U	650 U	420 U
2,4-DIMETHYLPHENOL	410 U	380 U	650 U	420 U
BIS(2-CHLOROETHOXY)METHANE	410 U	380 U	650 U	420 U
2,4-DICHLOROPHENOL	410 U	380 U	650 U	420 U
1,2,4-TRICHLOROBENZENE	410 U	380 U	650 U	420 U
NAPHTHALENE	410 U	380 U	650 U	420 U
4-CHLOROANILINE	410 U	380 U	650 U	420 U
HEXACHLOROBUTADIENE	410 U	380 U	650 U	420 U
4-CHLORO-3-METHYLPHENOL	410 U	380 U	650 U	420 U
2-METHYLNAPHTHALENE	410 U	380 U	650 U	420 U
HEXACHLOROCYCLOPENTADIENE	410 U	380 U	650 U	420 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
SEMIVOLATILES (cont)				
2,4,6-TRICHLOROPHENOL	410 U	380 U	650 U	420 U
2,4,5-TRICHLOROPHENOL	1000 U	960 U	1600 U	1000 U
2-CHLORONAPHTHALENE	410 U	380 U	650 U	420 U
2-NITROANILINE	1000 U	960 U	1600 U	1000 U
DIMETHYLPHTHALATE	410 U	380 U	650 U	420 U
ACENAPHTHYLENE	410 U	380 U	650 U	420 U
2,6-DINITROTOLUENE	410 U	380 U	650 U	420 U
3-NITROANILINE	1000 UJ	960 UJ	1600 UJ	1000 UJ
ACENAPHTHENE	410 U	380 U	650 U	420 U
2,4-DINITROPHENOL	1000 UJ	960 UJ	1600 UJ	1000 UJ
4-NITROPHENOL	1000 U	960 U	1600 U	1000 U
DIBENZOFURAN	410 U	380 U	650 U	420 U
2,4-DINITROTOLUENE	410 U	380 U	650 U	420 U
DIETHYLPHTHALATE	410 U	380 U	650 U	420 U
4-CHLOROPHENYL-PHENYLETHER	410 U	380 U	650 U	420 U
FLUORENE	410 U	380 U	650 U	420 U
4-NITROANILINE	1000 U	960 U	1600 UJ	1000 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	960 U	1600 U	1000 U
N-NITROSODIPHENYLAMINE (1)	410 U	380 U	650 U	420 U
4-BROMOPHENYL-PHENYLETHER	410 U	380 U	650 U	420 U
HEXACHLOROBENZENE	410 U	380 U	650 U	420 U
PENTACHLOROPHENOL	1000 U	960 U	1600 U	1000 U
PHENANTHRENE	44 J	380 U	650 U	420 U
ANTHRACENE	410 U	380 U	650 U	420 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
SEMIVOLATILES (cont)				
CARBAZOLE	410 U	380 U	650 UJ	420 U
DI-N-BUTYLPHTHALATE	410 U	380 U	650 U	420 U
FLUORANTHENE	81 J	380 U	650 U	420 U
PYRENE	140 J	52 J	650 U	51 J
BUTYLBENZYLPHTHALATE	410 U	380 U	650 U	420 U
3,3'-DICHLOROBENZIDINE	410 U	380 U	650 U	420 U
BENZO(A)ANTHRACENE	58 J	380 U	650 U	420 U
CHRYSENE	95 J	380 U	650 U	420 U
BIS(2-ETHYLHEXYL)PHTHALATE	130 J	90 J	88 J	13000
DI-N-OCTYLPHTHALATE	410 U	380 U	650 U	420 U
BENZO(B)FLUORANTHENE	140 J	40 J	650 U	420 U
BENZO(K)FLUORANTHENE	50 J	380 U	650 U	420 U
BENZO(A)PYRENE	75 J	380 U	3100	420 U
INDENO(1,2,3-CD)PYRENE	410 U	380 U	650 U	420 U
DIBENZO(A,H)ANTHRACENE	410 U	380 U	650 U	420 U
BENZO(G,H,I)PERYLENE	410 U	380 U	650 U	420 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
PESTICIDES/PCBS				
ALPHA-BHC	NA	NA	NA	2.1 U
BETA-BHC	NA	NA	NA	2.1 U
DELTA-BHC	NA	NA	NA	2.1 UJ
GAMMA-BHC (LINDANE)	NA	NA	NA	2.1 U
HEPTACHLOR	NA	NA	NA	2.1 U
ALDRIN	NA	NA	NA	2.1 U
HEPTACHLOR EPOXIDE	NA	NA	NA	2.1 U
ENDOSULFAN I	NA	NA	NA	2.1 U
DIELDRIN	NA	NA	NA	4.2 U
4,4'-DDE	NA	NA	NA	44 J
ENDRIN	NA	NA	NA	4.2 U
ENDOSULFAN II	NA	NA	NA	4.2 U
4,4'-DDD	NA	NA	NA	79
ENDOSULFAN SULFATE	NA	NA	NA	4.2 U
4,4'-DDT	NA	NA	NA	34
METHOXYCHLOR	NA	NA	NA	21 UJ
ENDRIN KETONE	NA	NA	NA	4.2 U
ENDRIN ALDEHYDE	NA	NA	NA	4.2 U
ALPHA-CHLORDANE	NA	NA	NA	2.9
GAMMA-CHLORDANE	NA	NA	NA	4.6 J
TOXAPHENE	NA	NA	NA	210 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.
NA = Not analyzed.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	UG/KG	UG/KG	UG/KG	UG/KG
PESTICIDES/PCBS (cont)				
AROCLOR-1016	NA	NA	NA	42 U
AROCLOR-1221	NA	NA	NA	84 U
AROCLOR-1232	NA	NA	NA	42 U
AROCLOR-1242	NA	NA	NA	42 U
AROCLOR-1248	NA	NA	NA	42 U
AROCLOR-1254	NA	NA	NA	42 U
AROCLOR-1260	NA	NA	NA	42 U

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/kg = micrograms per kilogram.
NA = Not analyzed.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
METALS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD01-06	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD04-06	89-EC-SD05-06	89-EC-SD02-612
LAB_ID	9607G440-016	9607G440-018	9607G440-020	9607G440-005	9607G440-001	9607G440-017
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/26/96	07/26/96	07/27/96
UNITS	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG	MG/KG
TOTAL METALS						
ALUMINUM, TOTAL	1690 J	1980 J	2750 J	2040 J	1010 J	2800 J
ANTIMONY, TOTAL	2.9 U	3.2 U	3.1 U	3.1 U	2.9 U	3.3 U
ARSENIC, TOTAL	0.33 UJ	0.51	0.59	0.42	0.38	0.28 UJ
BARIUM, TOTAL	8.9	16.3	18.6	9.9	6	13.4
BERYLLIUM, TOTAL	0.14	0.16 U	0.15 U	0.15 U	0.14 U	0.36
CADMIUM, TOTAL	0.82	0.58 U	0.77	0.56 U	0.53 U	0.59 U
CALCIUM, TOTAL	21500 J	18800 J	47700 J	14000 J	42700 J	8020
CHROMIUM, TOTAL	4.1	5.2	4.5	4.4	2.4	3.6
COBALT, TOTAL	0.72 U	0.8 U	0.78 U	0.77 U	0.73 U	0.82 U
COPPER, TOTAL	5.5	38.7	5.9	4.3 U	1.8 U	2.9 U
IRON, TOTAL	1590 J	3220 J	2340 J	2150 J	1190 J	1630
LEAD, TOTAL	14.3 J	20.7 J	17.3 J	20.2 J	35.4 J	6.6
MAGNESIUM, TOTAL	413	369	768	303	603	219
MANGANESE, TOTAL	10.4	11.7	13.6	10.3	8.6	7.9
MERCURY, TOTAL	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	0.07 U
NICKEL, TOTAL	1.7 U	1.9 U	2.3	1.9 U	1.8 U	2 U
POTASSIUM, TOTAL	139 U	153 U	149 U	148 U	141 U	157 U
SELENIUM, TOTAL	0.42 UJ	0.44 U	0.34 U	0.41 U	0.33 UJ	0.36 U
SILVER, TOTAL	0.62 U	0.69 U	0.67 U	0.66 U	0.63 U	0.71 U
SODIUM, TOTAL	65.2	62.4	130	56.4	125	38.5
THALLIUM, TOTAL	0.35 UJ	0.36 U	0.29 U	0.34 UJ	0.27 UJ	0.3 UJ
VANADIUM, TOTAL	7.1	8.9	7.9	5.2	4	6.4
ZINC, TOTAL	53.1	34	27.6	29.7	29.2	24.9

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
mg/kg = milligrams per kilogram.

TABLE 4-4 (continued)
FIXED BASE DETECTION SUMMARY
SEDIMENT
METALS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-EC-SD02-612	89-EC-SD03-612	89-EC-SD04-612	89-EC-SD05-612
LAB_ID	9607G440-019	9607G440-021	9607G440-006	9607G440-002
DATE SAMPLED	07/27/96	07/27/96	07/26/96	07/26/96
UNITS	MG/KG	MG/KG	MG/KG	MG/KG
TOTAL METALS				
ALUMINUM, TOTAL	1990 J	1820 J	14000 J	1110 J
ANTIMONY, TOTAL	2.9 U	2.7 U	4.9 U	3.1 U
ARSENIC, TOTAL	0.39	0.28 UJ	0.55 UJ	0.85
BARIUM, TOTAL	13.2	15.5	30.1	10.7
BERYLLIUM, TOTAL	0.15	0.13 U	0.55	0.15 U
CADMIUM, TOTAL	0.53 U	0.78	0.89 U	0.55 U
CALCIUM, TOTAL	23000	48000	8900	26400
CHROMIUM, TOTAL	3.4	2.7	7.6	4.7
COBALT, TOTAL	0.73 U	0.68 U	1.2 U	0.77 U
COPPER, TOTAL	7.9	3.1 U	0.77 U	7.9
IRON, TOTAL	2930	1750	3860	1380
LEAD, TOTAL	15.7	12.3	13.5	14.6
MAGNESIUM, TOTAL	409	888	322	464
MANGANESE, TOTAL	11.1	13.5	16.3	7.3
MERCURY, TOTAL	0.05 U	0.05 U	0.1	0.06 U
NICKEL, TOTAL	3.7	1.6 U	3 U	1.9 U
POTASSIUM, TOTAL	141 U	130 U	236 U	147 U
SELENIUM, TOTAL	0.31 UJ	0.36 U	0.72 UJ	0.32 U
SILVER, TOTAL	0.63 U	0.59 U	1.1 U	0.66 U
SODIUM, TOTAL	74.1	131	88.6	92
THALLIUM, TOTAL	0.26 U	0.3 U	0.59 U	0.27 UJ
VANADIUM, TOTAL	19.7	5.2	11.2	5.5
ZINC, TOTAL	33.5	40.7	11.7	24.7

QUALIFIER DEFINITIONS
J = Estimated value.
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
mg/kg = milligrams per kilogram.

TABLE 4-5

SUMMARY OF SITE SEDIMENT CONTAMINATION
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

Media	Fraction	Detected Contaminants or Analytes	Comparison Criteria [1]	Min.	Max	Location of Maximum Detection	Detection Frequency	Detections Above Comparison Criteria
Sediment [1] (fixed based lab)	Volatiles	Vinyl Chloride	NE	35	230	89-EC-SD03-612	2/10	NA
		1,1-Dichloroethene	NE	37J	37J	89-EC-SC03-612	1/10	NA
		1,2-Dichloroethene (total)	NE	1500	1600	89-EC-SD03-06	2/10	NA
		Trichloroethene	NE	120	2400	89-EC-SD03-06	2/10	NA
		1,1,2-Trichloroethane	NE	13	19	89-EC-SD03-06	2/10	NA
		1,1,2,2-Tetrachloroethane	NE	550	1700	89-EC-SD03-06	2/10	NA
	Semivolatiles	Phenanthrene	NE	44J	100J	89-EC-SD04-06	4/10	NA
		Flouranthene	NE	51J	180J	89-EC-SD04-06	5/10	NA
		Pyrene	665	50J	140J	89-EC-SD02-612	7/10	0
		Benzo(a)anthracene	261	48J	58J	89-EC-SD02-612	2/10	0
		Chrysene	384	51J	120J	89-EC-SD04-06	3/10	0
		Bis(2-ethylhexyl)phthalate	NE	88J	13000	89-EC-SD05-612	10/10	NA
		Benzo(b)flouranthene	NE	44J	140J	89-EC-SD02-612	5/10	NA
		Benzo(k)flouranthene	NE	50J	51J	89-EC-SD04-06	2/10	NA
		Benzo(a)pyrene	430	65J	3100	89-EC-SD04-612	3/10	1
		Indeno(1,2,3-cd)pyrene	NE	59J	59J	89-EC-SD04-06	1/10	NA
		Benzo(g,h,i)perylene	NE	50J	55J	89-EC-SD04-06	2/10	NA
	Pesticides/PCBs	4,4'-DDE	2.2	33J	44J	89-EC-SD05-612	2/10	2
		4,4'-DDD	NE	42J	79	89-EC-SD05-612	2/10	NA
		4,4'-DDT	1.58	23J	34	89-EC-SD05-612	2/10	2
		Alpha-Chlordane	NE	2J	2.9	89-EC-SD05-612	2/10	NA
		Gamma-Chlordane	NE	1.6J	4.6J	89-EC-SD05-612	2/10	NA
	Metals	Aluminum	NE	1010J	14000	89-EC-SD04-612	10/10	NA
		Arsenic	8.2	0.38	0.85	89-EC-SD05-612	6/10	0
		Barium	NE	6	18.6	89-EC-SD03-06	10/10	NA
		Beryllium	NE	0.14	0.55	89-EC-SD04-612	4/10	NA
		Cadmium	1.2	0.77	0.82	89-EC-SD01-06	3/10	0

TABLE 4-5

SUMMARY OF SITE SEDIMENT CONTAMINATION
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

Media	Fraction	Detected Contaminants or Analytes	Comparison Criteria [1]	Min.	Max	Location of Maximum Detection	Detection Frequency	Detections Above Comparison Criteria
Sediment [1] (fixed based lab)		Chromium	81	2.4	7.6	89-EC-SD04-612	10/10	0
		Copper	34	5.5	38.7	89-EC-SD02-06	5/10	1
		Iron	NE	1190	3860	89-EC-SD04-612	10/10	NA
		Lead	46.7	6.6	35.4J	89-EC-SD05-06	10/10	0
		Manganese	NE	7.3	16.3	89-EC-SD04-612	10/10	NA
		Nickel	20.9	2.3	3.7	89-EC-SD02-612	2/10	0
		Vanadium	NE	4	19.7	89-EC-SD02-612	10/10	NA
		Zinc	150	11.7	53.1	89-EC-SD01-06	10/10	0

(1) - Sediment concentrations compared to Long, E.R. et al., 1995 Environmental Management Vol. 19, No. 1, pp. 81-97.
NA - Not Applicable
NE - None Established

TABLE 4-6
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-MW01	89-MW02	89-MW03	89-MW42B	89-TW04	89-TW08	89-TW09	89-TW10
SAMPLE DATE	07/31/96	07/30/96	07/31/96	07/31/96	07/31/96	08/03/96	08/03/96	08/04/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES								
VINYL CHLORIDE	ND	130	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	177	451	82	6	ND	61	ND	ND
CIS-1,2-DICHLOROETHENE	261	818	150	37	ND	253	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	323.1	744.3	131.0	85.8	ND	638.4	ND	0.2
TETRACHLOROETHENE	42.4	9.4	13.1	ND	ND	27.0	ND	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-6 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-TW11	89-TW12	89-TW13	89-TW15	89-TW16	89-TW18	89-TW19	89-TW20	89-TW21
SAMPLE DATE	08/04/96	08/04/96	08/05/96	08/06/96	08/06/96	08/13/96	08/13/96	08/14/96	08/15/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES									
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	3	53	44	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	18	162	102	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	0.2	ND	ND	ND
TRICHLOROETHENE	ND	ND	136.9	355.9	562.9	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	4.8	13.7	42.7	0.2	ND	ND	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-6 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-TW04IW	89-TW08IW	89-TW09IW	89-TW10IW	89-TW11IW	89-TW12IW
SAMPLE DATE	07/31/96	08/03/96	08/03/96	08/04/96	08/04/96	08/04/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES						
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	ND	ND	20	5	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND	114	27	14	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	0.3	233.4	36.3	3.3	ND
TETRACHLOROETHENE	ND	ND	8.8	ND	ND	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-6 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-TW13IW	89-TW15IW	89-TW16IW	89-TW17IW	89-TW18IW	89-TW19IW
SAMPLE DATE	08/05/96	08/06/96	08/06/96	08/07/96	08/13/96	08/13/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES						
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	1	ND	ND	90	ND	ND
CIS-1,2-DICHLOROETHENE	21	3	ND	287	ND	11
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	57.9	6.0	0.6	425.7	ND	3.8
TETRACHLOROETHENE	7.4	0.1	ND	1.5	ND	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-6 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE NORTH CAROLINA
CTO-0356

SAMPLE ID	89-TW20IW	89-TW21IW	89-TW22IW	89-TW23IW
SAMPLE DATE	08/14/96	08/15/96	08/16/96	08/21/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES				
VINYL CHLORIDE	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHENE	8	1	17	9
CIS-1,2-DICHLOROETHENE	57	9	106	84
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND
TRICHLOROETHENE	59.1	10.4	293.9	123.9
TETRACHLOROETHENE	0.4	ND	13.0	0.1

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-7
FIXED BASE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-TW08-01	89-TW09-01	89-TW09IW-01	89-TW17IW-01
LAB_ID	9608G686-004	9608G686-006	9608G686-007	9608G686-009
DATE SAMPLED	08/06/96	08/07/96	08/07/96	08/07/96
UNITS	UG/L	UG/L	UG/L	UG/L
VOLATILES				
CHLOROMETHANE	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U
CARBON DISULFIDE	10 U	10 U	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U	10 U
1,2-DICHLOROETHENE (TOTAL)	370	10 U	150	360
CHLOROFORM	10 U	10 U	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U	10 U
2-BUTANONE	10 UJ	10 UJ	10 UJ	10 UJ
1,1,1-TRICHLOROETHANE	10 U	10 U	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U
TRICHLOROETHENE	670	10 U	260	390
DIBROMOCHLOROMETHANE	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U
BROMOFORM	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 UJ	10 UJ	10 UJ	10 UJ

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-7 (continued)
FIXED BASED DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	89-TW08-01	89-TW09-01	89-TW09IW-01	89-TW17IW-01
LAB_ID	9608G686-004	9608G686-006	9608G686-007	9608G686-009
DATE SAMPLED	08/06/96	08/07/96	08/07/96	08/07/96
UNITS	UG/L	UG/L	UG/L	UG/L
VOLATILES (cont)				
2-HEXANONE	10 UJ	10 UJ	10 UJ	10 UJ
TETRACHLOROETHENE	23	10 U	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 UJ	10 U	10 U	10 U
TOLUENE	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U
STYRENE	10 U	10 U	10 U	10 U
XYLENE (TOTAL)	10 U	10 U	10 U	10 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-8

SUMMARY OF SITE GROUNDWATER CONTAMINATION
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

Media	Fraction	Detected Contaminants or Analytes	Comparison Criteria (1)		Min.	Max.	Location of Maximum Detection	Detection Frequency	Detections Comparison	Above Criteria
			NC WQS	Federal MCL					NC WQS	Federal MCL
Groundwater (1) (on-site lab)	Volatiles	Vinyl Chloride	0.000015	2	130	130	89-MW02	1/36	1	1
		Trans-1,2-Dichloroethene	70	100	1	451	89-MW02	16/33	4	2
		Cis-1,2-Dichloroethene	70	70	3	818	89-MW02	19/33	11	11
		1,1,1-Trichloroethane	NE	200	0.2	0.2	89-TW18	1/33	0	0
		Trichloroethene	2.8	5	0.2	744.3	89-MW02	22/33	19	17
		Tetrachloroethene	1	5	0.1	42.7	89-TW16	15/33	11	9
Groundwater (1) (fixed based lab)	Volatiles	1,2-Dichloroethene (total)	70	70	150	370	89-TW08	3/4	3	3
		Trichloroethene	2.8	5	260	670	89-TW08	3/4	3	3
		Tetrachloroethene	1	5	23	23	89-TW08	1/4	1	1

(1) - Groundwater concentrations compared to North Carolina Water Quality Standards for Groundwater/USEPA Maximum Contaminant Levels
Concentrations in ug/L
NA - Not Applicable
NE - None Established

TABLE 4-9
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 93)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE ID	93-MW05-01	93-TW01	93-TW02-01	93-TW03-01	93-TW05-01	93-TW06-01
SAMPLE DATE	07/30/96	07/30/96	07/30/96	07/31/96	08/01/96	08/01/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES						
TRANS-1,2-DICHLOROETHENE	5	57	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	15	175	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	0.2	ND	ND	ND	ND
TRICHLOROETHENE	24.3	39.4	ND	ND	ND	1.3
TETRACHLOROETHENE	65.1	16.2	ND	ND	ND	8.9

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-9 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 93)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE ID	93-TW07-01	93-TW14-01
SAMPLE DATE	08/03/96	08/05/96
UNITS	(ug/L)	(ug/L)
VOLATILES		
TRANS-1,2-DICHLOROETHENE	ND	ND
CIS-1,2-DICHLOROETHENE	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND
TRICHLOROETHENE	0.6	ND
TETRACHLOROETHENE	0.8	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-9 (continued)
ONSITE LABORATORY POSITIVE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 93)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE ID	93-TW01IW	93-TW02IW-01	93-TW03IW-01	93-TW05IW-01	93-TW06IW-01	93-TW07IW-01	93-TW14IW-01
SAMPLE DATE	07/30/96	07/30/96	07/31/96	08/01/96	08/01/96	08/03/96	08/05/96
UNITS	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
VOLATILES							
TRANS-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND
CIS-1,2-DICHLOROETHENE	ND	4	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	0.1	0.1	ND	ND	0.1	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	0.5	0.1	ND

NOTES
ug/L = micrograms per liter.
ND = Not Detected.

TABLE 4-10
FIXED BASE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 93)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	93-TW01-01	93-TW07-01	93-TW02IW-01	93-TW07IW-01
LAB_ID	9608G686-001	9608G686-003	9608G686-002	9608G686-005
DATE SAMPLED	08/06/96	08/06/96	08/06/96	08/06/96
UNITS	UG/L	UG/L	UG/L	UG/L
VOLATILES				
CHLOROMETHANE	10 U	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U
CARBON DISULFIDE	10 U	10 U	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U	10 U
1,2-DICHLOROETHENE (TOTAL)	200	10 U	10 U	10 U
CHLOROFORM	10 U	10 U	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U	10 U
2-BUTANONE	10 UJ	10 UJ	10 UJ	10 UJ
1,1,1-TRICHLOROETHANE	10 U	10 U	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U
TRICHLOROETHENE	26	10 U	10 U	10 U
DIBROMOCHLOROMETHANE	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U
BROMOFORM	10 U	10 U	10 U	10 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-10 (continued)
FIXED BASE DETECTION SUMMARY
GROUNDWATER
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 93)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE_NO	93-TW01-01	93-TW07-01	93-TW02IW-01	93-TW07IW-01
LAB_ID	9608G686-001	9608G686-003	9608G686-002	9608G686-005
DATE SAMPLED	08/06/96	08/06/96	08/06/96	08/06/96
UNITS	UG/L	UG/L	UG/L	UG/L
VOLATILES (cont)				
4-METHYL-2-PENTANONE	10 UJ	10 UJ	10 UJ	10 UJ
2-HEXANONE	10 UJ	10 UJ	10 UJ	10 UJ
TETRACHLOROETHENE	12	10 U	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 UJ	10 UJ	10 UJ	10 U
TOLUENE	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U
STYRENE	10 U	10 U	10 U	10 U
XYLENE (TOTAL)	10 U	10 U	10 U	10 U

QUALIFIER DEFINITIONS
U = Not detected at reported quantitation limit.
UJ = Reported quantitation limit is estimated.

NOTES
ug/L = micrograms per liter.

TABLE 4-11

SUMMARY OF SITE GROUNDWATER CONTAMINATION
OPERABLE UNIT NO. 16 (SITE 93)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

Media	Fraction	Detected Contaminants or Analytes	Comparison Criteria (1)		Min.	Max.	Location of Maximum Detection	Detection Frequency	Detections Comparison	Above Criteria
			NC WQS	Federal MCL					NC WQS	Federal MCL
Groundwater (1) (on-site lab)	Volatiles	Trans-1,2-Dichloroethene	70	100	5	57	93-TW01	2/15	0	0
		Cis-1,2-Dichloroethene	70	70	4	175	93-TW01	3/15	1	1
		1,1,1-Trichloroethane	NE	200	0.2	0.2	93-TW01	1/15	0	0
		Trichloroethene	2.8	5	0.1	39.4	93-TW01	7/15	2	2
		Tetrachloroethene	1	5	0.1	65.1	93-MW05	6/15	3	3
Groundwater (1) (fixed based lab)	Volatiles	1,2-Dichloroethene (total)	70	70	200	200	93-TW01	1/4	1	1
		Trichloroethene	2.8	5	26	26	93-TW01	1/4	1	1
		Tetrachloroethene	1	5	12	12	93-TW01	1/4	1	1

(1) - Groundwater concentrations compared to North Carolina Water Quality Standards for Groundwater/USEPA Maximum Contaminant Levels
NE - None Established

FIGURES

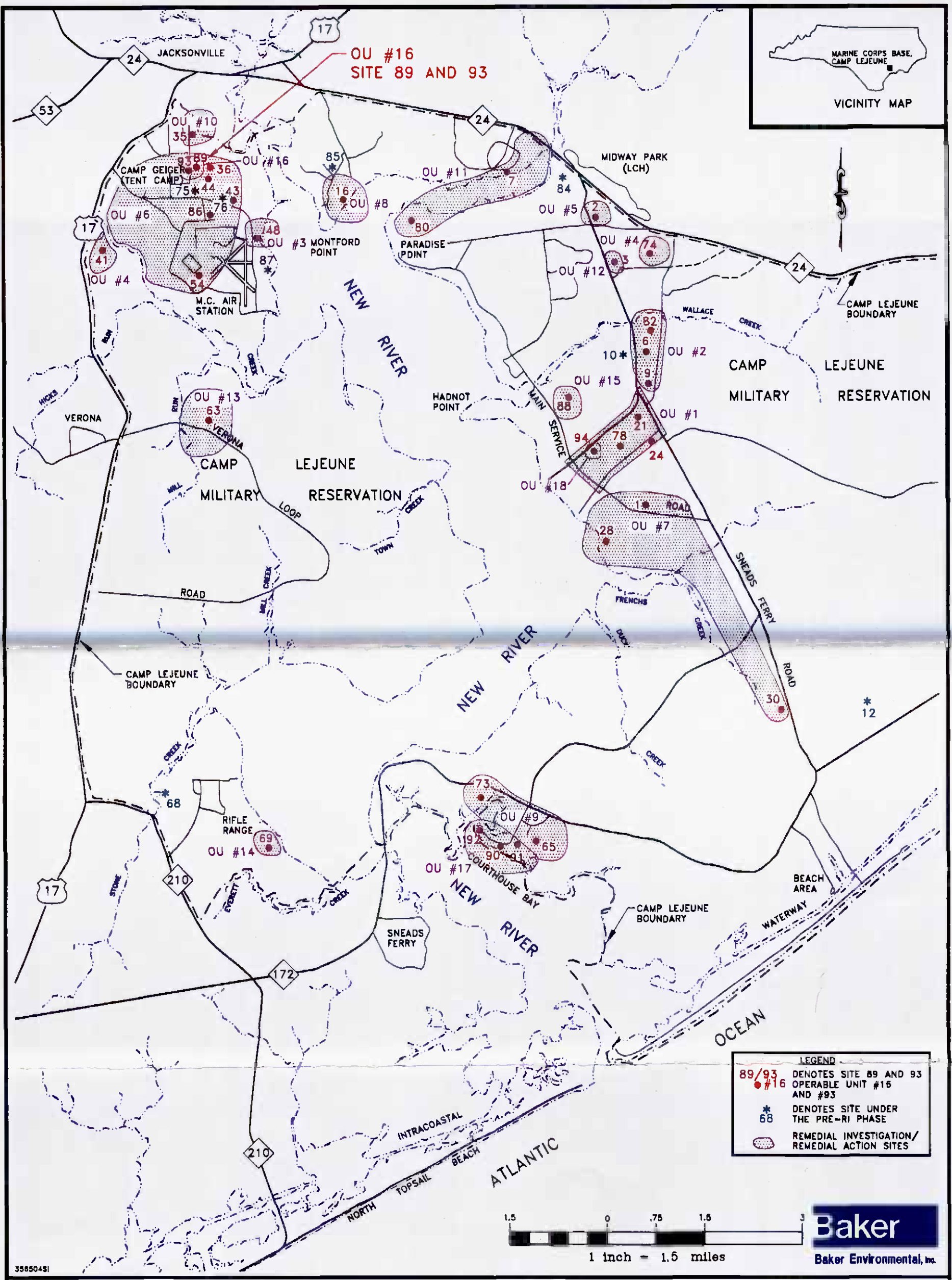


FIGURE 1-1
OPERABLE UNITS AND SITE LOCATIONS AT
MARINE CORPS BASE CAMP LEJEUNE
CTO - 0356

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

017H&E01Y

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

356503SI

TC751
TC753
TC753
TC754
PARKING
8TH STREET
TC840
TC846
TC841
TC846
TC842
TC848
TC849
TC844
TC852
TC845
TC853
9TH STREET
TC940
TC942
10TH STREET
TC1048
TC1049
TC1055
TC1056
E STREET
761
TC 762
TC773
ST
TC880
F STREET
BARBWIRE
CONC. WALL
GATE
TC864
TC859
TC854
TC855
TC851
TC950
TC951
TC952
FLOW DIRECTION
TC859
SCALES
DRMO AREA
CONC. WALL
WELDING SHOP
GATE
TC867
RAMP
CONC PIT
BUILDING
SPRAY AREA
TC861
±20' DITCH
RAILROAD
SITE 89
EDWARDS
CREEK
FLOW DIRECTION
APPROXIMATE SITE BOUNDARY
STC953
HOLDING POND
1061
59
57
63
TC1050
TC1059
TC1051
TC1060
TC1062
TC1052
STC1070
COASTLINE
125'
RIGHT-OF-WAY
COVERED PICNIC AREA

200 0 100 200
1 inch = 200 ft.

Baker
Baker Environmental, Inc.

LEGEND

- APPROXIMATE SITE BOUNDARY
- STREET W/CURB
- SWAMP
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

FIGURE 1-2
SITE LOCATION MAP
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

3565055I

F STREET

TC860

BARBWIRE

CONC. SWALE

TC864

GATE

GATE

TC859

SCALES

DRMO AREA

CONC. WALL

WELDING SHOP

TC867

RAMP

RAMP

CONC PIT

CONC. WALL

BUILDING 865

STC-868

ELEVATED WASH RACK

WASH PAD

SPRAY AREA

APPROXIMATE LOCATION OF FORMER UST STC-868

SITE 89

OIL/WATER SEPARATOR

±20' DITCH

TC861

TC952

EDWARDS CREEK

FLOW DIRECTION

RAILROAD

LEGEND

STREET W/CURB

SWALE

TREE LINE

FENCE

FIRE HYDRANT

CONCRETE

ASPHALT

FORMER UST

100 0 50 100

1 inch = 100 ft.

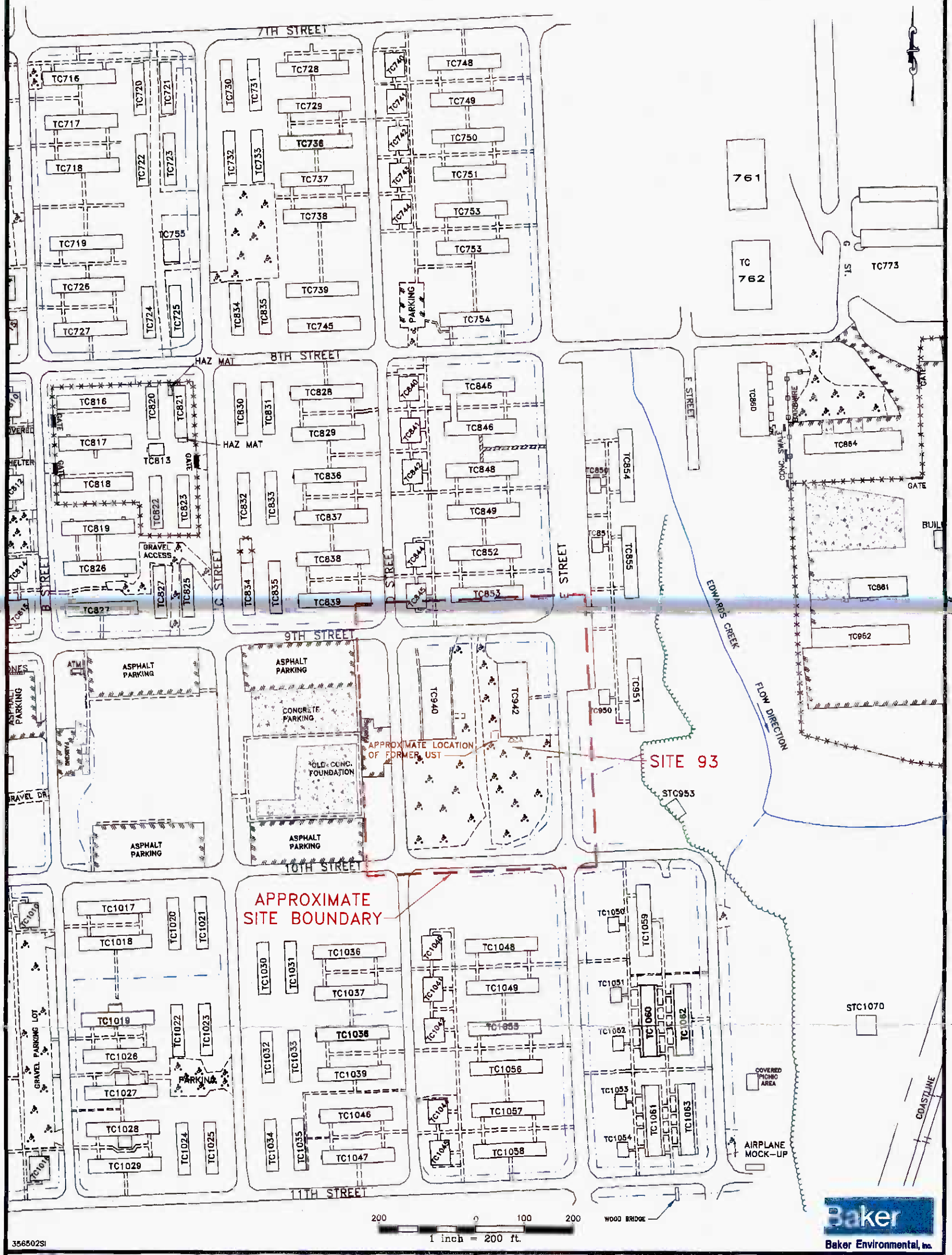
Baker

Baker Environmental, Inc.

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

FIGURE 1-3
UST STC-868 LOCATION
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



Baker Environmental, Inc.

LEGEND

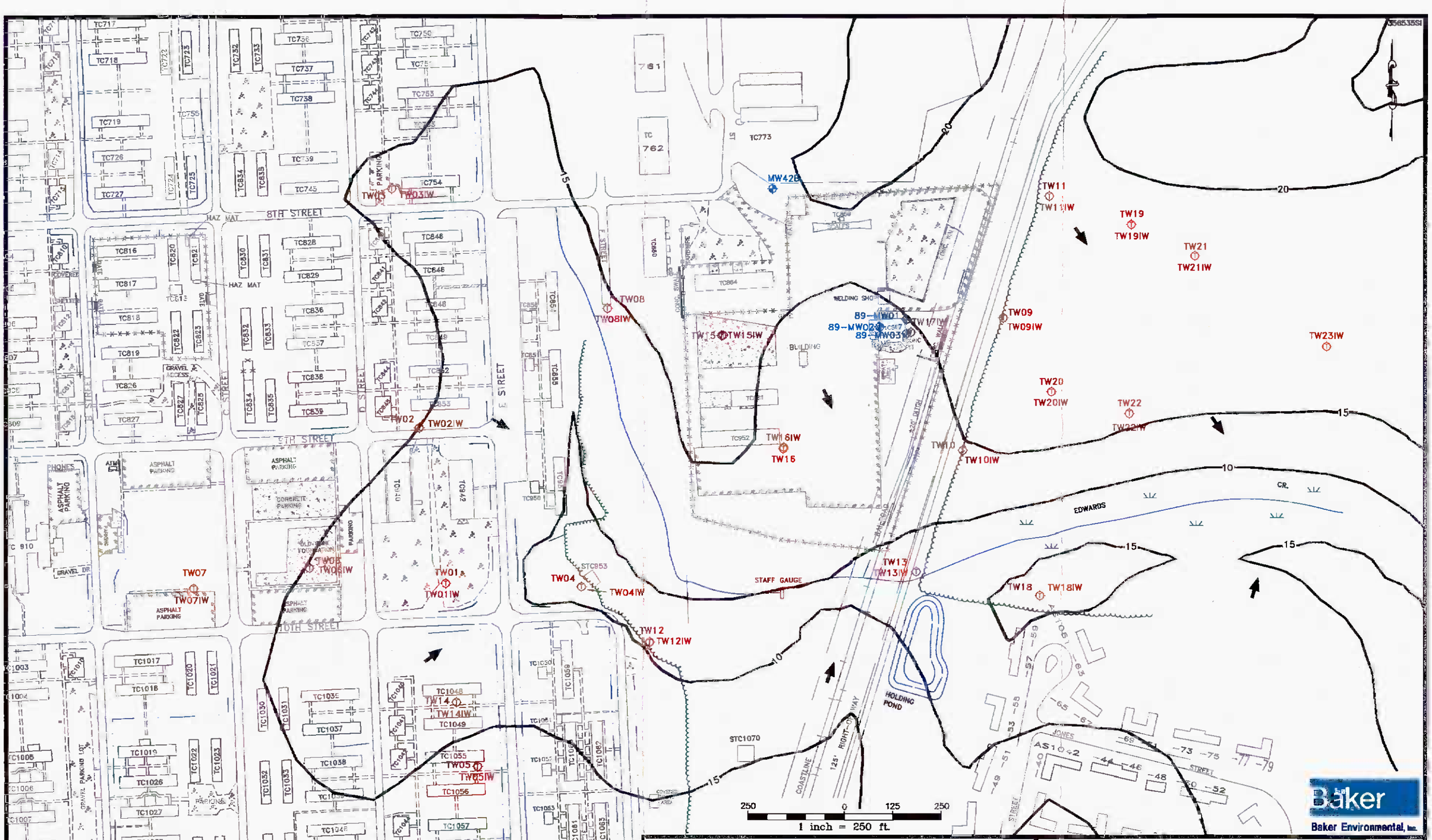
- APPROXIMATE SITE BOUNDARY
- FORMER UST
- STREET W/CURB
- GRAVEL ROAD
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996-OCT. 1991

FIGURE 1-4
SITE LOCATION MAP
SITE 93

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

01748E047



Baker

Baker Environmental, Inc.

LEGEND

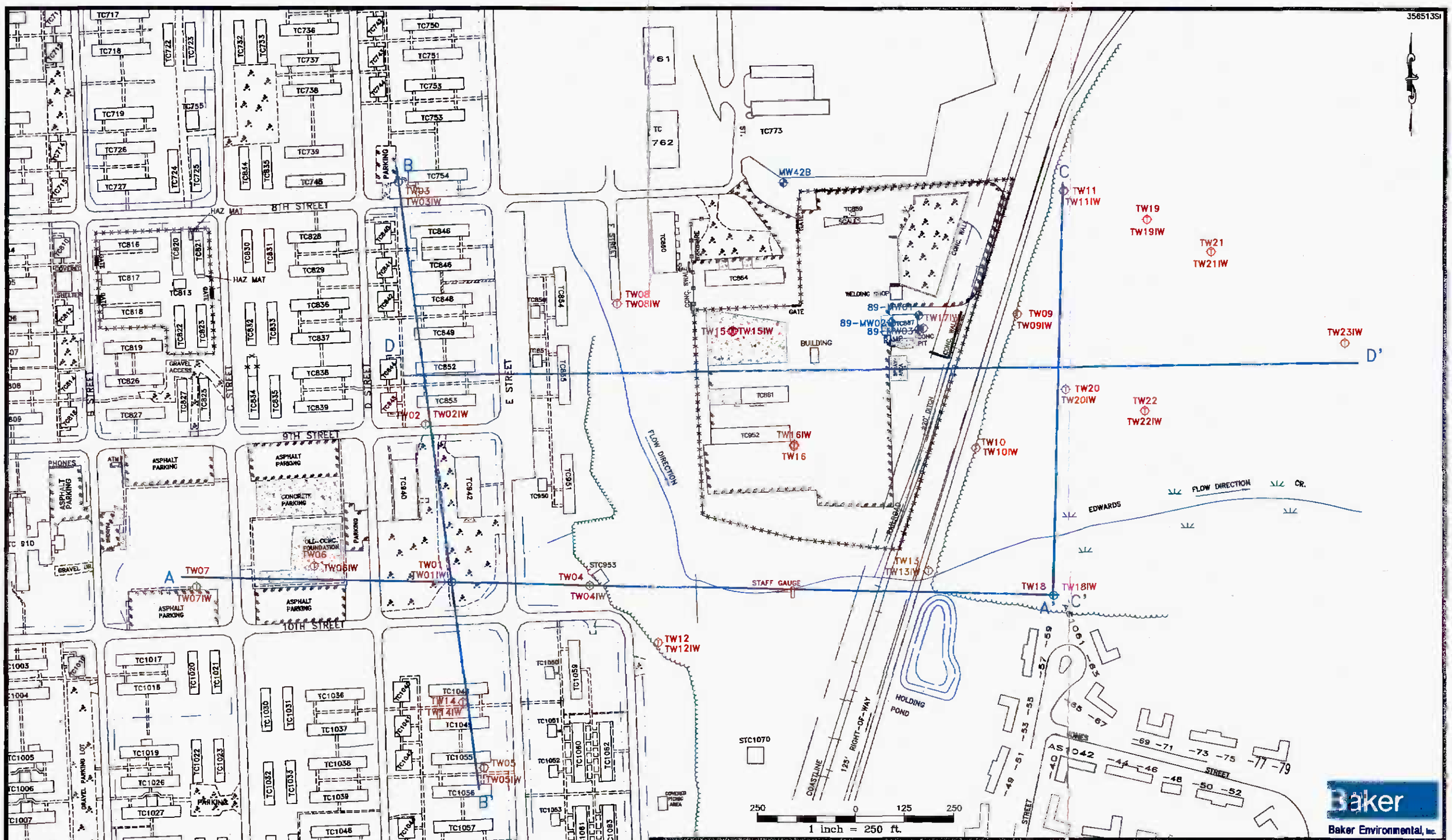
EXISTING WELLS	MW42B	SWAMP	
TEMPORARY WELL		SWALE	
CONTOUR LINE	15	TREE LINE	
APPROXIMATE SURFACE DRAINAGE		FENCE	
STREET W/CURB		FIRE HYDRANT	
GRAVEL ROAD		CONCRETE	
		ASPHALT	

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996-OCT. 1991

FIGURE 2-1
SURFACE TOPOGRAPHY
SITES 89 AND 93

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

01748E05Y



LEGEND

- EXISTING WELLS — MW42B
- TEMPORARY WELL
- STREET W/CURB
- GRAVEL ROAD
- SWAMP
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.OCT. 1991

FIGURE 2-2
CROSS-SECTION LOCATION MAP
SITES 89 AND 93

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental, Inc.

356514SI

A
WEST

A'
EAST

93-TW07
93-TW07IW
93-TW06IW
93-TW06
93-TW01
93-TW01IW
89-TW04IW
89-TW04
89-TW13IW
89-TW13
89-TW18
89-TW18IW

EDWARDS CREEK

GROUND SURFACE

CLAY, and silt, some fine sand brown to gray

FINE SAND little wood, AND SILT, brown to gray

CLAY, fine some silt, little sand, gray

SILT, little to some clay, little fine sand, gray

SILT, little fine sand and clay, brown

UNDIFFERENTIATED FORMATION (SURFICIAL AQUIFER)

FINE TO COARSE SAND, little to some silt, trace to little clay, gray to green

FINE SAND AND SILT, gray

FINE SAND AND SILT, little wood, brown to gray

FINE TO MEDIUM SAND, trace to some silt, trace to little clay, tan to green

RIVER BEND FORMATION (CASTLE HAYNE AQUIFER)

SHELL AND FOSSIL FRAGMENTS, trace to some silt & clay, interbedded with calcareous sand & silt, gray

FINE SAND, little silt, trace clay, green to dark green

B.T. 2.52
B.T. 2.72
B.T. -0.46
B.T. -3.16
B.T. 0.67
B.T. -6.82
B.T. -34.5
B.T. -34.3
B.T. -39.5
B.T. -38.2
B.T. -33.8
B.T. -31.3

ELEVATION (FEET, MSL)

20
10
0
-10
-20
-30
-40

LEGEND

- GROUNDWATER ENCOUNTERED DURING DRILLING
- STATIC GROUNDWATER ELEVATION IN SHALLOW WELL
- STATIC GROUNDWATER ELEVATION IN INTERMEDIATE WELL
- B.T. X' BORING TERMINATED, ELEVATION MSL
- WELL SCREEN INTERVAL
- ESTIMATED
- PROJECTED

190 0 95 190 380
Horizontal Scale: 1 inch = 190 ft.

10 0 5 10 20
Vertical Scale: 1 inch = 10 ft.

THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

FIGURE 2-3
HYDROGEOLOGIC CROSS-SECTION A-A'
SITE 89 AND SITE 93
PHASE I INVESTIGATION

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental, Inc.

B
NORTH

B'
SOUTH

ELEVATION (FEET, MSL)

20
10
0
−10
−20
−30
−40

93−TW03IW
93−TW03

FINE SAND, little to some silt, trace to little clay, greenish−gray to gray

B.T. −1.92

B.T. −41.0

RIVER BEND FORMATION
(CASTLE HAYNE AQUIFER)

93−TW02
93−TW02IW

UNDIFFERENTIATED FORMATION
(SURFICIAL AQUIFER)

B.T. 1.59

MEDIUM TO COARSE SAND

B.T. −35.3

93−TW01IW
93−TW01

GROUND SURFACE

FINE SAND & SILT, little wood, brown to gray

B.T. −0.46

FINE TO COARSE SAND, trace to little silt, trace clay, gray to dark gray

FINE SAND AND SILT, gray

FINE SAND, little to some silt, trace to little clay, greenish−gray to gray

B.T. −39.5

93−TW14
93−TW14IW

B.T. −9.42

B.T. −34.4

93−TW05IW
93−TW05

FINE SAND, some silt, little clay, brown & gray

MEDIUM TO COARSE SAND, some silt & clay, gray

CLAY AND SILT, dark gray

B.T. 1.58

B.T. −33.3

LEGEND

- GROUNDWATER ENCOUNTERED DURING DRILLING
- STATIC GROUNDWATER ELEVATION IN SHALLOW WELL
- STATIC GROUNDWATER ELEVATION IN INTERMEDIATE WELL
- B.T. X' — BORING TERMINATED, ELEVATION MSL
- WELL SCREEN INTERVAL
- ESTIMATED
- PROJECTED

130 0 65 130 260
Horizontal Scale: 1 inch = 130 ft.

10 0 5 10 20
Vertical Scale: 1 inch = 10 ft.

THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

FIGURE 2−4
HYDROGEOLOGIC CROSS−SECTION B−B'
SITE 89 AND SITE 93
PHASE I INVESTIGATION

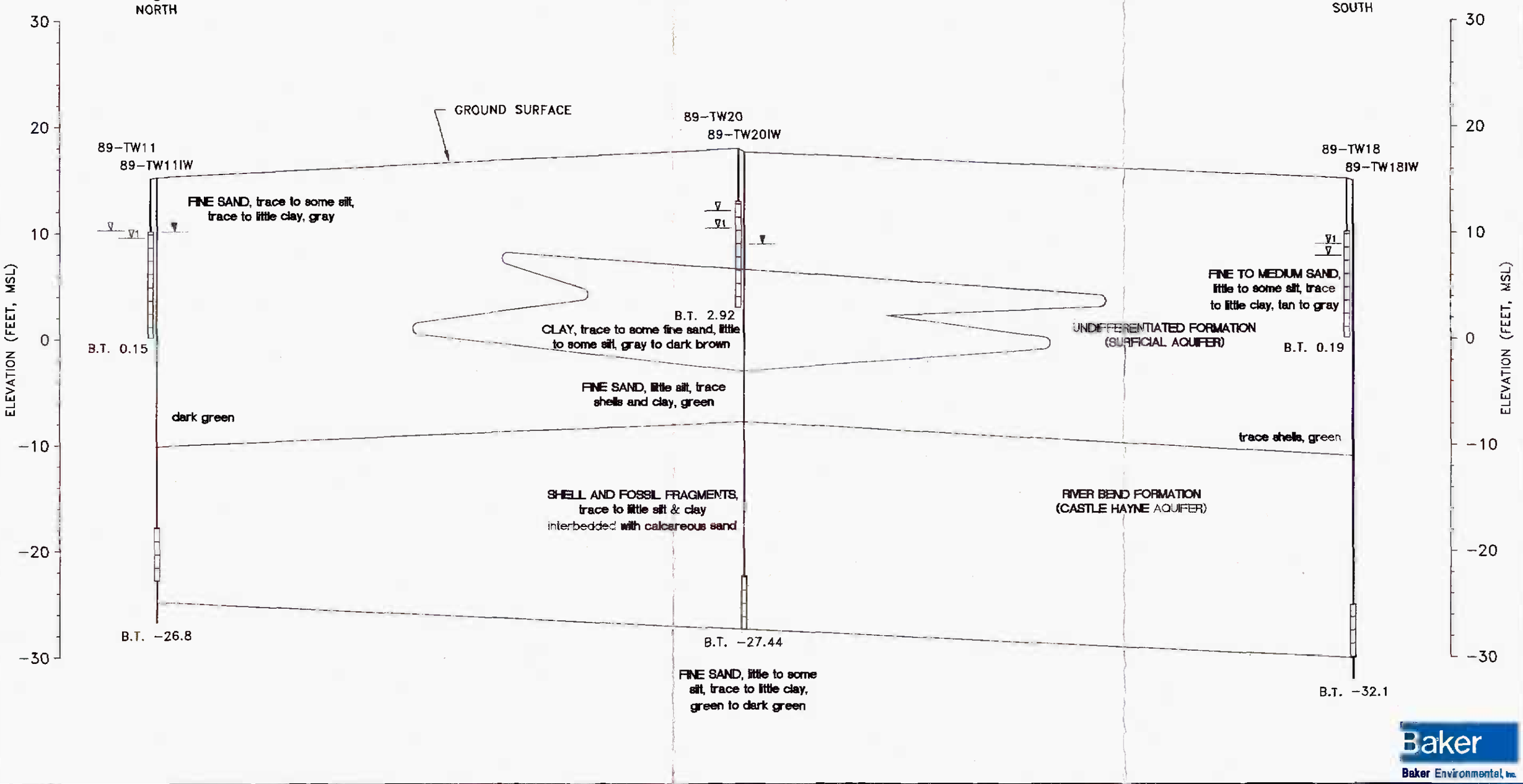
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental, Inc.

356516SI

C
NORTH

C'
SOUTH



Baker
Baker Environmental, Inc.

LEGEND

- GROUNDWATER ENCOUNTERED DURING DRILLING
- STATIC GROUNDWATER ELEVATION IN SHALLOW WELL
- STATIC GROUNDWATER ELEVATION IN INTERMEDIATE WELL
- B.T. X' — BORING TERMINATED, ELEVATION MSL
- WELL SCREEN INTERVAL
- ESTIMATED
- PROJECTED

90 0 45 90 180
Horizontal Scale: 1 inch = 90 ft.

10 0 5 10 20
Vertical Scale: 1 inch = 10 ft.

THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

FIGURE 2−5
HYDROGEOLOGIC CROSS−SECTION C−C'
SITE 89 AND SITE 93
PHASE I INVESTIGATION

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

D
WEST

D'
EAST

ELEVATION (FEET, MSL)

20
10
0
−10
−20
−30
−40

93−TW02IW
93−TW02
GROUND SURFACE
89−TW08IW
89−TW08
89−TW15
89−TW15IW
89−TW16
89−TW16IW
89−TW17IW
89−TW09IW
89−TW09
89−TW20IW
89−TW20
89−TW22
89−TW22IW
89−TW23IW

FINE SAND, little to some silt & clay, gray to brown

FINE SAND, little silt & clay, brown

FINE, MEDIUM, & COARSE SAND, trace gravel, silt & clay, orange to brown

FINE SAND, trace silt, brown and gray

FINE SAND, little silt, trace clay

CLAY, trace to little fine sand & silt, some organic matter, gray

UNDIFFERENTIATED FORMATION (SURFICIAL AQUIFER)

FINE SAND, some silt, trace clay, dark gray

SILT, some fine sand, trace shell fragments & clay, light gray

FINE SAND, little shell fragments, trace silt, light gray

FINE SAND, and fossil frag clay, trace fine

some shell ments, some sand, gray

SHELL AND FOSSIL FRAGMENTS, trace to little silt & clay, interbedded with calcareous sand

RIVER BEND FORMATION (CASTLE HAYNE AQUIFER)

FINE SAND, little to some silt, trace to little clay, green-gray to gray

B.T. 1.5
B.T. −2.0
B.T. 1.0
B.T. 0.0
B.T. 2.1
B.T. 2.56
B.T. 3.
B.T. −35.3
B.T. −29.0
B.T. −31.0
B.T. −32.0
B.T. −25.5
B.T. −23.9
B.T. −29.4
B.T. −28.9
B.T. −24.9

LEGEND

- GROUNDWATER ENCOUNTERED DURING DRILLING
- STATIC GROUNDWATER LEVEL IN SHALLOW WELL
- STATIC GROUNDWATER LEVEL IN INTERMEDIATE WELL
- B.T. X' — BORING TERMINATED, ELEVATION MSL
- WELL SCREEN INTERVAL
- ESTIMATED
- PROJECTED

240 0 120 240 480
Horizontal Scale: 1 inch = 240 ft.

10 0 5 10 20
Vertical Scale: 1 inch = 10 ft.

THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

FIGURE 2−6
HYDROGEOLOGIC CROSS−SECTION D−D'
SITE 89 AND SITE 93
PHASE 1 INVESTIGATION

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental, Inc.

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

3565345I

TC751
TC753
TC753
TC754
PARKING
8TH STREET
TC846
TC846
TC848
TC849
TC852
TC853
E STREET
9TH STREET
TC840
TC842
TC950
TC951
10TH STREET
TC1048
TC1049
TC1055
TC1056
TC1050
TC1059
TC1051
TC1060
TC1062
TC1052
COVERED PICNIC AREA
761
TC 762
TC773
ST.
MW42B
10.41
F STREET
TC859
SCALES
GATE
CONC. SWALE
BARBWIRE
TC864
DRMO AREA
WELDING SHOP
CONC. WALL
TC867
CONC PIT
SPRAY AREA
BUILDING
TW08
10.38
TW15
9.57
TC861
TC952
TW16
9.12
STC953
TW04
9.92
STAFF GAUGE
TW12
9.22
STC1070
COASTLINE
RIGHT-OF-WAY
125'
RAILROAD
±20' DITCH
TW11
12.62
TW19
10.49
TW21
10.56
TW09
9.64
TW20
7.94
TW22
10.24
TW10
10.39
EDWARDS CREEK
FLOW DIRECTION
TW13
5.34
TW18
6.76
HOLDING POND
A
1061
-59
-57
-63
200 0 100 200
1 inch = 200 ft.

Baker
Baker Environmental, Inc.

LEGEND

EXISTING WELL	MW42B	SWALE	
TEMPORARY WELL		TREE LINE	
STREET W/CURB		FENCE	
APPROXIMATE GROUNDWATER FLOW DIRECTION		FIRE HYDRANT	
SWAMP		CONCRETE	
		ASPHALT	

FIGURE 2-7
GROUNDWATER ELEVATIONS (SHALLOW WELLS)
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

356533SI

TC751 TC753 TC753 TC754 TC744 TC743 PARKING

8TH STREET

TC846 TC846 TC848 TC849 TC852 TC853 TC840 TC841 TC842 TC844 TC845

E STREET

TC854 TC855 TC851 TC850

9TH STREET

TC940 TC942 TC950 TC951

10TH STREET

TC1048 TC1049 TC1055 TC1056 TC1040 TC1041 TC1042 TC1050 TC1059 TC1051 TC1060 TC1062 TC1052

COVERED PICNIC AREA

761

TC 762

ST. TC773

F STREET

TC860

CONC. SWALE

BARBWIRE

TC864

GATE

TW08IW 10.19

TC859 SCALES

DRMO AREA

WELDING SHOP

CONC. WALL

TW15IW 9.95

NOT RECORDED

TC867

TW17IW

CONC PIT

RAMP

CONC. WALL

BUILDING

SPRAY AREA

TC861

TC952

TW16IW 8.71

±20' DITCH

TOH ROAD

STC953

TW04IW 11.56

STAFF GAUGE

TW12IW 11.65

STC1070

COASTLINE

125'

RIGHT-OF-WAY

HOLDING POND

TW11IW 9.03

TW19IW 8.81

TW21IW 8.39

TW09IW 9.57

TW23IW 7.36

TW20IW 10.64

TW22IW 7.85

TW10IW 9.46

EDWARDS CREEK FLOW DIRECTION

TW13IW 9.24

TW18IW 7.63

-57 -59 -61 -63

200 0 100 200

1 inch = 200 ft.

Baker

Baker Environmental, Inc.

LEGEND

TEMPORARY WELL	ⓣ	SWALE	
STREET W/CURB		TREE LINE	
APPROXIMATE GROUNDWATER		FENCE	
		FIRE HYDRANT	
SWAMP		CONCRETE	
		ASPHALT	

FIGURE 2-8
GROUNDWATER ELEVATIONS (INTERMEDIATE WELLS)
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

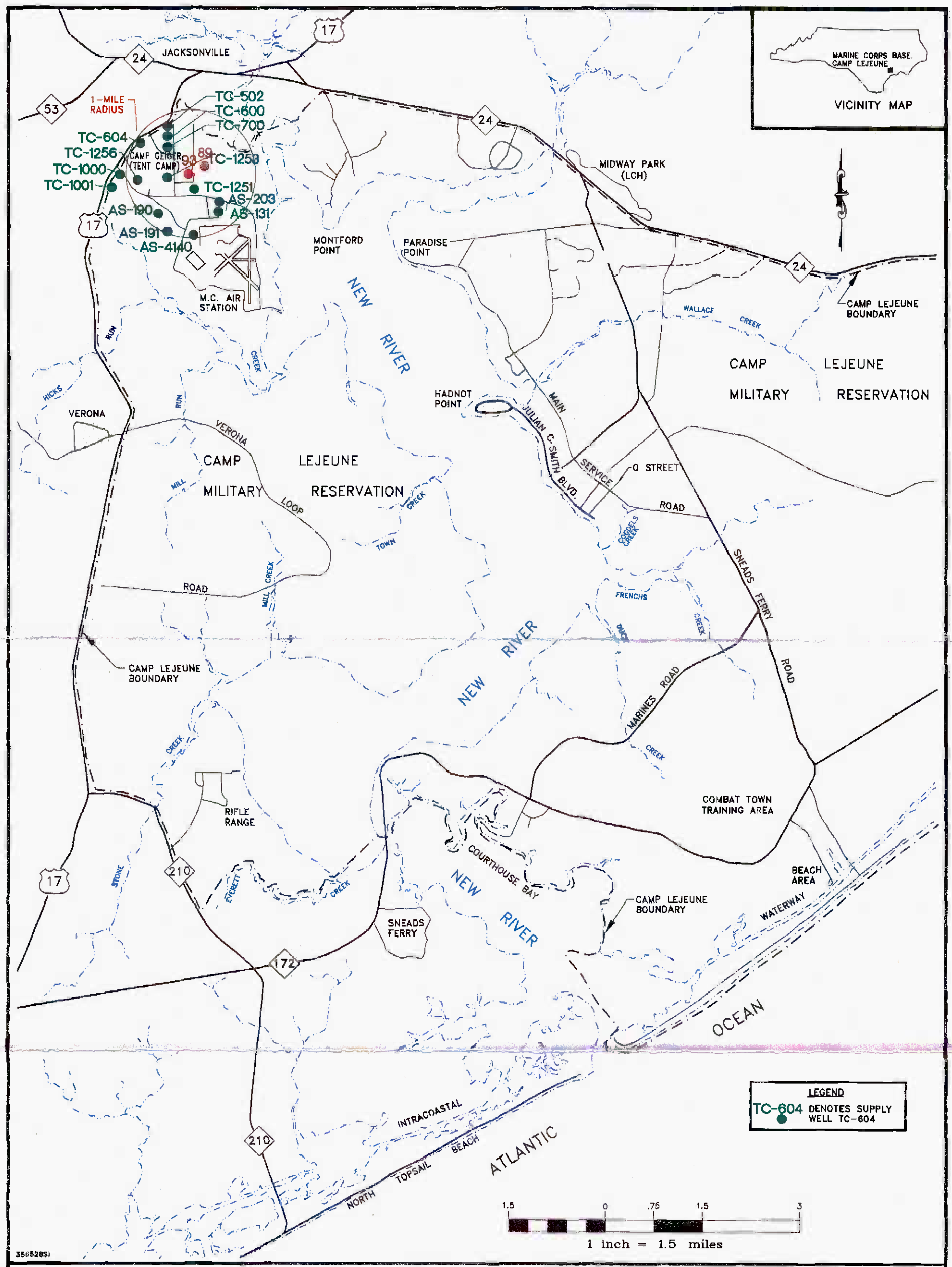
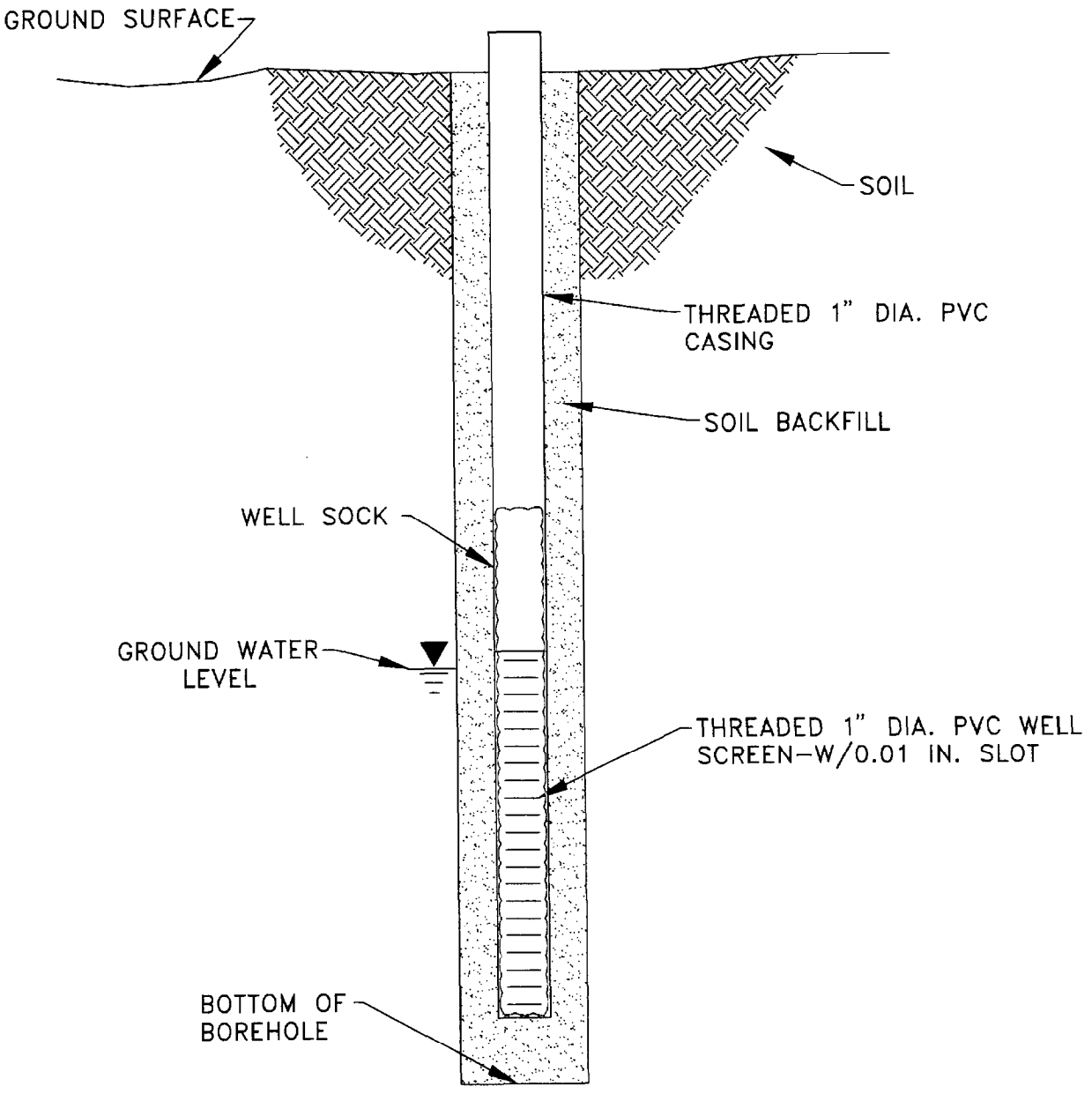


FIGURE 2-9
ACTIVE WATER SUPPLY WELL LOCATIONS
SITE 89 AND 93
CTO-0356

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

356501SI



N.T.S.

Baker

Baker Environmental, Inc.

FIGURE 3–1
TYPICAL TEMPORARY MONITORING WELL
CONSTRUCTION DIAGRAM
PHASE I INVESTIGATION
CTO – 0356
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

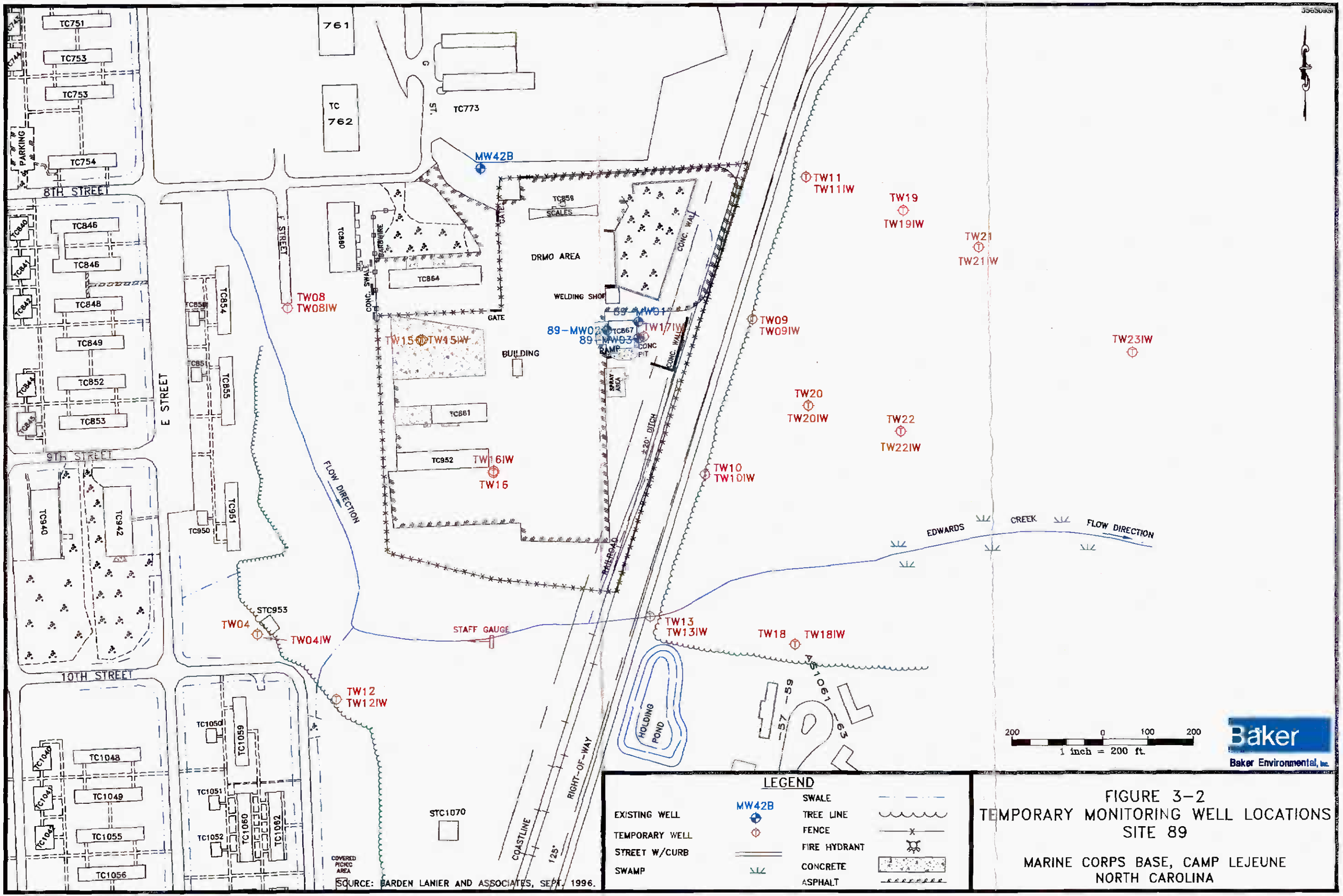
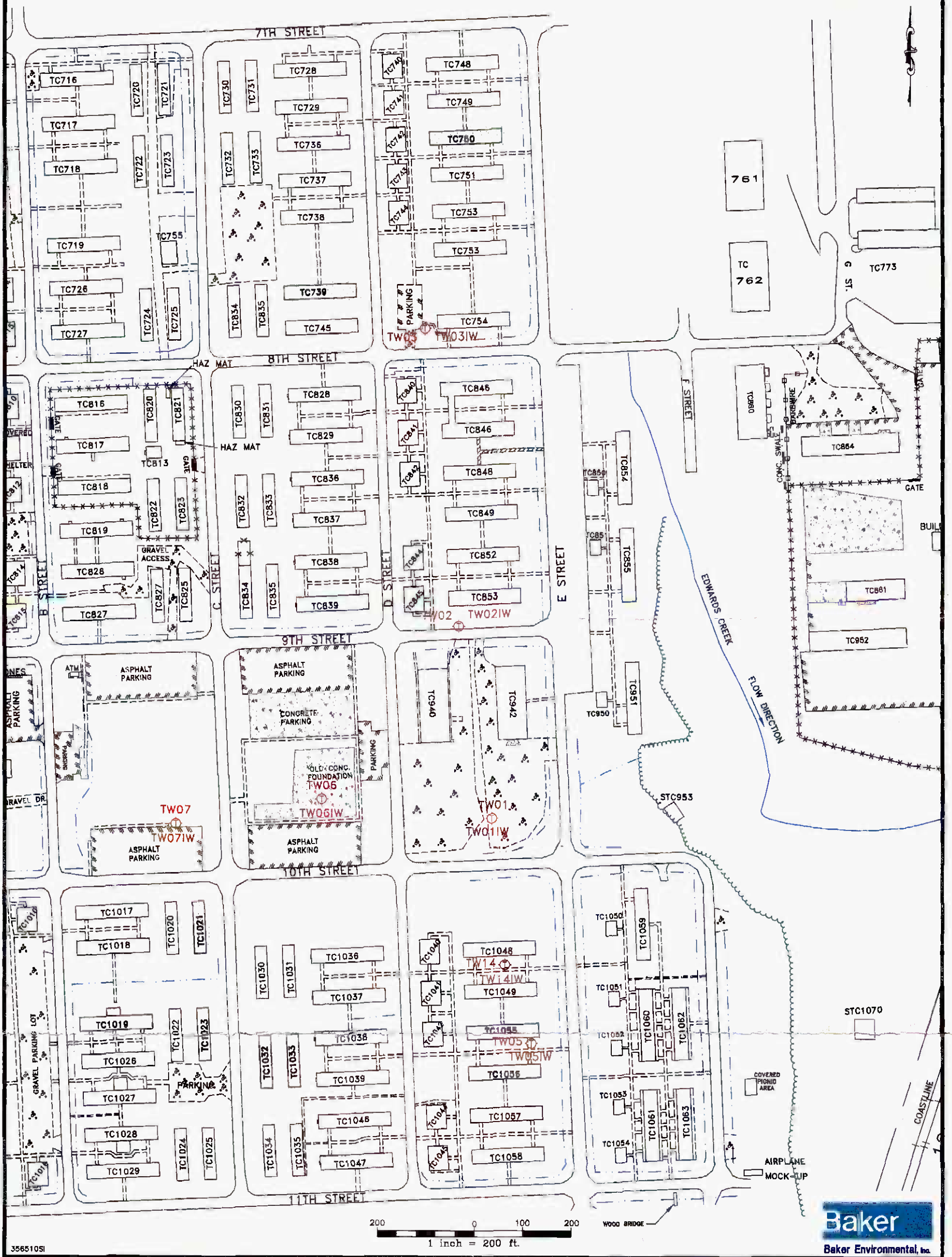


FIGURE 3-2
TEMPORARY MONITORING WELL LOCATIONS
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



3565105I

Baker
Baker Environmental, Inc.

LEGEND

- TEMPORARY WELL
- STREET W/CURB
- GRAVEL ROAD
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.OCT. 1991

FIGURE 3-3
TEMPORARY MONITORING WELL LOCATIONS
SITE 93

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

356524SI

761

TC
762

TC773

TC751
TC753
TC753
TC754
PARKING
8TH STREET
TC840
TC846
TC841
TC846
TC842
TC848
TC849
TC844
TC852
TC845
TC853
9TH STREET
E STREET
F STREET
TC940
TC942
TC950
TC951
TC854
TC858
TC855
TC856
TC860
TC859
SCALES
GATE
BARBWIRE
CONC. SWALE
TC864
GATE
DRMO AREA
CONC. WALL
WELDING SHOP
TC867
CONC PIT
BUILDING
CONC. WALL
SPRAY AREA
TC861
TC952
20' DITCH
RAILROAD
SW06
SW/SD01
FLOW DIRECTION
SW07
SW08
STC953
SW/SD02
SG
STAFF GAUGE
SW/SD03
SW/SD04
SW/SD05
SW09
SW10
SW11
EDWARDS
CREEK
FLOW DIRECTION
10TH STREET
TC1050
TC1059
TC1048
TC1049
TC1051
TC1060
TC1062
TC1055
TC1052
TC1056
COVERED PICNIC AREA
STC1070
COASTLINE
125'
RIGHT-OF-WAY
HOLDING POND
AS1061
-57
-59
-63
10L
200 0 100 200
1 inch = 200 ft.

Baker
Baker Environmental, Inc.

LEGEND

SURFACE WATER SAMPLE	SW05	SWALE	
SURFACE WATER\ SEDIMENT SAMPLE	SW/SD01	TREE LINE	
STREET W/CURB		FENCE	
SWAMP		FIRE HYDRANT	
		CONCRETE	
		ASPHALT	

FIGURE 3-4
SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

356512SI

SAMPLE I.D.	SW01
CIS-1,2-DICHLOROETHENE	2
TRICHLOROETHENE	3.8
TETRACHLOROETHENE	.2

SAMPLE I.D.	SW07
TRANS-1,2-DICHLOROETHENE	21
CIS-1,2-DICHLOROETHENE	27
TRICHLOROETHENE	14.8
TETRACHLOROETHENE	1.2

SAMPLE I.D.	SW08
TETRACHLOROETHENE	.4

SAMPLE I.D.	SW02
TRANS-1,2-DICHLOROETHENE	37
CIS-1,2-DICHLOROETHENE	48
TRICHLOROETHENE	7.3
TETRACHLOROETHENE	.2

SAMPLE I.D.	SW04
TRANS-1,2-DICHLOROETHENE	19
CIS-1,2-DICHLOROETHENE	52
TRICHLOROETHENE	32.9
TETRACHLOROETHENE	.2

SAMPLE I.D.	SW09
TRANS-1,2-DICHLOROETHENE	16
CIS-1,2-DICHLOROETHENE	44
TRICHLOROETHENE	28.5
TETRACHLOROETHENE	.2

SAMPLE I.D.	SW10
TRANS-1,2-DICHLOROETHENE	15
CIS-1,2-DICHLOROETHENE	43
TRICHLOROETHENE	27.9
TETRACHLOROETHENE	.1

SAMPLE I.D.	SW11
TRANS-1,2-DICHLOROETHENE	14
CIS-1,2-DICHLOROETHENE	43
TRICHLOROETHENE	27.6
TETRACHLOROETHENE	.2

SAMPLE I.D.	SW05
TRANS-1,2-DICHLOROETHENE	15
CIS-1,2-DICHLOROETHENE	44
TRICHLOROETHENE	27.3
TETRACHLOROETHENE	.1

SAMPLE I.D.	SW03
TRANS-1,2-DICHLOROETHENE	31
CIS-1,2-DICHLOROETHENE	44
TRICHLOROETHENE	6.4
TETRACHLOROETHENE	.2

200 0 100 200
1 inch = 200 ft.

Baker
Baker Environmental, Inc.

LEGEND

SURFACE WATER SAMPLE SW05
STREET W/CURB
SWALE
APPROXIMATE GROUNDWATER WATER FLOW DIRECTION
SWAMP
TREE LINE
FENCE
FIRE HYDRANT
CONCRETE
ASPHALT

FIGURE 4-1
VOLATILE ORGANIC COMPOUNDS IN SURFACE WATER SAMPLES
SITE 89
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

017485179

SAMPLE I.D.	SD03
DEPTH	0–0.5'
VINYL CHLORIDE	35
1,2–DICHLOROETHENE (TOTAL)	1600
TRICHLOROETHANE	2400
1,1,2–TRICHLOROETHANE	19
1,1,2,2–TETRACHLOROETHANE	1700
TOLUENE	7 J

SAMPLE I.D.	SD03
DEPTH	0.5–1.0'
VINYL CHLORIDE	230
1,2–DICHLOROETHENE (TOTAL)	37 J
TRICHLOROETHANE	1500
1,1,2–TRICHLOROETHANE	120
1,1,2,2–TETRACHLOROETHANE	13
TOLUENE	550

LEGEND

- SEDIMENT SAMPLE (SD05)
- STREET W/CURB
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- SWAMP
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

200 0 100 200
1 inch = 200 ft.

Baker Environmental, Inc.

FIGURE 4–2
VOLATILE ORGANIC COMPOUNDS IN SEDIMENT FIXED BASED ANALYSIS
SITE 89
MARINE CORPS BASE, CAMP LEJEUNE NORTH CAROLINA

SOURCE: HARDEN LANIER AND ASSOCIATES, SEPT. 1996.

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

358522SI

SAMPLE I.D.	SD01
DEPTH	0–0.5'
PHENANTHRENE	50 J
FLOURANTHENE	68 J
PYRENE	50 J
BIS(2–ETHYLHEXYL)PHTHALATE	360 J
BENZO(B)FLOURANTHENE	53 J
BENZO(G,H,I)PERYLENE	50 J

SAMPLE I.D.	SD01
DEPTH	0.5–1.0'
BIS(2–ETHYLHEXYL)PHTHALATE	97 J

SAMPLE I.D.	SD02
DEPTH	0–0.5'
FLOURANTHENE	59 J
CHRYSENE	51 J
BIS(2–ETHYLHEXYL)PHTHALATE	150 J

SAMPLE I.D.	SD02
DEPTH	0.5'1.0'
PHENANTHRENE	44 J
FLOURANTHENE	81 J
PYRENE	140 J
BENZO(A)ANTHRACENE	58 J
CHRYSENE	95 J
BIS(2–ETHYLHEXYL)PHTHALATE	130 J
BENZO(B)FLOURANTHENE	50 J
BENZO(K)FLOURANTHENE	53 J
BENZO(A)PYRENE	75 J

SAMPLE I.D.	SD03
DEPTH	0–0.5'
PHENANTHRENE	42 J
BIS(2–ETHYLHEXYL)PHTHALATE	140 J

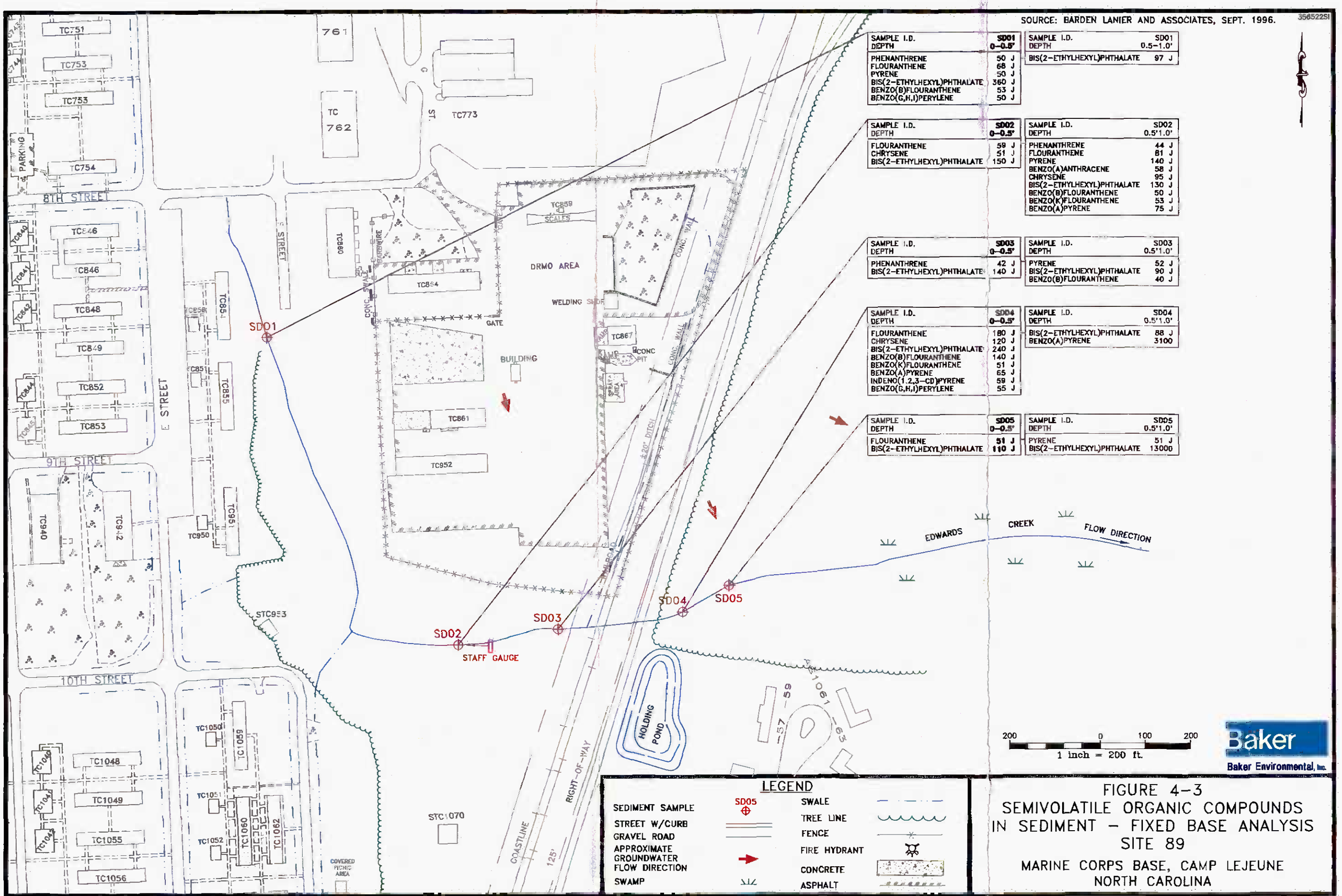
SAMPLE I.D.	SD03
DEPTH	0.5'1.0'
PYRENE	52 J
BIS(2–ETHYLHEXYL)PHTHALATE	90 J
BENZO(B)FLOURANTHENE	40 J

SAMPLE I.D.	SD04
DEPTH	0–0.5'
FLOURANTHENE	180 J
CHRYSENE	120 J
BIS(2–ETHYLHEXYL)PHTHALATE	240 J
BENZO(B)FLOURANTHENE	140 J
BENZO(K)FLOURANTHENE	51 J
BENZO(A)PYRENE	65 J
INDENO(1,2,3–CD)PYRENE	59 J
BENZO(G,H,I)PERYLENE	55 J

SAMPLE I.D.	SD04
DEPTH	0.5'1.0'
BIS(2–ETHYLHEXYL)PHTHALATE	88 J
BENZO(A)PYRENE	3100

SAMPLE I.D.	SD05
DEPTH	0–0.5'
FLOURANTHENE	51 J
BIS(2–ETHYLHEXYL)PHTHALATE	110 J

SAMPLE I.D.	SD05
DEPTH	0.5'1.0'
PYRENE	51 J
BIS(2–ETHYLHEXYL)PHTHALATE	13000



LEGEND

- SEDIMENT SAMPLE (SD05)
- STREET W/CURB
- GRAVEL ROAD
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- SWAMP
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

Baker

Baker Environmental, Inc.

FIGURE 4–3
SEMIVOLATILE ORGANIC COMPOUNDS IN SEDIMENT – FIXED BASE ANALYSIS SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

356523S

SAMPLE I.D.	SD05
DEPTH	0–0.5'
4,4'–DDE	33 J
4,4'–DDD	42 J
4,4'–DDT	23 J
ALPHA–CHLORDANE	2 J
GAMMA–CHLORDANE	16 J

SAMPLE I.D.	SD05
DEPTH	0.5–1.0'
4,4'–DDE	44 J
4,4'–DDD	79
4,4'–DDT	34
ALPHA–CHLORDANE	2.9
GAMMA–CHLORDANE	4.6 J

200 0 100 200
1 inch = 200 ft.

Baker Environmental, Inc.

LEGEND

- SEDIMENT SAMPLE (SD05)
- STREET W/CURB
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- SWAMP
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

FIGURE 4–4
PESTICIDES/PCBs IN SEDIMENT
FIXED BASED ANALYSIS
SITE 89
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

356521SI

SAMPLE I.D.	SD01
DEPTH	0–0.5'
ALUMINUM	1690 J
BARIUM	8.9
BERYLLIUM	0.14
CADMIUM	0.82
CHROMIUM	4.1
COPPER	5.5
LEAD	14.3 J
MANGANESE	10.4
VANADIUM	7.1
ZINC	53.1

SAMPLE I.D.	SD01
DEPTH	0.5'–1.0'
ALUMINUM	2800 J
BARIUM	13.4
BERYLLIUM	0.36
CHROMIUM	3.6
LEAD	6.6
MANGANESE	7.9
VANADIUM	6.4
ZINC	24.9

SAMPLE I.D.	SD02
DEPTH	0–0.5'
ALUMINUM	1980 J
ARSENIC	0.51
BARIUM	16.3
CHROMIUM	5.2
COPPER	38.7
LEAD	20.7
MANGANESE	11.7
VANADIUM	8.9
ZINC	34

SAMPLE I.D.	SD02
DEPTH	0.5'–1.0'
ALUMINUM	1990 J
ARSENIC	0.39
BARIUM	13.2
BERYLLIUM	0.15
CHROMIUM	3.4
COPPER	7.9
LEAD	15.7
MANGANESE	11.1
NICKEL	3.7
VANADIUM	19.7
ZINC	33.5

SAMPLE I.D.	SD03
DEPTH	0–0.5'
ALUMINUM	27505
ARSENIC	0.59
BARIUM	18.6
CADMIUM	0.77
CHROMIUM	4.5
COPPER	5.9
LEAD	17.3 J
MANGANESE	13.6
NICKEL	2.3
VANADIUM	7.9
ZINC	27.6

SAMPLE I.D.	SD03
DEPTH	0.5'–1.0'
ALUMINUM	1820 J
BARIUM	15.5
CADMIUM	0.78
CHROMIUM	2.7
LEAD	12.3
MANGANESE	13.5
VANADIUM	5.2
ZINC	40.7

SAMPLE I.D.	SD05
DEPTH	0–0.5'
ALUMINUM	1010 J
ARSENIC	0.38
BARIUM	6
CHROMIUM	2.4
LEAD	35.4 J
MANGANESE	8.6
VANADIUM	4
ZINC	29.2

SAMPLE I.D.	SD05
DEPTH	0.5'–1.0'
ALUMINUM	1110 J
ARSENIC	0.85
BARIUM	10.7
CHROMIUM	4.7
COPPER	7.9
LEAD	14.6
MANGANESE	7.3
VANADIUM	5.5
ZINC	24.7

SAMPLE I.D.	SD04
DEPTH	0–0.5'
ALUMINUM	2040 J
ARSENIC	0.42
BARIUM	9.9
CHROMIUM	4.4
LEAD	20.2 J
MANGANESE	10.3
VANADIUM	5.2
ZINC	29.7

SAMPLE I.D.	SD04
DEPTH	0.5'–1.0'
ALUMINUM	14000 J
BARIUM	30.1
BERYLLIUM	0.55
CHROMIUM	7.6
LEAD	13.5
MANGANESE	16.3
MERCURY	0.1
VANADIUM	11.2
ZINC	11.7

SD01 SD02 SD03 SD04 SD05

STAFF GAUGE

EDWARDS CREEK FLOW DIRECTION

HOLDING POND

DRMO AREA

BUILDING

WELDING SHOP

SCALES

GATE

CONC. WALL

CONC. PIT

SPRAY AREA

CONC. SWALE

BARBWIRE

20' DITCH

RAILROAD

RIGHT-OF-WAY

125'

COASTLINE

COVERED PICNIC AREA

8TH STREET

9TH STREET

10TH STREET

E STREET

F STREET

TC751 TC753 TC753 TC754 TC761 TC762 TC773 TC846 TC846 TC848 TC849 TC852 TC853 TC854 TC855 TC859 TC860 TC864 TC867 TC861 TC952 TC940 TC942 TC950 TC951 STC953 TC1048 TC1049 TC1055 TC1056 TC1050 TC1059 TC1051 TC1060 TC1052 TC1062 STC1070

200 0 100 200

1 inch = 200 ft.

Baker Environmental, Inc.

LEGEND

- SEDIMENT SAMPLE (SD05)
- STREET W/CURB
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- SWAMP
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT

FIGURE 4–5
METALS IN SEDIMENT
FIXED BASED ANALYSIS
SITE 89

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996. 356520SI

SAMPLE I.D.	89-MW42B
SAMPLE DATE	07/31/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	6
CIS-1,2-DICHLOROETHENE	37
TRICHLOROTHENE	85.8

SAMPLE I.D.	89-MW02
SAMPLE DATE	07/30/96
VOLATILES (ug/L)	
VINYL CHLORIDE	130
TRANS-1,2-DICHLOROETHENE	451
CIS-1,2-DICHLOROETHENE	818
TRICHLOROTHENE	744.3
TETRACHLOROETHENE	9.4

SAMPLE I.D.	89-MW01
SAMPLE DATE	07/31/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	177
CIS-1,2-DICHLOROETHENE	261
TRICHLOROTHENE	323.1
TETRACHLOROETHENE	42.4

SAMPLE I.D.	89-MW03
SAMPLE DATE	07/31/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	82
CIS-1,2-DICHLOROETHENE	150
TRICHLOROTHENE	131.0
TETRACHLOROETHENE	13.1

SAMPLE I.D.	89-TW08
SAMPLE DATE	08/03/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	61
CIS-1,2-DICHLOROETHENE	253
TRICHLOROTHENE	638.4
TETRACHLOROETHENE	27

SAMPLE I.D.	89-TW15
SAMPLE DATE	08/06/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	53
CIS-1,2-DICHLOROETHENE	162
TRICHLOROTHENE	355.9
TETRACHLOROETHENE	13.7

SAMPLE I.D.	89-TW10
SAMPLE DATE	08/04/96
VOLATILES (ug/L)	
TRICHLOROTHENE	0.2

SAMPLE I.D.	89-TW16
SAMPLE DATE	08/06/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	44
CIS-1,2-DICHLOROETHENE	102
TRICHLOROTHENE	562.9
TETRACHLOROETHENE	42.7

SAMPLE I.D.	89-TW13
SAMPLE DATE	08/05/96
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	3
CIS-1,2-DICHLOROETHENE	18
TRICHLOROTHENE	136.9
TETRACHLOROETHENE	4.8

SAMPLE I.D.	89-TW18
SAMPLE DATE	08/13/96
VOLATILES (ug/L)	
1,1,1-TRICHLOROTHANE	0.2
TETRACHLOROETHENE	0.2

FEDERAL MAXIMUM CONTAMINATION LEVELS AND NORTH CAROLINA WATER QUALITY STANDARDS CLASS GA STANDARDS

ORGANIC CONTAMINANTS	MCL (ug/L)	N.C. REGULATION (ug/L)
VOLATILES		
TRICHLOROETHENE	5	2.8
CIS-1,2-DICHLOROETHENE	70	70
TRANS-1,2-DICHLOROETHENE	100	70
VINYL CHLORIDE	2	0.015
TETRACHLOROETHANE	5	0.7
1,1,1-TRICHLOROETHANE	200	200

NOTES:

CONTAMINANT CONCENTRATIONS ARE EXPRESSED IN MICROGRAMS PER LITER (ug/L).

CONTAMINANTS THAT EXCEED N.C. REGULATIONS ARE COLORED GREEN.

CONTAMINANTS THAT EXCEED BOTH N.C. REGULATIONS AND MCLs ARE COLORED RED.

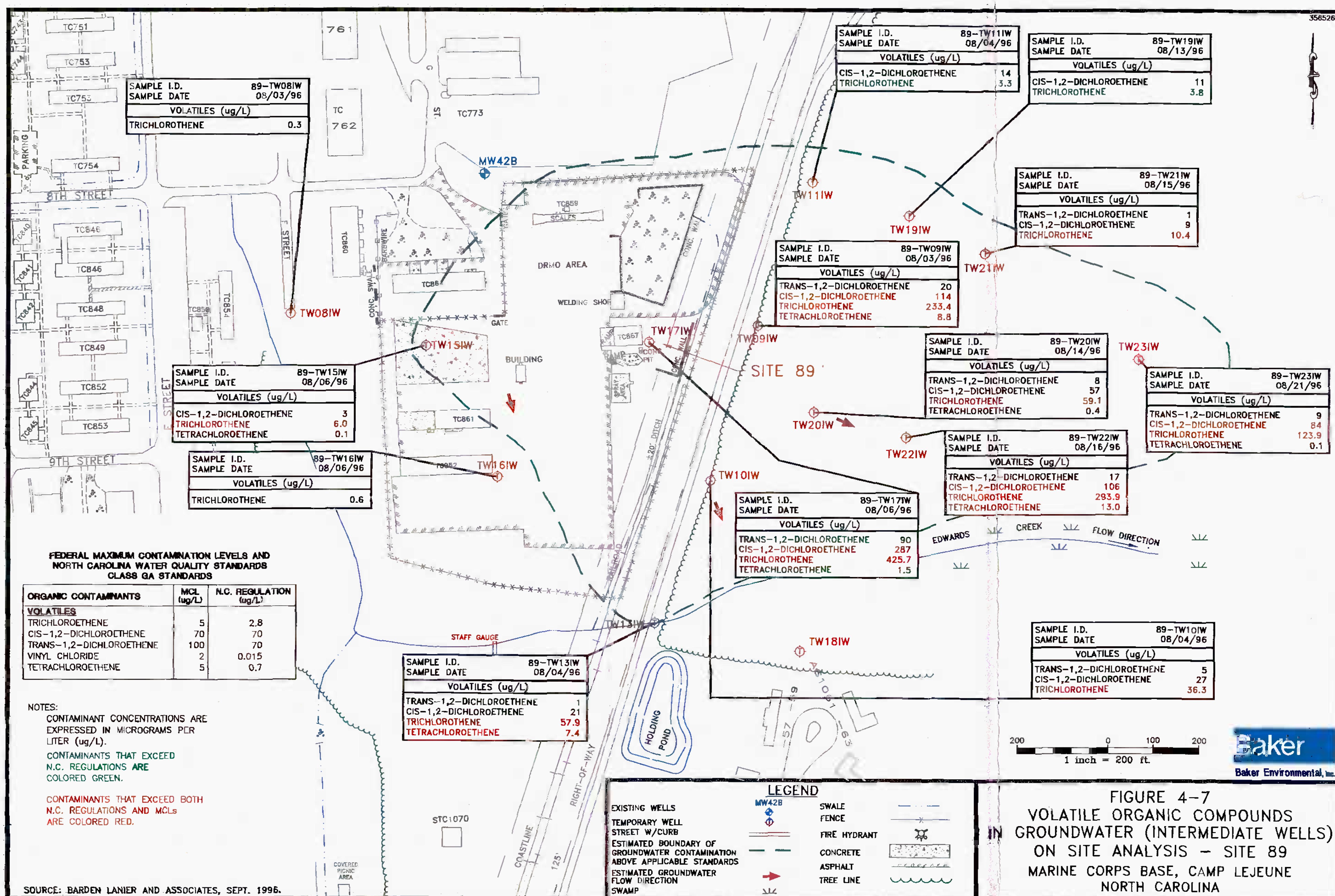
LEGEND

- EXISTING WELLS (MW42B)
- TEMPORARY WELL
- ESTIMTED BOUNDARY OF GROUNDWATER CONTAMINATION ABOVE APPLICABLE STANDARDS
- ESTIMATED GROUNDWATER FLOW DIRECTION
- SWAMP
- SWALE
- STREET W/CURB
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT
- TREE LINE

200 0 100 200
1 inch = 200 ft.

Baker Environmental, Inc.

FIGURE 4-6
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER (SHALLOW WELLS) ON SITE ANALYSIS - SITE 89
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



356526SI
TC751
TC753
TC753
TC754
PARKING
8TH STREET
TC846
TC846
TC848
TC849
TC852
TC853
9TH STREET
F STREET
E STREET
761
TC 762
TC773
TC860
TC854
TC850
BARBWIRE
CONC. SWALE
MW42B
TC859
SCALES
DRMO AREA
WELDING SHOP
TC864
GATE
BUILDING
TC861
TC867
TC862
CONC. WALL
CONC. PIT
20' DITCH
RAILROAD
RIGHT-OF-WAY
COASTLINE
125'
STAFF GAUGE
STC1070
COVERED PICNIC AREA
HOLDING POND
SITE 89
EDWARDS CREEK
FLOW DIRECTION
TW08IW
TW15IW
TW16IW
TW13IW
TW11IW
TW19IW
TW21IW
TW09IW
TW17IW
TW20IW
TW22IW
TW23IW
TW10IW
TW18IW
SAMPLE I.D. 89-TW08IW
SAMPLE DATE 08/03/96
VOLATILES (ug/L)
TRICHLOROTHENE 0.3
SAMPLE I.D. 89-TW15IW
SAMPLE DATE 08/06/96
VOLATILES (ug/L)
CIS-1,2-DICHLOROETHENE 3
TRICHLOROTHENE 6.0
TETRACHLOROETHENE 0.1
SAMPLE I.D. 89-TW16IW
SAMPLE DATE 08/06/96
VOLATILES (ug/L)
TRICHLOROTHENE 0.6
SAMPLE I.D. 89-TW13IW
SAMPLE DATE 08/04/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 1
CIS-1,2-DICHLOROETHENE 21
TRICHLOROTHENE 57.9
TETRACHLOROETHENE 7.4
SAMPLE I.D. 89-TW11IW
SAMPLE DATE 08/04/96
VOLATILES (ug/L)
CIS-1,2-DICHLOROETHENE 14
TRICHLOROTHENE 3.3
SAMPLE I.D. 89-TW19IW
SAMPLE DATE 08/13/96
VOLATILES (ug/L)
CIS-1,2-DICHLOROETHENE 11
TRICHLOROTHENE 3.8
SAMPLE I.D. 89-TW21IW
SAMPLE DATE 08/15/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 1
CIS-1,2-DICHLOROETHENE 9
TRICHLOROTHENE 10.4
SAMPLE I.D. 89-TW09IW
SAMPLE DATE 08/03/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 20
CIS-1,2-DICHLOROETHENE 114
TRICHLOROTHENE 233.4
TETRACHLOROETHENE 8.8
SAMPLE I.D. 89-TW20IW
SAMPLE DATE 08/14/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 8
CIS-1,2-DICHLOROETHENE 57
TRICHLOROTHENE 59.1
TETRACHLOROETHENE 0.4
SAMPLE I.D. 89-TW23IW
SAMPLE DATE 08/21/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 9
CIS-1,2-DICHLOROETHENE 84
TRICHLOROTHENE 123.9
TETRACHLOROETHENE 0.1
SAMPLE I.D. 89-TW22IW
SAMPLE DATE 08/16/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 17
CIS-1,2-DICHLOROETHENE 106
TRICHLOROTHENE 293.9
TETRACHLOROETHENE 13.0
SAMPLE I.D. 89-TW17IW
SAMPLE DATE 08/06/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 90
CIS-1,2-DICHLOROETHENE 287
TRICHLOROTHENE 425.7
TETRACHLOROETHENE 1.5
SAMPLE I.D. 89-TW10IW
SAMPLE DATE 08/04/96
VOLATILES (ug/L)
TRANS-1,2-DICHLOROETHENE 5
CIS-1,2-DICHLOROETHENE 27
TRICHLOROTHENE 36.3
200 0 100 200
1 inch = 200 ft.
Baker
Baker Environmental, Inc.

FEDERAL MAXIMUM CONTAMINATION LEVELS AND NORTH CAROLINA WATER QUALITY STANDARDS CLASS GA STANDARDS

ORGANIC CONTAMINANTS	MCL (ug/L)	N.C. REGULATION (ug/L)
VOLATILES		
TRICHLOROETHENE	5	2.8
CIS-1,2-DICHLOROETHENE	70	70
TRANS-1,2-DICHLOROETHENE	100	70
VINYL CHLORIDE	2	0.015
TETRACHLOROETHENE	5	0.7

NOTES:

CONTAMINANT CONCENTRATIONS ARE EXPRESSED IN MICROGRAMS PER LITER (ug/L).

CONTAMINANTS THAT EXCEED N.C. REGULATIONS ARE COLORED GREEN.

CONTAMINANTS THAT EXCEED BOTH N.C. REGULATIONS AND MCLs ARE COLORED RED.

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.

LEGEND

EXISTING WELLS (MW42B)
TEMPORARY WELL
STREET W/CURB
ESTIMATED BOUNDARY OF GROUNDWATER CONTAMINATION ABOVE APPLICABLE STANDARDS
ESTIMATED GROUNDWATER FLOW DIRECTION
SWAMP
SWALE
FENCE
FIRE HYDRANT
CONCRETE
ASPHALT
TREE LINE

FIGURE 4-7
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER (INTERMEDIATE WELLS)
ON SITE ANALYSIS – SITE 89
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996. OCT. 1991

FEDERAL MAXIMUM CONTAMINATION LEVELS AND NORTH CAROLINA WATER QUALITY STANDARDS CLASS GA STANDARDS

ORGANIC CONTAMINANTS	MCL (ug/L)	N.C. REGULATION (ug/L)
VOLATILES		
TRICHLOROETHENE	5	2.8
CIS-1,2-DICHLOROETHENE	70	70
TRANS-1,2-DICHLOROETHENE	100	70
TETRACHLOROETHENE	5.0	0.7
1,1,1-TRICHLOROETHANE	200	200

NOTES:

CONTAMINANT CONCENTRATIONS ARE EXPRESSED IN MICROGRAMS PER LITER (ug/L).

CONTAMINANTS THAT EXCEED N.C. REGULATIONS ARE COLORED GREEN.

CONTAMINANTS THAT EXCEED BOTH N.C. REGULATIONS AND MCLs ARE COLORED RED.

SAMPLE I.D.	93-MW05
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	5
CIS-1,2-DICHLOROETHENE	15
TRICHLOROETHENE	24.3
TETRACHLOROETHENE	65.1

SAMPLE I.D.	93-TW08
VOLATILES (ug/L)	
TRICHLOROETHENE	1.3
TETRACHLOROETHENE	8.9

SAMPLE I.D.	93-TW01
VOLATILES (ug/L)	
TRANS-1,2-DICHLOROETHENE	57
CIS-1,2-DICHLOROETHENE	175
1,1,1-TRICHLOROETHANE	0.2
TRICHLOROETHENE	39.4
TETRACHLOROETHENE	16.2

SAMPLE I.D.	93-TW07
VOLATILES (ug/L)	
TRICHLOROETHENE	0.6
TETRACHLOROETHENE	0.8

7TH STREET, 8TH STREET, 9TH STREET, 10TH STREET, 11TH STREET

B STREET, C STREET, D STREET, E STREET, G STREET

HAZ MAT, GRAVEL ACCESS, PARKING, ASPHALT PARKING, CONCRETE PARKING, GRAVEL PARKING LOT, GRAVEL DR

TW03, TW02, TW01, TW04, TW05, TW06, TW07

93-MW05, SITE 93

FORMER UST, OLD CONC. FOUNDATION

EDWARDS CREEK, FLOW DIRECTION, STAFF GAUGE, STC953, STC1070

761, TC 762, TC773, TC860, TC884, TC861, TC952

COVERED PICNIC AREA, AIRPLANE MOCK-UP, WOOD BRIDGE, COASTLINE, GATE

200 0 100 200

1 inch = 200 ft.

3565255I

Baker Environmental, Inc.

LEGEND

- MONITORING WELL
- TEMPORARY WELL
- FORMER UST
- STREET W/CURB
- GRAVEL ROAD
- ESTIMATED BOUNDARY OF GROUNDWATER CONTAMINATION ABOVE APPLICABLE STANDARDS
- SWALE
- TREE LINE
- FENCE
- FIRE HYDRANT
- CONCRETE
- ASPHALT
- APPROXIMATE GROUNDWATER FLOW DIRECTION

FIGURE 4-8
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER (SHALLOW WELLS) ON SITE ANALYSIS SITE 93

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

01748E24Y

SOURCE: BARDEN LANIER AND ASSOCIATES, SEPT. 1996.OCT. 1991

7TH STREET
8TH STREET
9TH STREET
10TH STREET
11TH STREET
B STREET
C STREET
D STREET
E STREET
F STREET
6 ST
HAZ MAT
HAZ MAT
PARKING
GRAVEL ACCESS
GATE
CONC. SWALE
CARDWIRE
BUILD
ATM
ASPHALT PARKING
CONCRETE PARKING
OLD CONC. FOUNDATION
FORMER UST
EDWARDS CREEK
FLOW DIRECTION
SITE 93
STAFF GAUGE
COVERED PICNIC AREA
AIRPLANE MOCK-UP
WOOD BRIDGE
COASTLINE
GRAVEL DR
GRAVEL PARKING

TC716 TC717 TC718 TC719 TC720 TC721 TC722 TC723 TC724 TC725 TC726 TC727 TC755
TC728 TC729 TC730 TC731 TC732 TC733 TC734 TC735 TC736 TC737 TC738 TC739 TC745
TC740 TC741 TC742 TC743 TC744 TC748 TC749 TC750 TC751 TC753 TC753 TC754
761
TC 762
TC773
TC816 TC817 TC813 TC818 TC819 TC820 TC821 TC822 TC823 TC825 TC826 TC827
TC828 TC829 TC830 TC831 TC832 TC833 TC834 TC835 TC836 TC838 TC839
TC840 TC841 TC842 TC843 TC844 TC846 TC846 TC848 TC849 TC852 TC853
TC854 TC855 TC850 TC851 TC860 TC864 TC861 TC952
TC940 TC942 TC950 TC951
TC1017 TC1018 TC1020 TC1021 TC1030 TC1031 TC1036 TC1037 TC1038 TC1039 TC1046 TC1047
TC1019 TC1022 TC1023 TC1028 TC1027 TC1026 TC1024 TC1025 TC1029 TC1032 TC1033 TC1034 TC1035
TC1040 TC1041 TC1042 TC1043 TC1044 TC1045 TC1048 TC1049 TC1056 TC1057 TC1058
TC1050 TC1059 TC1051 TC1060 TC1062 TC1052 TC1053 TC1061 TC1063 TC1054

93-TW02IW
SAMPLE I.D. 93-TW02IW
VOLATILES (ug/L)
CIS-1,2-DICHLOROETHENE 4
TRICHLOROETHENE 0.1

93-MW05
TW02IW
TW03IW
TW06IW
TW07IW
TW01IW
TW04IW
TW05IW
STC953
STC1070

SAMPLE I.D. 93-TW06IW
VOLATILES (ug/L)
TRICHLOROETHENE 0.1
TETRACHLOROETHENE 0.5

SAMPLE I.D. 93-TW07IW
VOLATILES (ug/L)
TETRACHLOROETHENE 0.1

SAMPLE I.D. 93-TW01IW
VOLATILES (ug/L)
TRICHLOROETHENE 0.1

200 0 100 200
1 inch = 200 ft.

3565295I

Baker
Baker Environmental, Inc.

LEGEND

MONITORING WELL
TEMPORARY WELL
FORMER UST
STREET W/CURB
GRAVEL ROAD
APPROXIMATE GROUNDWATER FLOW DIRECTION
SWALE
TREE LINE
FENCE
FIRE HYDRANT
CONCRETE
ASPHALT

FIGURE 4-9
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER (INTERMEDIATE WELLS) ON SITE ANALYSIS SITE 93

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

APPENDIX A
TEST BORING AND WELL CONSTRUCTION RECORDS

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW04
COORDINATES: EAST: 2465170.0996 NORTH: 360186.3001
ELEVATION: SURFACE: 11.84 TOP OF PVC CASING: 13.92

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/31/96	0.0 - 15.0	M.cloudy, 90s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW04IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW04 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW04

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW04 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW04IW
COORDINATES: EAST: 2465170.4943 NORTH: 360188.9924
ELEVATION: SURFACE: 11.84 TOP OF PVC CASING: 14.12

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/31/96	0.0 - 50.0	M.cloudy, 90s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	42
Sch 40, 10-Slot, PVC Screen	1"	42	47

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.0	5	--	(1)	F SAND, some silt, trace clay; brown; m. dense; moist		
2 2.0		50%	6 9 6					
						2.6		
3	S-2	1.6	4 6	--	(1)	CLAY, some silt, little f sand; gray w/ iron stains; stiff; moist		
4 4.0		80%	6 9					
5	S-3	1.7	4 7	--	(1)			
6 6.0		85%	11 11			5.4		
7	S-4	0.0	5 10	--	(1)	F SAND, some silt; gray; wet		
8 8.0		0%	5 4			**Water @ 7.5'** 8.0		
9	S-5	1.7	3 3	--	(1)	F SAND, some silt & clay; gray; stiff; wet		
10 10.0		85%	4 7			9.7		
			2			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW04IW SHEET 1 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW04IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-6	1.4 70%	3 5 7	--	(1)	Continued from Sheet 1		
12 12.0						SILT, little to some clay, little f sand; dk gray;		
13	S-7	1.4 70%	6 7 10 10	--	(1)	v. stiff; moist		
14 14.0								
15	S-8	2.0 100%	6 6 8 9	--	(1)			
16 16.0						15.9		
17	S-9	2.0 100%	8 10 7 10	--	(1)	M/C SAND, little silt w/ zones of clay; dk gray; m. dense; wet		
18 18.0								
19	S-10	2.0 100%	9 10 28 47	--	(1)	19.3		
20 20.0						F SAND & SHELL/FOSSIL		
21	S-11	0.8 40%	13 34 48 51	--	(1)	FRAG, little silt, trace clay lt. gray; v. dense; moist 20		
22 22.0								
23	S-12	1.5 75%	20 22 34 41	--	(1)	SILT, trace f sand & shell frag; lt gray; hard; damp		
24 24.0						clayey zones & wet zones		
25	S-13	2.0 100%	11 34 38 35	--	(1)	F SAND, some shell/fossil frag & silt; lt gray; hard moist to wet		
26 26.0								
27	S-14	0.9 45%	38 35 38 50/2"	--	(1)	SHELL FRAG, trace f sand; gray; v dense; wet 27.8		
28 28.0						28.0		
29	S-15	1.3 65%	20 16 28 37	--	(1)	F SAND, some silt, trace clay; green; v dense; damp		
30 30.0								
			20			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW04IW SHEET 2 OF 3

Baker Environmental

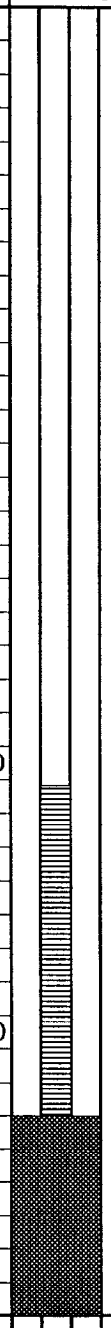
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW04IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-16	1.4	24	--	(1)	Continued from Sheet 2		
		70%	21			SHELL/FOSSIL FRAG,		
32 32.0			?			little silt; gray; dense;		
			32			wet		
33	S-17	1.0	24	--	(1)			
		50%	37			F SAND, little shell/fossil		
34 34.0			34			frag & silt; gray; v dense;		
			17			wet		
35	S-18	0.9	21	--	(1)			
		45%	22			SHELL/FOSSIL FRAG,		
36 36.0			22			little silt; gray; dense;		
			25			wet		
37	S-19	1.0	34	--	(1)			
		50%	35					
38 38.0			44					
			38					
39	S-20	1.1	21	--	(1)			
		55%	20					
40 40.0			25					
			28					
41	S-21	1.2	35	--	(1)			
		60%	22					
42 42.0			30			42.0		42.0
			29					
43	S-22	1.2	30	--	(1)	F/M SAND, little silt;		
		60%	31			gray; v dense; wet		
44 44.0			50					
			14					
45	S-23	0.9	15	--	(1)	little silt & clay		
		45%	20					
46 46.0			30			46.0		
	S-24	1.0	17	--	(1)			
47 47.0		100%	47			F SAND, some silt, trace		47.0
	A-N	--	--	--	--	clay; greenish-gray;		
48 48.0						v dense; moist		
49	S-25	--	--	--	(1)			
50 50.0								
						BOH @ 50.0 '		



DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW041W SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW08
COORDINATES: EAST: 2465236.3850 NORTH: 360898.3614
ELEVATION: SURFACE: 13.26 TOP OF PVC CASING: 15.38

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/2/96	0.0 - 15.0	Rainy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW08IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW08 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW08

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW08 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW08IW
COORDINATES: EAST: 2465236.9573 NORTH: 360893.7663
ELEVATION: SURFACE: 13.36 TOP OF PVC CASING: 15.19

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/2/96	0.0 - 42.0	Rainy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	37
Sch 40, 10-Slot, PVC Screen	1"	37	42

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 – 2 / 2.0	S-1	1.2 60%	10 15 13 13	--	(1)	F SAND, little silt, trace gravel & clay; grayish-brown; m dense; damp		
3 – 5 / 5.0	A-N	--	--	--	--			
6 – 7 / 7.0	S-2	1.5 75%	3 2 2 2	--	(1)	some silt & clay, trace wood; brown; soft; moist to wet		
8 – 10 / 10.0	A-N	--	--	--	--	**Water @ 6.0'**		
			5			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW08IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW08IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	1.1	5	--	(1)	Continued from Sheet 1		
		55%	6			Little silt & clay, trace		
12 12.0			8			m/c sand; dk gray; m dense;		
			13			wet		
13	A-N	--	--	--	--			
14								
15 15.0								
			15					
16	S-4	1.0	16	--	(1)	F/C SAND, some gravel,		
		50%	14			trace silt & clay; dk gray;		
17 17.0			1			dense; wet		
18	A-N	--	--	--	--			
19								
20 20.0						20.0		
			9					
21	S-5	2.0	13	--	(1)	F SAND, some shell/fossil		
		100%	23			frag, silt & clay; gray;		
22 22.0			26			dense; wet		
23	A-N	--	--	--	--			
24								
25 25.0								
			14					
26	S-6	1.1	19	--	(1)	SHELL/FOSSIL FRAG,		
		55%	25			some silt & clay; gray;		
27 27.0			31			dense; wet		
28	A-N	--	--	--	--			
29								
30 30.0								
			15			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW08IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW08IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.5	30	--	(1)	Continued from Sheet 2		
		75%	27			trace silt & clay; v dense		
32 32.0			25					
33	A-N	--	--	--	--			
34								
35 35.0								
			20					
36	S-8	2.0	24	--	(1)	smaller sized frag, trace silt		
		100%	30					
37 37.0			34					37.0
38	A-N	--	--	--	--			
39								
40 40.0						40.0		
			9			F SAND, some silt, trace		
41	S-9	1.7	11	--	(1)	shell frag & clay; olive		
		85%	18			drab; m dense; moist		
42 42.0			21			42.0		42.0
43								
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW08IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW09
COORDINATES: EAST: 2466256.6689 NORTH: 360873.0072
ELEVATION: SURFACE: 14.45 TOP OF PVC CASING: 16.94

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/3/96	0.0 - 15.0	Cloudy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW09IW for descriptions		5.0
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW09 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW09

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW09 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW09IW
COORDINATES: EAST: 2466257.6724 NORTH: 360877.2226
ELEVATION: SURFACE: 14.45 TOP OF PVC CASING: 17.12

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/3/96	0.0 - 40.0	Cloudy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) The H-Nu is not working properly.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	33
Sch 40, 10-Slot, PVC Screen	1"	33	38

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.1	5	--	(1)	F SAND, some silt, little clay; brown; m. dense;		
2 2.0		55%	5 12 12			damp		
3	S-2	1.0	9 12	--	(1)	dense		
4 4.0		50%	20 20					
5	S-3	1.7	6 6	--	(1)	SILT & CLAY, some f sand; gray		
6 6.0		85%	4 8			w/ orange stains; 5.4 stiff; damp 6.0		
7	S-4	1.8	8 9	--	(1)	F SAND, some silt, little clay; gray w/ orange stains;		
8 8.0		90%	12 13			m dense; moist to wet **Water @ 7.0'** 8.0		
9	S-5	0.9	15 18	--	(1)	F/M SAND, some silt, trace clay; orange; dense; wet		
10 10.0		45%	19 22					
			6			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW09IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW09IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-6	1.3	6	--	(1)	Continued from Sheet 1		
12 12.0		65%	12 15					
13	S-7	2.0	12 13	--	(1)			
14 14.0		100%	12 10			13.6		
15	S-8	1.0	2 2	--	(1)	F SAND, some silt, little clay; gray w/ orange stains;		
16 16.0		50%	3 3			m dense; wet - becoming brown; loose		
17	S-9	1.8	2 3	--	(1)	faint rust-colored laminae		
18 18.0		90%	3 4					
19	S-10	1.4	WOH/12"	--	(1)	v loose		
20 20.0		70%	1 2					
21	S-11	1.7	WOH/18"	--	(1)			
22 22.0		85%	2			22.0		
23	S-12	1.8	WOH 14	--	(1)	SILT, some shell/fossil frag & clay, trace f sand;		
24 24.0		90%	16 24			tan & gray; v stiff; wet		
25	S-13	1.4	7 17	--	(1)	F SAND, some silt, little shell frag, trace clay; gray;		
26 26.0		70%	30 26			dense; moist		
27	S-14	1.4	4 10	--	(1)	SHELL/FOSSIL FRAG, trace f sand & silt; gray;		
28 28.0		70%	17 24			m dense; wet		
29	S-15	0.3	8 12	--	(1)	dense		
30 30.0		15%	20 26					
			10			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW09IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW09IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-16	1.2	11	--	(1)	Continued from Sheet 2		
32 32.0		60%	21 20					
33	S-17	1.4	12 17	--	(1)			
34 34.0		70%	27 32					
35	S-18	1.3	12 15	--	(1)			
36 36.0		65%	20 24					
37	S-19	1.6	22 29	--	(1)	v dense		
38 38.0		80%	42 40			38.0		
39	S-20	1.3	6 11	--	(1)	F SAND, some silt, little clay, trace shell frag; dk green; stiff; moist		
40 40.0		65%	11 10			40.0	40.0	
41						BOH @ 40.0		
42								
43								
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW09IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW10
COORDINATES: EAST: 2466152.5755 NORTH: 360533.9638
ELEVATION: SURFACE: 13.78 TOP OF PVC CASING: 16.14

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/3/96	0.0 - 15.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW10IW for descriptions		5.0
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW10 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW10

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW10 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW10IW
COORDINATES: EAST: 2466154.1863 NORTH: 360537.7338
ELEVATION: SURFACE: 13.78 TOP OF PVC CASING: 14.81

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/3/96	0.0 - 44.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	39
Sch 40, 10-Slot, PVC S	1"	39	44

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.3	2	--	(1)	F SAND, some silt, little clay; brown; loose; damp		
2 2.0		65%	4 4 7					
3 4	A-N	--	--	--	--			
5 5.0						5.0		
6	S-2	1.5	4 6	--	(1)	CLAY, some silt, little f sand; gray w/ orange & red stains - mottled; stiff; damp		
7 7.0		75%	7 7					
8 9	A-N	--	--	--	--			
10 10.0						10.0		
			8			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW10IW SHEET 1 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW10IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	1.7	9	--	(1)	Continued from Sheet 1		
		85%	8			M/C SAND, little silt; orangish-		
12 12.0			6			m dense; wet 11.3		
13	A-N	--	--	--	--	F SAND, some silt, trace clay; dk greenish-gray;		
14						m dense; wet		
15 15.0						15.0		
16	S-4	1.5	5 6	--	(1)	SILT, trace coarse sand &		
		75%	17			clay; dk green; m dense;		
17 17.0			38			damp		
18	A-N	--	--	--	--			
19								
20 20.0								
			27			20.4		
21	S-5	1.5	28	--	(1)	SHELL/FOSSIL FRAG,		
		75%	27			trace silt & clay; gray;		
22 22.0			17			v dense; wet		
23	A-N	--	--	--	--			
24								
25 25.0								
26	S-6	1.4	16 17	--	(1)	little silt & clay; dense		
		70%	20					
27 27.0			20					
28	A-N	--	--	--	--			
29								
30 30.0								
			16			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW10IW SHEET 2 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW10IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.8	18	--	(1)	Continued from Sheet 2		
32 32.0		90%	27 36			trace silt & clay; dense		
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-8	1.5	19 24	--	(1)			
36.5 37		75%	23 22					
38	A-N	--	--	--	--			
39								
40 40.0								
41	S-9	1.4	25 23	--	(1)			
42 42.0		70%	16 8					
43	S-10	1.8	12 19	--	(1)	F SAND, som 43.0		
44 44.0		90%	28 30			silt, trace clay; dk green; dense; moist 44.0		44.0
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW10IW SHEET 3 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356
BORING NO.: 89-TW11
COORDINATES: EAST: 2466374.8568 NORTH: 361184.2110
ELEVATION: SURFACE: 15.15 TOP OF PVC CASING: 17.72

Rig: Diedrich D-50					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
	Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	1-3/8"	--	2-3/4"	--	8/4/96	0.0 - 15.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW11IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 89-TW11 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW11

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 89-TW11 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW11IW
COORDINATES: EAST: 2466378.8263 NORTH: 361182.2455
ELEVATION: SURFACE: 15.25 TOP OF PVC CASING: 17.63

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/4/96	0.0 - 42.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) The H-Nu is not working properly.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	39
Sch 40, 10-Slot, PVC Screen	1"	39	44

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 – 2 (2.0)	S-1	0.8 40%	15 11 7 7	--	(1)	F SAND, little silt & clay; gray; m dense; damp		
3 – 5 (5.0)	A-N	--	--	--	--			
6 – 7 (7.0)	S-2	2.0 100%	6 9 8 7	--	(1)	little silt; gray w/ tan streaks; m dense; wet **Water @ 5.0'**		
8 – 10 (10.0)	A-N	--	--	--	--			
			10			10.0 Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW11IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW11IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	1.8	12	--	(1)	Continued from Sheet 1		
		90%	16			F/M SAND, little silt; gray		
12 12.0			20			w/ tan streaks; m dense;		
13	A-N	--	--	--	--	wet		
14								
15 15.0								
16	S-4	1.4	2	--	(1)	F SAND, little silt & clay;		
		70%	2			gray; v loose; wet		
17 17.0			2					
18	A-N	--	--	--	--			
19								
20 20.0								
21	S-5	2.0	2	--	(1)	some silt, little clay;		
		100%	2			dk green		
22 22.0			2					
23	A-N	--	--	--	--			
24								
25 25.0								
26	S-6	2.0	9	--	(1)	F SAND, little shell/fossil		
		100%	7			frag & silt, trace clay;		
27 27.0			20			gray; m dense; moist		
28	A-N	--	31	--	--			
29			--					
30 30.0								
			17			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW11IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW11IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	2.0 100%	20 26 33	--	(1)	Continued from Sheet 2 SHELL/FOSSIL FRAG, little silt, trace clay; gray; dense; wet		
32 32.0								
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-8	1.3 65%	20 23 26 30	--	(1)			
36.5 37								
38	A-N	--	--	--	--			
39								
40 40.0						40.0		
41	S-9	1.0 50%	6 13 14 15	--	(1)	F SAND, some silt, little clay; dk green; m dense; moist		
42 42.0						42.0		42.0
43						BOH @ 42.0'		
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW11IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW12
COORDINATES: EAST: 2465345.2237 NORTH: 360043.8209
ELEVATION: SURFACE: 11.98 TOP OF PVC CASING: 13.62

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/4/96	0.0 - 10.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Scr	1"	5	10

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
5	A-N	--	--	--	--	Refer to the log for well 89-TW12IW for descriptions	5.0	
10	10.0					10.0	10.0	
						BOH @ 10.0'		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW12 SHEET 1 OF 1

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW12IW
COORDINATES: EAST: 2465346.3291 NORTH: 360047.0289
ELEVATION: SURFACE: 11.68 TOP OF PVC CASING: 13.35

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/4/96	0.0 - 47.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) The H-Nu is not working properly.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	42
Sch 40, 10-Slot, PVC Screen	1"	42	47

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 – 2 – 2.0	S-1	1.8 90%	4 5 7 10	--	(1)	F SAND, little silt, trace coal frag; brown & gray m dense; damp		
3 – 4 – 5 – 5.0	A-N	--	--	--	--			
6 – 7 – 7.0	S-2	1.6 80%	3 2 3 2	--	(1)	F SAND, some silt, trace clay; gray to dk gray; loose; wet		
8 – 9 – 10 – 10.0	A-N	--	--	--	--			
			5			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW12IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW12IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	1.4	1	--	(1)	Continued from Sheet 1		
		70%	1			CLAY, little silt, trace f		
12 12.0			2			sand; dk gray; v soft; moist		
13	A-N	--	--	--	--			
14								
15 15.0								
			5					
16	S-4	1.8	8	--	(1)	bluish-gray; v stiff; moist		
		90%	9					
17 17.0			8					
18	A-N	--	--	--	--			
19								
20 20.0						20.0		
	S-5	0.1	23	--	(1)	LIMESTONE FRAG		
21 20.3		13%	50/3"					
22	A-N	--	--	--	--			
23								
24								
25 25.0								
			25					
26	S-6	1.7	15	--	(1)	SHELL/FOSSIL FRAG,		
		85%	19			little silt & clay; lt gray;		
27 27.0			31			dense; wet		
28	A-N	--	--	--	--			
29								
30 30.0								
			23			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW12IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW12IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.3 65%	28 30 39	--	(1)	Continued from Sheet 2 little m/c sand, trace silt & clay; v dense		
32 32.0								
33 A-N	--	--	--	--				
34								
35 35.0								
36 S-8	1.3 65%	23 30 31 30	--	(1)	trace silt & clay			
36.5 37								
38 A-N	--	--	--	--				
39								
40 40.0								
41 S-9	1.4 70%	19 25 31 34	--	(1)	little silt & clay			
42 42.0								
43 A-N	--	--	--	--				
44								
45 45.0						45.0		
46 S-10	1.0 50%	2 2 3 6	--	(1)	F/M SAND, little silt, trace clay; dk green;			
47 47.0						loose; wet 47.0		47.0
48						BOH @ 47.0'		
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW12IW SHEET 3 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW13
COORDINATES: EAST: 2466032.3238 NORTH: 360223.9067
ELEVATION: SURFACE: 13.28 TOP OF PVC CASING: 14.00

Rig: Diedrich D-50	Split Spoon	Casing	uger	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4	--	8/5/96	0.0 - 20.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	9
Sch 40, 10-Slot, PVC Screen	1"	9	19

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW13IW for descriptions		
6								
7								
8								
9								9.0
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW13 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW13

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15								
16								
17								
18								
19							19.5	
20	20.0					20.0	20.0	
21						BOH @ 20.0'		
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW13 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW13IW
COORDINATES: EAST: 2466029.9917 NORTH: 360219.0120
ELEVATION: SURFACE: 13.18 TOP OF PVC CASING: 14.29

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/4/96	0.0 - 47.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) The H-Nu is not working properly.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	39
Sch 40, 10-Slot, PVC Screen	1"	39	44

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 – 2 (2.0)	S-1	1.3 65%	9 11 11 14	--	(1)	SILT, little f sand & clay; brown; m dense; damp		
3 – 5 (5.0)	A-N	--	--	--	--			
6 – 7 (7.0)	S-2	1.1 55%	11 12 10 12	--	(1)			
8 – 10 (10.0)	A-N	--	--	--	--			
			2			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW13IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW13IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	1.3 65%	3 3 8	--	(1)	Continued from Sheet 1 F SAND, little silt, trace clay & gravel; dk gray to gray; loose; wet **Water @ 11.5'**		
12 12.0								
13	A-N	--	--	--	--			
14								
15 15.0						15.0		
16	S-4	1.5 75%	3 3 3 9	--	(1)	F/M SAND, little silt, layer of clay & organic matter; dk gray; loose; wet		
17 17.0								
18	A-N	--	--	--	--			
19								
20 20.0						20.0		
21	S-5	1.0 71%	26 31 50/4"	--	(1)	SHELL/FOSSIL FRAG, trace silt & clay; gray; v dense; moist to wet		
21.4								
22	A-N	--	--	--	--			
23								
24								
25 25.0								
26	S-6	1.7 85%	20 22 28 20	--	(1)	wet		
27 27.0								
28	A-N	--	--	--	--			
29								
30 30.0								
			22			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW13IW SHEET 2 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW13IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.5 75%	24 25 23	--	(1)	Continued from Sheet 2 smaller frag; dense		
32 32.0								
33 A-N	--	--	--	--				
34								
35 35.0								
36 S-8	2.0 100%	31 23 33 38	--	(1)	F/M SAND, little silt, trace shell frag; gray; v dense; wet			
37 37.0								
38 A-N	--	--	--	--				
39								
40 40.0								
41 S-9	1.1 55%	27 30 30 41	--	(1)	SHELL/FOSSIL FRAG, trace silt & clay; lt gray; v dense; wet			
42 42.0								
43 A-N	--	--	--	--				
44								
45 45.0						45.0		
46 S-10	1.0 50%	17 20 24 25	--	(1)	F SAND, little silt, trace clay; dk green; dense; moist to wet			
47 47.0						47.0		47.0
48						BOH @ 47.0'		
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW13IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW15
COORDINATES: EAST: 2465529.2568 NORTH: 360827.5487
ELEVATION: SURFACE: 16.21 TOP OF PVC CASING: 17.47

Rig: Diedrich D-50					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
	Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	1-3/8"	--	2-3/4"	--	8/6/96	0.0 - 15.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

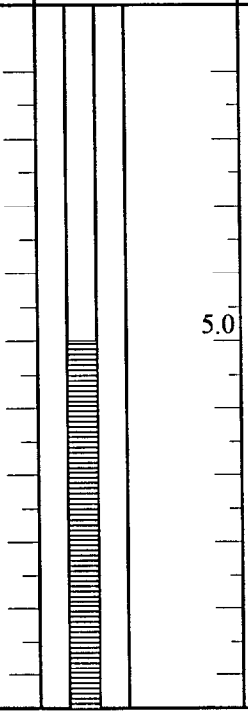
Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW15IW for descriptions		5.0
6								
7								
8								
9								
10						Match to Sheet 2		



DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW15 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW15

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW15 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356
BORING NO.: 89-TW15IW
COORDINATES: EAST: 2465533.4588 NORTH: 360828.1723
ELEVATION: SURFACE: 16.25 TOP OF PVC CASING: 16.70

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel
Size (ID)	1-3/8"	--	2-3/4"	--
Length	2'	--	5'	--
Type	Stainless	--	HSA	--
Hammer Wt.	140 #	--	--	--
Fall	30"	--	--	--
Stickup	--	--	--	--

Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
8/6/96	0.0 - 47.0	P Sunny, 80s	--	--

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	39.5
Sch 40, 10-Slot, PVC Screen	1"	39.5	44.5

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5 5.0	A-N	--	--	--	--			
6 7 7.0	S-1	2.0 100%	6 8 7 7	--	0.4 0.4	F SAND, little silt & clay; brown; m dense; damp 6.1		
8 9 10 10.0	A-N	--	--	--	--	F SAND, trace silt; brown; m dense; damp to wet **Water @ 7.0'**		
			4			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 89-TW15IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW15IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.4	8	--	0.4	Continued from Sheet 1		
12 12.0		70%	8 9		0.4	brown & gray layering		
13 14 15 15.0	A-N	--	--	--	--			
16	S-3	1.4	4 5	--	0.3	F/M SAND, trace silt & c sand; brown & gray layers; m dense; wet 16.6		
17 17.0		70%	6 7		0.3			
18 19 20 20.0	A-N	--	--	--	--	SILT, some clay; dk gray; stiff; moist		
21	S-4	1.5	3 4	--	0.2	M/C SAND & SHELL		
22 22.0		75%	5 7		0.2	FRAG, little silt & clay; dk gray; loose; wet		
23 24 25 25.0	A-N	--	--	--	--			
26	S-5	1.6	21 40	--	0.2	F SAND, little shell/fossil		
27 27.0		80%	32 37		0.2	frag & silt, trace clay; lt gray; v dense; moist		
28 29 30 30.0	A-N	--	--	--	--			
			10			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW15IW SHEET 2 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW15IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.8	17	--	0.2	Continued from Sheet 2		
		90%	32		0.2	SHELL/FOSSIL FRAG,		
32 32.0			30			little f sand & silt, trace		
33						clay; gray; dense; wet		
	A-N	--	--	--	--			
34								
35 35.0								
36	S-7	1.3	16 20	--	0.2	trace silt & clay		
		65%	21		0.2			
37 37.0			26					
38								
	A-N	--	--	--	--			
39								
40 40.0								
41	S-8	1.3	18 23	--	0.2	SHELL/FOSSIL FRAG,		
		65%	25		0.2	trace silt & clay; lt gray;		
42 42.0			30			v dense; wet		
43								
	A-N	--	--	--	--			
44								
45 45.0								
46	S-9	1.5	8 9	--	0.2	F SAND		
		75%	10		0.2	little silt, trace		
47 47.0			12			clay; dk green; 46.8		
						m dense; moist		47.0
						BOH @ 47.0' 47.0		
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW15IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW16
COORDINATES: EAST: 2465688.9912 NORTH: 360537.9058
ELEVATION: SURFACE: 15.02 TOP OF PVC CASING: 17.02

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/6/96	0.0 - 15.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Samp.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW16IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW16 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW16

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW16 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW16IW
COORDINATES: EAST: 2465689.5175 NORTH: 360542.2647
ELEVATION: SURFACE: 15.46 TOP OF PVC CASING: 15.46

Rig: Diedrich D-50					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
	Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	1-3/8"	--	2-3/4"	--	8/6/96	0.0 - 47.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	40
Sch 40, 10-Slot, PVC Screen	1"	40	45

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5	A-N	--	--	--	--			
5.0						F SAND, little silt & clay; brown; m dense; damp		
6	S-1	2.0	7 7	--	0.2	6.2		
7		100%	9 12		0.2	F/M SAND, trace silt & clay; brown & gray layers; m dense; moist		
8 9 10	A-N	--	--	--	--			
10.0			10			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW16IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW16IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.8	12	--	0.1	Continued from Sheet 1		
		90%	14		0.1	11.4		
12 12.0			17			M/C SAND, trace gravel & silt; brown; m dense; wet		
13	A-N	--	--	--	--			
14								
15 15.0								
16	S-3	2.0	6 9	--	0.1			
		100%	18		0.1	16.5		
17 17.0			34					
18	A-N	--	--	--	--	F SAND, some silt, trace clay; orange; m dense; wet		
19								
20 20.0						20.0		
21	S-4	1.8	5 7	--	0.1	F SAND, some silt, little clay; green; dense; moist		
		90%	42		0.1	21.5		
22 21.9			50/.4					
23	A-N	--	--	--	--	SHELL/FOSSIL FRAG, trace silt & clay; gray; v dense; wet		
24								
25 25.0								
26	S-5	1.2	8 9	--	0.1	some f sand & silt, trace clay		
		60%	12		0.1			
27 27.0			25					
28	A-N	--	--	--	--			
29								
30 30.0								
			12			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW16IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW16IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	2.0	24	--	0.1	Continued from Sheet 2		
32 32.0		100%	18 21		0.1	trace silt & clay; dense		
33 34 35 35.0	A-N	--	--	--	--			
36	S-7	1.2	12 18	--	0.1			
37 37.0		60%	17 22		0.1			
38 39 40 40.0	A-N	--	--	--	--			
41	S-8	1.1	15 16	--	0.1	little silt & clay		
42 42.0		55%	20 18		0.1			
43 44 45 45.0	A-N	--	--	--	--	45.0		
46	S-9	2.0	4 5	--	0.1	F SAND, little silt, trace		
47 47.0		100%	12 13		0.1	clay; dk green; m dense moist 47.0		47.0
48 49 50						BOH @ 47.0'		

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 89-TW16IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW17IW
COORDINATES: EAST: Not Recorded NORTH: Not Recorded
ELEVATION: SURFACE: Not Recorded TOP OF PVC CASING: Not Recorded

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/7/96	0.0 - 42.0	Cloudy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	40
Sch 40, 10-Slot, PVC Screen	1"	40	45

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5 5.0	A-N	--	--	--	--			
6 7 7.0	S-1	1.5 75%	5 7 11 13	--	--	F SAND, little silt, trace clay; brown & dk gray layers; m dense; moist		
8 9 10 10.0	A-N	--	--	--	--			
			4			10.0 Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW17IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW17IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	0.9	7	--	--	Continued from Sheet 1		
12 12.0		45%	8 11			F/M SAND, some silt, trace clay w/ gray clayey laminae; orange; m dense; wet		
13 14 15 15.0	A-N	--	--	--	--			
16 17 17.0	S-3	1.7 85%	WOT/ 24"	--	--	SILT, trace clay; dk green; v soft; wet		
18 19 20 20.0	A-N	--	--	--	--			
21 22 21.9	S-4	2.0 100%	WOH WOH 1 2	--	--	F SAND , some silt, trace clay; dk green; v loose; wet; yellow stain @ 21' w/ a solvent odor		
23 24 25 25.0	A-N	--	--	--	--			
26 27 27.0	S-5	2.0 100%	7 14 19 31	--	0.1 0.1	SHELL/FOSSIL FRAG, little silt, trace clay; lt gray; dense; wet		
28 29 30 30.0	A-N	--	--	--	--			
			32			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW17IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW17IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.4	34	--	--	Continued from Sheet 2		
		70%	41			trace silt & clay; v dense		
32 32.0			47					
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-7	1.0	19 21	--	0.1	dense		
		50%	18		0.1			
37 37.0			29					
38	A-N	--	--	--	--			
39								
40 40.0						40.0		
41	S-8	1.2	18 22	--	--	F SAND, little silt, trace		
		60%	21			clay; dk green; dense;		
42 42.0			23			moist 42.0		42.0
43						BOH @ 42.0'		
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW17IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW18
COORDINATES: EAST: 2466351.5606 NORTH: 360162.9034
ELEVATION: SURFACE: 15.19 TOP OF PVC CASING: 17.11

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/12/96	0.0 - 15.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
5	A-N	--	--	--	--	Refer to the log for well 89-TW18IW for descriptions	5.0	

Match to Sheet 2

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW18 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW18

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW18 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW18IW
COORDINATES: EAST: 2466350.7386 NORTH: 360166.0466
ELEVATION: SURFACE: 14.89 TOP OF PVC CASING: 15.04

Rig: Diedrich D-50					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
	Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	1-3/8"	--	2-3/4"	--	8/12/96	0.0 - 47.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) The H-Nu was not used due to rainy conditions.

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	40
Sch 40, 10-Slot, PVC Screen	1"	40	45

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5 5.0	A-N	--	--	--	--			
6 7 7.0	S-1	2.0 100%	6 9 13 15	--	(1)	F SAND, little silt & clay (less clay w/ depth); gray w/ orange laminae; m dense; damp		
8 9 10 10.0	A-N	--	--	--	--			
			10			10.0 Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW18IW SHEET 1 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW18IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.4	14	--	(1)	Continued from Sheet 1		
12 12.0		70%	17 22			F SAND, trace silt; tan; wet 11.5		
13 14 15 15.0	A-N	--	--	--	--	F/M SAND, trace c sand & silt; tan & gray w/ orange stains; dense; wet 15.0		
16 17 17.0	S-3	2.0 100%	5 12 17 23	--	(1)	F SAND, some silt, little clay; dk gray; m dense; moist		
18 19 20 20.0	A-N	--	--	--	--			
21 21.4	S-4	1.4 100%	10 18 50.4	--	(1)	trace shell frag; v dense; green; damp		
22 23 24 25 25.0	A-N	--	--	--	--	25.0		
26 27 27.0	S-5	2.0 100%	10 13 29 43	--	(1)	F SAND, some silt, little shell frag & clay; lt gray; dense; moist		
28 29 30 30.0	A-N	--	--	--	--	30.0		
			9			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 89-TW18IW

Baker
Baker Environmental

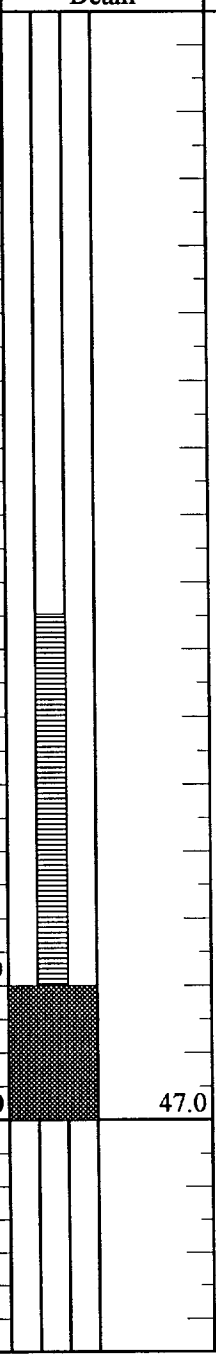
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW18IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	2.0 100%	18 46 39	--	(1)	Continued from Sheet 2 SHELL/FOSSIL FRAG, little silt & clay; lt gray; v dense; wet		
32 32.0								
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-7	1.4 70%	18 22 29 25	--	(1)	trace silt & clay		
37 37.0								
38	A-N	--	--	--	--			
39								
40 40.0								
41	S-8	1.4 70%	12 18 29 28	--	(1)	dense		
42 42.0								
43	A-N	--	--	--	--			
44								
45 45.0						45.0		
46	S-9	1.0 50%	12 13 23 27		(1)	F SAND, little silt, trace clay; green; dense; moist		
47 47.0						47.0		47.0
48						BOH @ 47.0'		
49								
50								



DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW18IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW19
COORDINATES: EAST: 2466593.8840 NORTH: 361111.0922
ELEVATION: SURFACE: 15.67 TOP OF PVC CASING: 17.59

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/13/96	0.0 - 15.0	Rainy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW19IW for descriptions		5.0
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW19 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW19

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW19 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT:	Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune			
CTO NO.:	62470-356		BORING NO.:	89-TW19IW
COORDINATES:	EAST:	2466592.2966	NORTH:	361109.1421
ELEVATION:	SURFACE:	15.47	TOP OF PVC CASING:	17.71

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/13/96	0.0 - 42.0	Rainy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) Due to wet conditions, the H-Nu was not used.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	35
Sch 40, 10-Slot, PVC Screen	1"	35	40

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5	A-N	--	--	--	--	F SAND, little silt & clay; gray; m dense; damp		
5.0								
6	S-1	2.0 100%	3 5 5 5	--	(1)	F SAND, little silt & clay; tan; loose; moist 6.2		
7						F SAND, trace silt; tan; loose; wet		
7.0						**Water @ 6.2'**		
8 9 10	A-N	--	--	--	--			
10.0						10.0		
			WOH			Match to Sheet 2		

DRILLING CO.:	Parratt - Wolff	BAKER REP.:	Mark DeJohn
DRILLER:	Chip Lafever	BORING NO.:	89-TW19IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW19IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.2	1	--	(1)	Continued from Sheet 1		
12 12.0		60%	2 2			CLAY, little f sand & silt; mottled, gray & ogange; soft; moist		
13 14 15 15.0	A-N	--	--	--	--			
			WOH/12"			15.4		
16 17 17.0	S-3	2.0 100%	1 1	--	(1)	F SAND, little silt & clay; gray w/ orange stains; v loose; wet		
18 19 20 20.0	A-N	--	--	--	--			
			WOH/12"					
21 22 22.0	S-4	2.0 100%	1 1	--	(1)	some silt, trace clay; green; v loose; wet		
23 24 25 25.0	A-N	--	--	--	--			
			6			25.0 F/M SAND, little silt, trace		
26 27 27.0	S-5	1.8 90%	12 8 13	--	(1)	clay; brown; m dense; wet 26.4 F SAND, some shell/fossil frag,trace clay; lt gray; m dense; moist to wet		
28 29 30 30.0	A-N	--	--	--	--			
			6			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW19IW SHEET 2 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW19IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.2	12	--	(1)	Continued from Sheet 2		
32 32.0		60%	27 33			dense		
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-7	0.8	10 11	--	(1)	SHELL/FOSSIL FRAG,		
36.5 37		40%	12 14			trace silt; lt gray; dense; wet		
38	A-N	--	--	--	--			
39								
40 40.0						40.0		
41	S-8	1.2	9 7	--	(1)	F SAND, little silt & clay;		
42 42.0		60%	9 12			green; m dense; danp 42.0		42.0
43						BOH @ 42.0'		
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW19IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW20
COORDINATES: EAST: 2466377.5510 NORTH: 360685.1148
ELEVATION: SURFACE: 17.92 TOP OF PVC CASING: 20.34

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/13/96	0.0 - 15.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW20IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW20 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW20

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW20 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW20IW
COORDINATES: EAST: 2466380.6062 NORTH: 360683.9715
ELEVATION: SURFACE: 17.56 TOP OF PVC CASING: 20.84

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/13/96	0.0 - 47.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) Due to wet conditions, the H-Nu was not used.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	40
Sch 40, 10-Slot, PVC Screen	1"	40	45

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5 5.0	A-N	--	--	--	--			
6 7 7.0	S-1	2.0 100%	5 6 7 7	--	(1)	F SAND, trace silt; tan w/ brown laminae; m dense; damp		
8 9 10 10.0	A-N	--	--	--	--			
			4			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW20IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW20IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.4	4	--	(1)	Continued from Sheet 1		
		70%	2			gray; wet 11.5		
12 12.0			2			**Water @ 10'**		
13	A-N	--	--	--	--	CLAY, some f sand & silt; mottled, gray, orange & red; m stiff, damp		
14								
15 15.0						15.0		
16	S-3	1.3	1	--	(1)	CLAY, little silt, trace organic debris; dk brown; soft; moist		
		65%	2					
17 17.0			2					
18	A-N	--	--	--	--			
19								
20 20.0						20.0		
21	S-4	1.5	WOH/12"	--	(1)	F SAND, little silt, trace clay & shell frag; green; v loose; moist		
		75%	3					
22 22.0			6					
23	A-N	--	--	--	--			
24								
25 25.0						25.0		
26	S-5	1.5	16	--	(1)	F SAND, little silt & shell/ fossil frag, trace clay; gray; dense; moist		
		75%	18					
27 27.0			20					
28	A-N	--	26	--	--			
29								
30 30.0								
			18			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW20IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW20IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.4	22	--	(1)	Continued from Sheet 2		
		70%	26			lt brown		
32 32.0			38					
33	A-N	--	--	--	--			
34								
35 35.0								
			12					
36	S-7	1.7	14	--	(1)	SHELL/FOSSIL FRAG,		
36.5		85%	11			trace silt; lt brown; m		
37			12			dense; wet		
38								
39								
40 40.0								
			10					
41	S-8	1.4	12	--	(1)			
		70%	14					
42 42.0			16					
43	A-N	--	--	--	--			
44								
45 45.0						45.0		
			3					
46	S-9	2.0	4	--	(1)	F SAND, little silt, trace		
		100%	8			clay; green; m dense;		
47 47.0			12			moist 47.0		47.0
48						BOH @ 47.0'		
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW20IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW21
COORDINATES: EAST: 2466756.7352 NORTH: 361031.9153
ELEVATION: SURFACE: 16.17 TOP OF PVC CASING: 18.36

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/14/96	0.0 - 15.0	M Cloudy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	4
Sch 40, 10-Slot, PVC Screen	1"	4	14

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4							4.0	
5	A-N	--	--	--	--	Refer to the log for well 89-TW21IW for descriptions		
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW21 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW21

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14							14.0	
15	15.0					15.0	15.0	
						BOH @ 15.0'		
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW21 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW21IW
COORDINATES: EAST: 2466758.7395 NORTH: 361028.4733
ELEVATION: SURFACE: 16.27 TOP OF PVC CASING: 18.49

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/14/96	0.0 - 42.0	M Cloudy, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	35
Sch 40, 10-Slot, PVC Screen	1"	35	40

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5 5.0	A-N	--	--	--	--			
6 7 7.0	S-1	1.0 50%	2 3 4 6	--	(1)	F SAND, trace silt; gray; loose; wet		
8 9 10 10.0	A-N	--	--	--	--			
			1			10.0 Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW21IW SHEET 1 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW21IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.8	1	--	(1)	Continued from Sheet 1		
12 12.0		90%	1 1					
13	A-N	--	--	--	--	CLAY, little f sand & silt; grayish-brown; v soft wet		
14 15 15.0								
16	S-3	1.5	WOH/	--	(1)	gray 16.2		
17 17.0		75%	24'			PEAT; dk brown; v soft; moist		
18	A-N	--	--	--	--			
19 20 20.0						20.0		
21	S-4	2.0	3 1	--	(1)	F SAND, some silt, little clay; gray; loose; wet		
22 22.0		100%	4 10					
23	A-N	--	--	--	--			
24 25 25.0						25.0		
26	S-5	0.9	17 22	--	(1)	F SAND, little silt, trace shell frag; lt gray; v dense; damp		
27 27.0		45%	38 46					
28	A-N	--	--	--	--			
29 30 30.0								
			4			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW21IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW21IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.9 95%	14 17 24	--	(1)	Continued from Sheet 2 SHELL/FOSSIL FRAG, some f sand & silt, trace clay; lt gray; dense; moist		
32 32.0								
33 34 35 35.0	A-N	--	--	--	--			
36 36.5 37	S-7	1.1 55%	14 16 22 23	--	(1)	wet; petroleum odor noted		
38 39 40 40.0	A-N	--	--	--	--	40.0		
41	S-8	2.0 100%	4 5 6 7	--	(1)	F SAND, little silt & clay green; m dense; moist		
42 42.0						42.0		42.0
43 44 45 46 47 48 49 50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW21IW SHEET 3 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW22
COORDINATES: EAST: 2466581.2895 NORTH: 360630.3235
ELEVATION: SURFACE: 18.12 TOP OF PVC CASING: 20.97

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/15/96	0.0 - 15.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 89-TW22IW for descriptions		5.0
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW22 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune

CTO NO.: 62470-356 BORING NO.: 89-TW22

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	15.0	
						BOH @ 15.0'		
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn

DRILLER: Chip Lafever BORING NO.: 89-TW22 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356
BORING NO.: 89-TW22IW
COORDINATES: EAST: 2466585.5999
NORTH: 360629.2373
ELEVATION: SURFACE: 18.12
TOP OF PVC CASING: 20.69

Rig: CME - 850	Split Spoon	Casing	Augers	Core Barrel
Size (ID)	1-3/8"	--	2-3/4"	--
Length	2'	--	5'	--
Type	Stainless	--	HSA	--
Hammer Wt.	140 #	--	--	--
Fall	30"	--	--	--
Stickup	--	--	--	--

Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
8/15/96	0.0 - 47.0	P Sunny, 70s	--	--

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	40
Sch 40, 10-Slot, PVC Screen	1"	40	45

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5	A-N	--	--	--	--			
5.0 6 7	S-1	1.1 55%	5 6 8 9	--	(1)	F SAND, trace silt; brown & gray layers; m dense; damp		
8 9 10	A-N	--	--	--	--			
10.0			2			10.0 Match to Sheet 2		

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 89-TW22IW

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW22IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.0	6	--	(1)	Continued from Sheet 1		
		50%	6			CLAY, trace silt; 11.7		
12 12.0			4			brown & gray; stiff; moist		
13	A-N	--	--	--	--	F SAND, little silt, trace		
14						clay & c sand; brown &		
15 15.0						gray; m dense; wet 15.0		
16	S-3	2.0	2	--	(1)	CLAY, little f sand & silt;		
		100%	2			gray; soft; wet 16.3		
17 17.0			3			CLAY, some organic matter,		
18	A-N	--	--	--	--	trace silt; dk brown; soft;		
19						wet		
20 20.0						20.0		
21	S-4	0.5	4	--	(1)	F SAND, little silt; dk gray;		
		25%	2			loose; wet		
22 22.0			1					
23	A-N	--	--	--	--			
24								
25 25.0						25.0		
26	S-5	1.8	12	--	(1)	F SAND, some silt, trace		
		90%	27			clay; lt greenish-gray; 26.1		
27 27.0			43			v dense; moist		
28	A-N	--	50	--	--	SHELL/FOSSIL FRAG,		
29			--			trace silt; lt gray; v dense;		
30 30.0						wet		
			11			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW22IW SHEET 2 OF 3

Baker
Baker Environmental

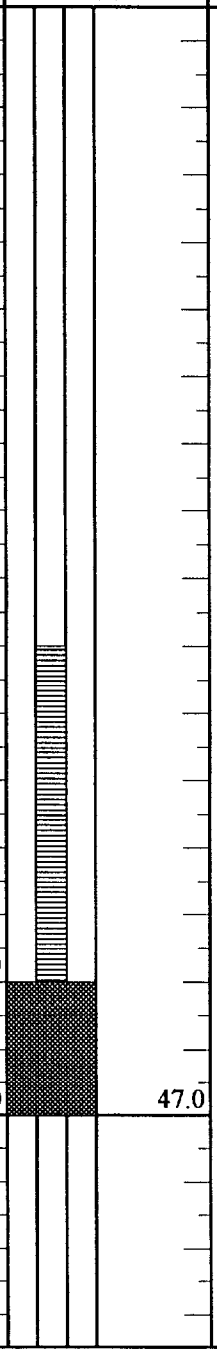
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW22IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	2.0	11	--	(1)	Continued from Sheet 2		
32 32.0		100%	23 26			F SAND, some shell/fossil frag & silt, trace clay; lt gray; dense; moist		
33 34 35 35.0	A-N	--	--	--	--			
36 37 37.0	S-7	2.0 100%	12 12 13 14	--	(1)	SHELL/FOSSIL FRAG, little silt, trace clay; lt gray; m dense; wet		
38 39 40 40.0	A-N	--	--	--	--			
41 42 42.0	S-8	2.0 100%	13 17 29 41	--	(1)			
43 44 45 45.0	A-N	--	--	--	--			
46 47 47.0	S-9	1.8 90%	1 3 5 8	--	(1)	F SAND, little silt & clay green; loose; moist		
48 49 50						BOH @ 47.0'		



DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW22IW SHEET 3 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW23IW
COORDINATES: EAST: 2467096.3354 NORTH: 360800.1531
ELEVATION: SURFACE: 12.10 TOP OF PVC CASING: 15.39

Rig: CME - 850									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/19/96	0.0 - 37.0	M Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	30
Sch 40, 10-Slot, PVC Screen	1"	30	35

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5	A-N	--	--	--	--			
5.0								
6 7	S-1	1.1 55%	3 4 5 8	--	--	F SAND, trace silt; brown & gray laminae; loose; damp		
7.0								
8 9 10	A-N	--	--	--	--			
10.0			3			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW23IW SHEET 1 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW23IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.8	2	--	--	Continued from Sheet 1		
		90%	1			gray w/ orange stains;		
12 12.0			2			v loose; wet		
13	A-N	--	--	--	--			
14								
15 15.0								
16	S-3	2.0	WOH/ 12"	--	--	brown w/ orange stains		
		100%	1					
17 17.0			1					
18	A-N	--	--	--	--			
19								
20 20.0								
21	S-4	1.7	1	--	--	trace clay; brown & orange laminae		
		85%	1					
22 22.0			2			21.8		
23	A-N	--	--	--	--	F SAND, little silt; dk green; v soft; wet		
24								
25 25.0						25.0		
26	S-5	2.0	8 10	--	--	F SAND, little shell/fossil		
		100%	12			frag, silt & clay; lt gray;		
27 27.0			15			m dense; moist		
28	A-N	--	--	--	--			
29								
30 30.0								
			15			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW23IW SHEET 2 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 89-TW23IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.1 55%	17 16	--	--	Continued from Sheet 2		
32 32.0			15			SHELL/FOSSIL FRAG, trace silt & clay; lt gray; dense; wet		
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-7	--	12 12 13	--	--			
37 37.0			14			36.8 37.0 F SAND, some silt, tr. clay; lt greenish-gray; dense; damp		37.0
38						BOH @ 37.0'		
39								
40								
41								
42								
43								
44								
45								
46								
47								
48								
49								
50								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 89-TW23IW SHEET 3 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW01
COORDINATES: EAST: 2464824.5095 NORTH: 360193.8725
ELEVATION: SURFACE: 14.44 TOP OF PVC CASING: 16.48

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/29/96	0.0 - 15.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
5	A-N	--	--	--	--	Refer to the log for well 93-TW01IW for descriptions	5.0	
						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW01 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW01

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW01 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune

CTO NO.: 62470-356 BORING NO.: 93-TW01IW

COORDINATES: EAST: 2464819.6049 NORTH: 306193.9619

ELEVATION: SURFACE: 14.54 TOP OF PVC CASING: 16.70

Rig: Diedrich D-50									
	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/29/96	0.0 - 54.0.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	48.5
Sch 40, 10-Slot, PVC Scre	1"	48.5	53.5

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.0	9	--	--	F SAND, some silt, coal		
		50%	13			& concrete; brown;		
2			11			m dense; moist		
2.0			11					
3	S-2	0.5	6	--	--	F SAND; lt gray; m dense;		
		25%	6			moist		
4			2					
4.0						4.0		
5	S-3	1.8	2	--	--	F SAND & SILT; lt gray &		
		90%	3			brown; m stiff; wet		
6			3			**Water @ 4.5'**		
6.0								
7	S-4	2.0	4	--	--	little wood & clay laminae;		
		100%	6			lt gray; stiff		
8			5					
8.0			5					
9	S-5	2.0	2	--	--	little wood; m stiff		
		100%	3					
10			4					
10.0			6			10.0		
			2			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic

DRILLER: Chip Lafever BORING NO.: 93-TW01IW SHEET 1 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW01IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11		2.0	4	--	--	Continued from Sheet 1		
	S-6	100%	4			F SAND, trace silt; lt gray;		
12 12.0			5			loose; wet		
			4					
13	S-7	2.0	5	--	--			
		100%	4					
14 14.0			6					
			1					
15	S-8	1.8	WOH/	--	--	trace m/c sand & silt		
		90%	18"					
16 16.0								
			2					
17	S-9	1.8	2	--	--	F/M SAND, trace c sand;		
		90%	2			lt gray; loose; wet		
18 18.0			3					
			2					
19	S-10	1.0	1	--	--	M SAND, little shell frag,		
		50%	2			trace c sand; lt gray;		
20 20.0			2			v loose; wet 20.0		
			4					
21	S-11	1.0	6	--	--	F SAND & SILT; lt gray to		
		50%	18			lt green; m dense; 21.7		
22 22.0			30					
			12					
23	S-12	2.0	22	--	--	F/C SAND, little shell/		
		100%	30			fossil frag; lt gray; v dense;		
24 24.0			39			wet		
			18					
25	S-13	2.0	20	--	--	SHELL/FOSSIL FRAG &		
		100%	29			F SAND, trace silt; dense		
26 26.0			41					
			20					
27	S-14	2.0	26	--	--	SHELL/FOSSIL FRAG,		
		100%	38			trace f sand; v dense		
28 28.0			33					
			13					
29	S-15	2.0	10	--	--	little f sand; dense		
		100%	21					
30 30.0			25					
			4			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW01IW SHEET 2 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW01IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-16	2.0	10	--	--	Continued from Sheet 2		
		100%	16					
32 32.0			18					
			16					
33	S-17	2.0	18	--	--	some f sand, little silt;		
		100%	10			m dense		
34 34.0			17					
			22					
35	S-18	2.0	20	--	--	F SAND & LIMESTONE		
		100%	23			FRAG, little shell frag		
36 36.0			26					
			28					
37	S-19	2.0	47	--	--	F SAND, little shell frag;		
		100%	40			v dense		
38 38.0			43					
			50					
39	S-20	2.0	22	--	--	M SAND & LIMESTONE		
		100%	20			FRAG; dense		
40 40.0			19					
40.3	S-21	.3/100	50/3"	--	--	F SAND		
41	A-N	--	--	--	--			
42 42.0								
			4					
43	S-22	1.5	8	--	--	LIMESTONE FRAG, some		
		75%	15			m sand; m dense		
44 44.0			19					
			13					
45	S-23	1.5	56	--	--	F/M SAND, some limestone		
		75%	38			frag; v dense		
46 46.0			24			46.0		
			9					
47	S-24	1.5	17	--	--	F SAND, trace silt; lt gray		
		75%	17			& green; dense; wet		
48 48.0			23					48.5
			8					
49	S-25	1.5	28	--	--	moist to wet		
		75%	16					
50 50.0			17					
			4			Match to Sheet 4		

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW01IW SHEET 3 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW01IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
51	S-26	1.5	10	--	--	Continued from Sheet 3		
		75%	22			some silt; lt green		
52 52.0			25					
			12					
53	S-27	0.6	12	--	--	trace silt		
		30%	31					53.5
54 54.0			49			54.0		54.0
55						BOH @ 54.0'		
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW01IW SHEET 4 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW02
COORDINATES: EAST: 2464754.7088 NORTH: 360592.1715
ELEVATION: SURFACE: 16.59 TOP OF PVC CASING: 18.74

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/30/96	0.0 - 15.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW02IW for descriptions		5.0
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW02 SHEET 1 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW02

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW02 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW02IW
COORDINATES: EAST: 2464759.1998 NORTH: 360592.2665
ELEVATION: SURFACE: 16.69 TOP OF PVC CASING: 18.72

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/30/96	0.0 - 52.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	45
Sch 40, 10-Slot, PVC Scree	1"	45	50

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.1	3	--	0.2	F SAND, little silt; dk		
2 2.0		55%	9 9 12		0.2	brown; m dense; damp		
3	S-2	2.0	1 3	--	0.2	some clay, trace silt;		
4 4.0		100%	3 5		0.2	brown & gray w/ iron stains; m stiff; moist		
5	S-3	1.2	1 1	--	0.2	little to some clay, trace silt;		
6 6.0		60%	1 1		0.2	mottled brown & gray; v soft; wet		
7	S-4	2.0	2 2	--	0.2	**Water @ 4.0'**		
8 8.0		100%	2 3		0.2			
9	S-5	1.2	2 2	--	0.2			
10 10.0		60%	4 5		0.2			
			1			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW02IW SHEET 1 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW02IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11		0.9	2	--	0.2	Continued from Sheet 1		
	S-6	45%	7		0.2	little to some silt, trace		
12	12.0		7			clay; gray; loose		
13	S-7	--	--	--	--			
14	14.0							
			2					
15	S-8	2.0	5	--	0.2	little to some silt & clay;		
		100%	7		0.2	stiff		
16	16.0		13					
			4					
17	S-9	2.0	5	--	0.2	little silt		
		100%	7		0.2	17.6		
18	18.0		16					
			2			M/C SAND, trace silt;		
19	S-10	2.0	2	--	0.2	orange; loose; wet		
		100%	2		0.2	19.5		
20	20.0		6					
			2					
21	S-11	0.5	2	--	0.2	F SAND, some silt, trace		
		25%	2		0.2	clay; dk gray; soft; wet		
22	22.0		5					
			1					
23	S-12	0.9	1	--	0.2	little silt; v soft		
		45%	1		0.2			
24	24.0		1			24.0		
			11					
25	S-13	1.2	7	--	0.2	SILT, some f sand, trace		
		60%	7		0.2	shell frag & clay; lt gray;		
26	26.0		10			stiff; damp 26.0		
			2					
27	S-14	2.0	12	--	0.2	F SAND, some shell/fossil		
		100%	41		0.2	frag, little silt, trace clay;		
28	28.0		50/.3			lt gray; v dense; damp		
			11					
29	S-15	2.0	16	--	0.2	m dense; moist to wet		
		100%	11		0.2			
30	30.0		32					
			13			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW02IW SHEET 2 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW02IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31		S-16	1.2	20	--	0.2	Continued from Sheet 2		
			60%	25		0.2	dense; moist		
32	32.0			25					
				4					
33		S-17	1.4	13	--	0.2	SHELL/FOSSIL FRAG,		
			70%	11		0.2	little f sand & silt, trace		
34	34.0			24			clay; lt gray; m dense		
				5					
35		S-18	2.0	18	--	0.2	F SAND, some shell/fossil		
			100%	23		0.2	frag, little silt; gray; dense;		
36	36.0			38			moist to wet		
				15					
37		S-19	2.0	17	--	0.2	wet		
			100%	19		0.2			
38	38.0			26					
				20					
39		S-20	0.8	26	--	0.2	v dense		
			40%	29		0.2			
40	40.0			25					
		S-21	0.8	28		0.2	F SAND, little silt; gray;		
41	41.0		100%	50/.3		0.2	v dense; wet		
		A-N	--	--	--	--			
42	42.0								
				26					
43		S-22	2.0	28	--	0.2	F/M SAND, little silt;		
			100%	24		0.2	gray; v dense; wet		
44	44.0			30					
				14					
45		S-23	2.0	24	--	0.2			45.0
			100%	28		0.2			
46	46.0			32					
				17					
47		S-24	2.0	25	--	0.2	F SAND, little silt, trace		
			100%	27		0.2	shell frag, m sand & clay;		
48	48.0			23			gray; v dense; wet		
				8					
49		S-25	2.0	9		0.2	little silt, trace shell frag &		
			100%	16		0.2	clay; m dense		
50	50.0			27					50.0
				7			Match to Sheet 4		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW02IW SHEET 3 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW02IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
51		S-26	2.0	16	--	0.2	Continued from Sheet 3		
			100%	33		0.2	51.3		
52	52.0			37			F SAND, some silt, trace shell frag & clay; greenish-gray; dense; damp to moist 52.0		52.0
53							BOH@ 52.0'		
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW02IW SHEET 4 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW03
COORDINATES: EAST: 2464683.8832 NORTH: 361203.1455
ELEVATION: SURFACE: 13.08 TOP OF PVC CASING: 15.93

Rig: Diedrich D-50					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
	Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	1-3/8"	--	2-3/4"	--	7/30/96	0.0 - 15.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	4.5
Sch 40, 10-Slot, PVC Screen	1"	4.5	14.5

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW03IW for descriptions		
6							4.5	
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW03 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW03

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	14.5 15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW03 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW03IW
COORDINATES: EAST: 2464686.6361 NORTH: 361205.3081
ELEVATION: SURFACE: 12.98 TOP OF PVC CASING: 14.74

Rig: Diedrich D-50					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
	Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	1-3/8"	--	2-3/4"	--	7/30/96	0.0 - 54.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	45
Sch 40, 10-Slot, PVC Screen	1"	45	50

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	2.0	2	--	0.1	F SAND, some silt, trace		
		100%	4		0.1	clay; black, brown & gray		
2 2.0			6 6			layers; m dense; damp		
3	S-2	1.1	4 7	--	0.1	some silt, little clay; moist		
		55%	6		0.1	moist		
4 4.0			7					
5	S-3	1.3	1 2	--	0.1	some organic matter;		
		65%	2		0.1	black; loose; wet		
6 6.0			3			**Water @ 4.0'**		
7	S-4	1.0	5 5	--	0.1	little silt & clay; dk green		
		50%	4		0.1			
8 8.0			4					
9	S-5	2.0	WOT/	--	0.1	little silt & clay, trace		
		100%	24"		0.1	c sand; v loose		
10 10.0								
			4			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW03IW SHEET 1 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW03IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11		1.8	8	--	0.1	Continued from Sheet 1		
	S-6	90%	10		0.1	some silt, trace shell frag;		
12 12.0			12			m dense; moist		
			6					
13	S-7	1.4	7	--	0.1			
		70%	9		0.1			
14 14.0			13					
			4					
15	S-8	2.0	6	--	0.1	some silt, trace shell frag &		
		100%	6		0.1	clay; greenish-gray		
16 16.0			13			16.0		
			4					
17	S-9	1.3	16	--	0.1	SHELL/LIMESTONE FRAG,		
		65%	28		0.1	trace f sand & silt; lt		
18 18.0			38			gray; dense; wet		
			13					
19	S-10	1.0	20	--	0.1			
		50%	16		0.1			
20 20.0			20					
			12					
21	S-11	1.3	33	--	0.1	some f sand		
		65%	14		0.1			
22 22.0			15					
			21					
23	S-12	2.0	32	--	0.1	23.2		
		100%	45		0.1	SILT, some f sand, little		
24 24.0			46			clay & shell frag; 24.0		
			20			lt gray; hard; damp		
25	S-13	1.3	24	--	0.1			
		65%	28		0.1	F SAND & SHELL FRAG,		
26 26.0			30			some silt, trace clay;		
			25			gray; v dense; wet		
27	S-14	2.0	27	--	0.1			
		100%	45		0.1			
28 28.0			46					
			14					
29	S-15	1.1	17	--	0.1	dense		
		55%	20		0.1			
30 30.0			40					
			27			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW03IW SHEET 2 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW03IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-16	1.9	28	--	0.1	Continued from Sheet 2		
		95%	21		0.1			
32 32.0			24					
			22					
33	S-17	1.3	25	--	--	SHELL/FOSSIL FRAG,		
		65%	26			little f sand & silt; v dense		
34 34.0			33					
			27					
35	S-18	1.2	29	--	--	F SAND, some shell/fossil		
		60%	22			frag, little silt		
36 36.0			24					
			24					
37	S-19	1.2	24	--	--			
		60%	30					
38 38.0			42					
			28					
39	S-20	2.0	17	--	--	some silt,little shell/fossil		
		100%	22			frag; dense		
40 40.0			31					
			28					
41	S-21	1.0	21	--				
		50%	21					
42 42.0			34					
			15					
43	S-22	1.3	20	--	--	some shell/fossil frag,		
		65%	50			little silt		
44 44.0			48					
45								45.0
46								
47	A-N	--	--	--	--			
48								
49								
50 50.0								50.0
			15			Match to Sheet 4		

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW03IW SHEET 3 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW03IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
51	S-23	1.1 55%	16 30 30	--	--	Continued from Sheet 3		
52 52.0								
53	S-24	1.2 60%	--	--	--			
54 54.0						54.0	54.0	
55						BOH @ 54.0'		
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Parratt - Wolff BAKER REP.: Jeff Tepsic
DRILLER: Chip Lafever BORING NO.: 93-TW03IW SHEET 4 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW05
COORDINATES: EAST: 2464903.9975 NORTH: 359726.9448
ELEVATION: SURFACE: 16.58 TOP OF PVC CASING: 19.72

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel
Size (ID)	1-3/8"	--	2-3/4"	--
Length	2'	--	5'	--
Type	Stainless	--	HSA	--
Hammer Wt.	140 #	--	--	--
Fall	30"	--	--	--
Stickup	--	--	--	--

Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
7/31/96	0.0 - 15.0	M.cloudy, 90s	--	--

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW05IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW05 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW05

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15 15.0						15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW05 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW05IW
COORDINATES: EAST: 2464893.2027 NORTH: 359725.9103
ELEVATION: SURFACE: 16.68 TOP OF PVC CASING: 18.88

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	7/31/96	0.0 - 52.0	M Cloudy, 90s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	45
Sch 40, 10-Slot, PVC Screen	1"	45	50

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 2.0	S-1	1.2 60%	3 8 4 2	--	0.1 0.1	F SAND, some silt, trace clay; brown & black; m dense; damp		
3 4 5 5.0	A-N	--	--	--	--	5.0		
6 7 7.0	S-2	1.6 80%	2 2 2 2	--	0.1 0.1	CLAY, some f sand & silt; gray; m stiff; moist 6.4		
8 9 10 10.0	A-N	--	--	--	--	M/C SAND, some silt & clay; gray; m stiff; wet **Water @ 6.5** 10.0		
			5			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW05IW SHEET 1 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW05IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	2.0	7	--	0.1	Continued from Sheet 1		
		100%	9		0.1			
12 12.0			12			SILT, some clay; dk gray;		
13	A-N	--	--	--	--	v stiff; damp		
14								
15 15.0								
16	S-4	2.0	10	--	0.1			
		100%	11		0.1			
17 17.0			12					
			14					
18	A-N	--	--	--	--			
19								
20 20.0								
21	S-5	2.0	3	--	0.1	some clay, trace f sand		
		100%	7		0.1			
22 22.0			9					
			11					
23	A-N	--	--	--	--			
24								
25 25.0						25.0		
26	S-6	1.3	3	--	0.1	SHELL/FOSSIL FRAG,		
		65%	29		0.1	trace silt & clay; gray;		
27 27.0			25			v dense; wet		
			36					
28	A-N	--	--	--	--			
29								
30 30.0								
			6			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW05IW SHEET 2 OF 4

Baker
Baker Environmental

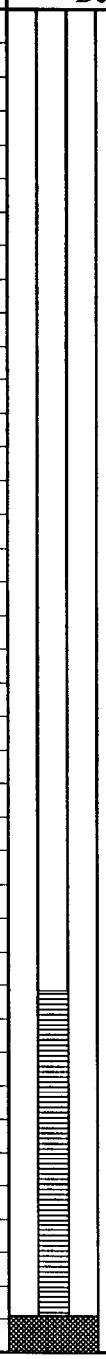
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW05IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.4	33	--	0.1	Continued from Sheet 2		
		70%	36		0.1	little silt & clay		
32 32.0			37					
33	A-N	--	--	--	--			
34								
35 35.0								
36	S-8	1.2	8 31	--	0.1	some silt, little clay		
		60%	38		0.1			
37 37.0			30					
38	A-N	--	--	--	--			
39								
40 40.0								
41	S-9	0.9	17 18	--	0.1	trace silt & clay; dense		
		45%	22		0.1			
42 42.0			24					
43	A-N	--	--	--	--			
44								
45 45.0								
46	S-10	1.2	24 28	--	0.1	v dense		
		60%	31		0.1			
47 47.0			37					
48	A-N	--	--	--	--			
49								
50 50.0								
			24			Match to Sheet 4		



DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW05IW SHEET 3 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW05IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
51	S-11	1.2	32	--	0.1	Continued from Sheet 3		
		60%	27		0.1			
52 52.0			33			52.0	52.0	
53						BOH @ 52.0'		
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW05IW SHEET 4 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356
BORING NO.: 93-TW06
COORDINATES: EAST: 2464470.2932 NORTH: 360233.3393
ELEVATION: SURFACE: 17.72 TOP OF PVC CASING: 19.45

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/1/96	0.0 - 15.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	4.5
Sch 40, 10-Slot, PVC Screen	1"	4.5	14.5

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW06IW for descriptions		
6							4.5	
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 93-TW06

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW06

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14							14.5	
15	15.0					15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW06 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW06IW
COORDINATES: EAST: 2464472.6119 NORTH: 360236.2220
ELEVATION: SURFACE: 17.72 TOP OF PVC CASING: 19.08

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/1/96	0.0 - 52.0	M Cloudy, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) H-Nu not working properly; perhaps due to rainy conditions

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	45
Sch 40, 10-Slot, PVC Screen	1"	45	50

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1 2 3 4 5 5.0	A-N	--	--	--	--	F SAND, little silt, trace clay; damp		
5.5 6 7 7.0	S-1	1 50%	2 2 4 5	--	0.1 0.1	CLAY, some f sand & silt; mottled brown & gray; m stiff; moist		
8 9 10 10.0	A-N	--	--	--	--			
			3			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW06IW SHEET 1 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW06IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-2	1.3	4	--	0.2	Continued from Sheet 1		
		65%	4		0.2	11.4		
12 12.0			6			M/C SAND, little silt; gray; loose; wet		
13	A-N	--	--	--	--	**Water @ 11.5**		
14								
15 15.0								
16	S-3	2.0	16 15	--	0.4	little silt, trace clay		
		100%	14		0.2			
17 17.0			10					
18	A-N	--	--	--	--			
19								
20 20.0								
21	S-4	1.3	5 8	--	0.2			
		65%	9		0.2	21.5		
22 22.0			10			F SAND, some silt, trace clay; dk green; m dense; wet		
23	A-N	--	--	--	--			
24								
25 25.0						25.0		
26	S-5	1.5	22 23	--	0.2	SHELL/FOSSIL FRAG, some silt trace clay; lt gray; v dense; wet		
		75%	28		0.2			
27 27.0			22					
28	A-N	--	--	--	--			
29								
30 30.0								
			12			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW06IW SHEET 2 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW06IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-6	1.4	20	--	0.2	Continued from Sheet 2		
32 32.0		70%	23		0.2	little silt & clay; dense		
			22					
33	A-N	--	--	--	--			
34								
35 35.0								
	S-7	0.9	32	--	0.2	some silt, little clay;		
36		45%	32		0.2	v dense		
37 37.0			34					
			40					
38	A-N	--	--	--	--			
39								
40 40.0								
	S-8	1.3	27	--	(1)	trace silt & clay		
41		65%	27					
42 42.0			26					
			25					
43	A-N	--	--	--	--			
44								
45 45.0								
	S-9	1.3	24	--	(1)	dense		
46		65%	23					
47 47.0			20					
			19					
48	A-N	--	--	--	--			
49								
50 50.0								
			17			Match to Sheet 4		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW06IW SHEET 3 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW06IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
51	S-10	1.4	21	--	(1)	Continued from Sheet 3		
52 52.0		70%	35			v dense		
			35			52.0	52.0	
53						BOH @ 52.0'		
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Parratt - Wolff
DRILLER: Chip Lafever
BAKER REP.: Mark DeJohn
BORING NO.: 93-TW06IW SHEET 4 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW07
COORDINATES: EAST: 2464169.7606 NORTH: 360177.9285
ELEVATION: SURFACE: 17.82 TOP OF PVC CASING: 20.08

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/2/96	0.0 - 15.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	5
Sch 40, 10-Slot, PVC Screen	1"	5	15

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW07IW for descriptions	5.0	
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW07 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW07

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15	15.0					15.0	15.0	
16						BOH @ 15.0'		
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW07 SHEET 2 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW07IW
COORDINATES: EAST: 2464169.6813 NORTH: 360185.7764
ELEVATION: SURFACE: 17.52 TOP OF PVC CASING: 19.87

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/2/96	0.0 - 52.0	P Sunny, 70s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) H-Nu not working properly; perhaps due to rainy conditions

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	45
Sch 40, 10-Slot, PVC Screen	1"	45	50

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.1	6	--	0.1	F SAND, little silt, trace		
2		55%	8 13 17		0.1	clay; brown; m dense; damp		
3	A-N	--	--	--	--			
4								
5 5.0						5.0		
6	S-2	1.4	5	--	0.1	F/C SAND some silt, liitle		
7 7.0		70%	8 13 15		0.1	clay; gray; m dense; wet **Water @ 5.0'**		
8	A-N	--	--	--	--			
9								
10 10.0								
			4			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW07IW SHEET 1 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW07IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-3	0.9	4	--	0.1	Continued from Sheet 1		
		45%	5		0.1			
12 12.0			3			Little silt; loose		
13	A-N	--	--	--	--			
14								
15 15.0								
			17					
16	S-4	1.5	15	--	0.2	dense		
		75%	18		0.2			
17 17.0			21					
18	A-N	--	--	--	--			
19								
20 20.0								
			25					
21	S-5	1.5	19	--	0.2	v dense		
		75%	33		0.2			
22 22.0			39					
23	A-N	--	--	--	--			
24								
25 25.0						25.0		
			2					
26	S-6	2.0	2	--	0.1	F SAND, some silt, trace		
		100%	3		0.1	clay; dk green; loose; wet		
27 27.0			2					
28	A-N	--	--	--	--			
29								
30 30.0								
			WOH			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW07IW SHEET 2 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW07IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.2	WOH	--	0.2	Continued from Sheet 2		
		60%	1		0.2	some silt, little clay; v loose		
32 32.0			2					
33	A-N	--	--	--	--			
34								
35 35.0								
			25			some silt w/ tan clay		
36	S-8	1.5	27	--	0.1	laminae; v dense		
36.5		100%	50/5"		0.1			
37	A-N	--	--	--	--			
38								
39								
40 40.0						40.0		
	S-9	0.5	45	--	0.2	SHELL/FOSSIL FRAG,		
41 41.0		50%	52		0.2	trace silt & clay; gray		
42						v dense; wet		
43	A-N	--	--	--	--			
44								
45 45.0								
	S-10	1.0	34		0.2	F SAND, some shell/fossil		
46 46.0		100%	56		0.2	frag & silt, trace clay;		
47						lt greenish-gray; v dense		
48	A-N	--	--	--	--	wet		
49								
50 50.0								
			15			Match to Sheet 4		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW07IW SHEET 3 OF 4

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW07IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
51	S-11	1.0	17	--	(1)	Continued from Sheet 3		
		50%	18			dense		
52 52.0			18			52.0	52.0	
						BOH @ 52.0'		
53								
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW07IW SHEET 4 OF 4

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW14
COORDINATES: EAST: 2464852.0714 NORTH: 359892.5238
ELEVATION: SURFACE: 15.58 TOP OF PVC CASING: 17.69

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/5/96	0.0 - 25.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks:

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	14.5
Sch 40, 10-Slot, PVC Screen	1"	14.5	24.5

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab. Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1								
2								
3								
4								
5	A-N	--	--	--	--	Refer to the log for well 93-TW14IW for descriptions		
6								
7								
8								
9								
10						Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW14 SHEET 1 OF 2

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW14

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11								
12								
13	A-N	--	--	--	--			
14								
15							14.5	
16								
17								
18								
19								
20								
21								
22								
23								
24								
25	25.0					25.0	24.5 25.0	
26						BOH @ 25.0'		
27								
28								
29								
30								

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW14 SHEET 2 OF 2

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW14IW
COORDINATES: EAST: 24644849.7354 NORTH: 359892.7213
ELEVATION: SURFACE: 15.58 TOP OF PVC CASING: 17.73

Rig: Diedrich D-50	Split Spoon	Casing	Augers	Core Barrel	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)	Time
Size (ID)	1-3/8"	--	2-3/4"	--	8/5/96	0.0 - 47.0	P Sunny, 80s	--	--
Length	2'	--	5'	--					
Type	Stainless	--	HSA	--					
Hammer Wt.	140 #	--	--	--					
Fall	30"	--	--	--					
Stickup	--	--	--	--					

Remarks: Note: (1) The H-Nu is not working properly.

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston
N = No Sample

WELL INFORMATION

Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
Sch 40, PVC Riser	1"	0	45
Sch 40, 10-Slot, PVC Screen	1"	45	50

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.5	2	--	(1)	F SAND, some silt, little clay; brown & gray - mottled; loose; damp		
2 2.0		75%	3 6 5					
3	A-N	--	--	--	--			
4								
5 5.0						5.0		
6	S-2	1.3	2 3	--	(1)	CLAY, little silt, trace f sand; gray & red - mottled; m stiff; damp - becoming some f sand & silt		
7 7.0		65%	4 5					
8	A-N	--	--	--	--			
9								
10 10.0								
			4			Match to Sheet 2		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW14IW SHEET 1 OF 3

Baker
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW14IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11 / 12 / 12.0	S-3	2.0 100%	7 8 15	--	(1)	Continued from Sheet 1 some silt, trace shell frag; dk gray; v stiff; damp		
13 / 14 / 15 / 15.0	A-N	--	--	--	--			
16 / 17 / 17.0	S-4	1.9 95%	5 7 9 14	--	(1)			
18 / 19 / 20 / 20.0	A-N	--	--	--	--			
21 / 22	S-5	2.0 100%	3 6 12 18	--	(1)	20.5 M/C SAND, little silt, trace clay & shell frag; dk gray; m dense; wet **Water @ 20.5'**		
23 / 24 / 25 / 25.0	A-N	--	--	--	--	25.0		
26 / 27 / 26.9	S-6	1.4 70%	12 19 27 50/5"	--	(1)	F SAND some silt, little shell/fossil frag, trace clay; lt gray; dense; moist		
28 / 29 / 30 / 30.0	A-N	--	--	--	--			
			18			Match to Sheet 3		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW14IW SHEET 2 OF 3

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Phase I Investigation at Sites 88, 89, and 93 - MCB Camp Lejeune
CTO NO.: 62470-356 BORING NO.: 93-TW14IW

SAMPLE TYPE
S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison P = Piston N = No Sample

DEFINITIONS
SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector measurement
Lab Class = USCS (ASTM D2487)

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab Class.	PID (ppm)	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
31	S-7	1.4	26	--	(1)	Continued from Sheet 2		
32 32.0		70%	23 39			SHELL/FOSSIL FRAG, trace silt & clay; lt gray; dense; wet		
33 34 35 35.0	A-N	--	--	--	--			
36 36.5 37	S-8	1.3 65%	14 14 21 21	--	(1)	smaller frag, little silt & clay		
38 39 40 40.0	A-N	--	--	--	--			
41 42 42.0	S-9	1.5 75%	27 39 43 47	--	(1)	v dense		
43 44 45 45.0	A-N	--	--	--	--			
46 47 47.0	S-10	1.1 55%	28 39 45 47	--	(1)	larger frag		
48 49 50 50.0	A-N	--	--	--	--		50.0	50.0
						BOH @ 50.0'		

DRILLING CO.: Parratt - Wolff BAKER REP.: Mark DeJohn
DRILLER: Chip Lafever BORING NO.: 93-TW14IW SHEET 3 OF 3

APPENDIX B
CHAIN-OF-CUSTODY RECORDS

WESTON Analytics Use Only

0056-002

Custody Transfer Record/Lab Work Request

WESTON MANAGERS / DESIGNERS / CONSULTANTS

Client BAKER ENVIRONMENTAL INC.
Est. Final Proj. Sampling Date 8/21/96
Work Order #
Project Contact/Phone # M. Bartman/412-269-2053
AD Project Manager D. Woltman
QC ____ Del ____ TAT ____
Date Rec'd ____ Date Due ____
Account # ____

Refrigerator #
#/Type Container — Liquid / Solid
Volume — Liquid / Solid
Preservatives
ANALYSES REQUESTED →

		ORGANIC								INORG								
		VOA	BNA	Pest/PCB	Herb					Metal	CN	Total Organic Carbon	Grain Size			Number of bottles	Turnaround (days)
Liquid																		
Solid																		
Liquid																		
Solid																		
Preservatives																		

MATRIX CODES: S - Soil; SE - Sediment; SO - Solid; SL - Sludge; W - Water; O - Oil; A - Air; DS - Drum Solids; DL - Drum Liquids; L - EP/TCLP Leachate; WI - Wipe; X - Other; F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected 1996	Time Collected	WESTON Analytics Use Only												
	89-TB02			W	7/27	1520	X											2	35
	89-EC-RS01			W	7/27	1130	X	X					X					5	35
	89-EC-SW01			W	7/27	0915	X	X					X					5	35
	89-EC-SW02			W	7/27	0845	X	X					X					5	35
	89-EC-SW03			W	7/27	0815	X	X					X					5	35
	89-EC-SD01-06			SE	7/27	0955	X	X					X		X	X		3	35
	89-EC-SD02-612			SE	7/27	0955	X	X					X		X	X		3	35
	89-EC-SD02-06			SE	7/27	0855	X	X					X		X	X		3	35
	89-EC-SD02-612			SE	7/27	0855	X	X					X		X	X		3	35
	89-EC-SD03-06			SE	7/27	0820	X	X					X		X	X		3	35

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

DATE/REVISIONS:
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

Special Instructions:
89-EC-RS01 = Stainless Steel Sampling Spoon

FED-EX Airbill # 1369799001

Relinquished by	Received by	Date	Time
JPT	FED-EX	7/27/96	1500

Relinquished by	Received by	Date	Time

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # ____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N

Ø356-ØØ2

WESTON Analytics Use Only

Custody Transfer Record/Lab Work Request

WESTON MANAGERS DESIGNERS/CONSULTANTS

Client BAKER ENVIRONMENTAL, INC

Est. Final Proj. Sampling Date 8/21/96

Work Order #

Project Contact/Phone # M. Bartman / 412-269-2053

AD Project Manager D. Woltman

QC ______ Del ______ TAT ______

Date Rec'd ______ Date Due ______

Account # ______

Refrigerator #

#/Type Container: Liquid / Solid

Volume: Liquid / Solid

Preservatives

ANALYSES REQUESTED →

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected 1996	Time Collected	ORGANIC VOA	BNA	Pest/PCB	Herb					INORG Metal	CN	Total Organic Carbon	Grain Size			Number of bottles	Temp upon Receipt (Deg C)
	89-EC-SDØ3-612			SE	7/27	Ø820	X	X							X		X	X			3	35

WESTON Analytics Use Only

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

FED-EX Airbill # 1369799001

DATE/REVISIONS:
1. ______
2. ______
3. ______
4. ______
5. ______
6. ______

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
JPT	FED-EX	7/27/96	1500				

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # ______
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N

WESTON Analytics Use Only

0356-001

Custody Transfer Record/Lab Work Request

WESTON MANAGERS / DESIGNERS / CONSULTANTS

Page 1 of 1

Client BAKER ENVIRONMENTAL, INC.
Est. Final Proj. Sampling Date 8/2/96
Work Order #
Project Contact/Phone # D. Woltman
AD Project Manager M. Bartman/412 269-2053
QC ____ Del ____ TAT ____
Date Rec'd ____ Date Due ____
Account # ____

Refrigerator #

#/Type Container	Liquid	
	Solid	
Volume	Liquid	
	Solid	
Preservatives		

ANALYSES REQUESTED →

ORGANIC: VOA | BNA | Pest/PCB | Herb
INORG: Metal | CN
Total Organic Carbon | Grain Size | No. of Bottles | Turnaround (Days)

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected 1996	Time Collected	WESTON Analytics Use Only													
	89-EC-SD05-06	X	X	SE	7/26	1020	X	X	X				X		X	X		5	7/26 RST	35
	89-EC-SD05-612	X	X	SE	7/26	1020	X	X	X				X		X	X		5	7	35
	89-EC-SD05-060			SE	7/26	1020	X	X	X				X		X				2	35
	89-EC-SD05-612D			SE	7/26	1020	X	X	X				X		X				2	35
	89-EC-SD04-06			SE	7/26	1225	X	X					X		X	X			3	35
	89-EC-SD04-612			SE	7/26	1225	X	X					X		X	X			3	35
	89-EC-SW05	X	X	W	7/26	1000	X	X	X				X						2	35
	89-EC-SW05D			W	7/26	1000	X	X	X				X						7	35
	89-EC-SW04			W	7/26	1245	X	X					X						5	35
	89-TB01			W	7/25	1520	X													

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:
Fed-Ex Airbill # 1369798990
SAMPLE # 89-EC-SW05 MS/MSD
89-EC-SD05-06 " "
89-EC-SD05-612
* CONFIRM WITH MATT BARTMAN CONCERNING TOC BEING PERFORMED ON DUPLICATE SEDIMENT SAMPLE.

DATE/REVISIONS:
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___ Airbill # ____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

Relinquished by	Received by	Date	Time
JPT	FED-EX	7/26/96	1800

Relinquished by	Received by	Date	Time

RFW 21-21-001/A-7/91 ____ L372 ____ L373 ____ L375 ____ L377 ____ L378 Ref# ____ Cooler# ____ 381-596a

WESTON Analytics Use Only

Custody Transfer Record/Lab Work Request

0356-004

Page 1 of 1

Client BAKER

Est. Final Proj. Sampling Date

Work Order # 356

Project Contact/Phone # MATT BARTMAN

AD Project Manager

QC ____ Del ____ TAT ____

Date Rec'd ____ Date Due ____

Account #

Refrigerator #

#/Type Container: Liquid / Solid

Volume: Liquid / Solid

Preservatives

ANALYSES REQUESTED →

ORGANIC: VOA | BNA | Pest/PCB | Herb

INORG: Metal | CN

WESTON Analytics Use Only

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	VOA	BNA	Pest/PCB	Herb	Metal	CN
	93-TW01-01			W	8/6/96	0750	X					
	93-TW02IW-01			W	8/6/96	0825	X					
	93-TW07-01			W	8/6/96	0910	X					
	89-TW08-01			W	8/6/96	0940	X					
	93-TW07IW-01			W	8/6/96	1800	X					
	89-TW09-01			W	8/7/96	0820	X					
	89-TW09IW-01			W	8/7/96	0845	X					
	TB-03			W	8/7/96	0845	X					
	89_TW17IW-01			W	8/7/96	1045	X					

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

FedEx Airbill # 136979907/

DATE/REVISIONS:

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # ____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

Relinquished by	Received by	Date	Time
Lisa Monday	FED-EX	8/7/96	1600

Relinquished by	Received by	Date	Time

RFW 21-21-001/A-7/91

____ L372 ____ L373 ____ L375 ____ L377 ____ L378 Ref# ____ Cooler# ____

381-596a

WESTON Analytics Use Only

356-005

Custody Transfer Record/Lab Work Request

WESTON MANAGERS DESIGNERS CONSULTANTS

Page 1 of 1

Client RAKER ENVIRONMENTAL, INC.
Est. Final Proj. Sampling Date 8/30/96
Work Order #
Project Contact/Phone # M. Bartman / 412-269-2053
AD Project Manager D. Woltman
QC ____ Del ____ TAT ____
Date Rec'd ____ Date Due ____
Account #

Refrigerator #

#/Type Container	Liquid																		
	Solid																		
Volume	Liquid																		
	Solid																		
Preservatives																			

ANALYSES REQUESTED →

	ORGANIC							INORG											
	VOA	BNA	Pest/PCB	Herb	PCB's	TCLP, Flash Point, Reac. Cy, Reac. Sulfide		Metal	CN										No. of bottles
89-BOX01-01					X	X													4
89-TNK01-01	X	X	X					X											3
89-TB03	X																		2

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected 1996	Time Collected
	89-BOX01-01			S	8/16	1230
	89-TNK01-01			W	8/16	1315
	89-TB03			W	7/12	1320

WESTON Analytics Use Only

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

DATE/REVISIONS:
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____

Special Instructions:
89-BOX01-01 2 4oz. soils for extra vol.
89-TNK01-01 1 1 liter amber for extra vol.
Fed-Ex Airbill # 136979908 2

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # ____
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N

COC Record Present Upon Sample Rec't Y or N

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

Relinquished by	Received by	Date	Time
J.P.T.	FED-EX	8/16/96	1800

Relinquished by	Received by	Date	Time

RFW 21-21-001/A-7/91 ____ L372 ____ L373 ____ L375 ____ L377 ____ L378 Ref# ____ Cooler# ____ 381-596a

APPENDIX C
LABORATORY DATA

ENGINEERING DATA SUMMARY
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD05-06	89-EC-SD05-612	89-EC-SD04-06	89-EC-SD04-612	89-EC-SD01-06
DATE SAMPLED	07/26/96	07/26/96	07/26/96	07/26/96	07/27/96
WET CHEMISTRY					
TOTAL ORGANIC CARBON (%)	0.17	0.22	0.59	3.4	1.3

ENGINEERING DATA SUMMARY
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD02-612	89-EC-SD02-612	89-EC-SD02-06	89-EC-SD03-06	89-EC-SD03-612
DATE SAMPLED	07/27/96	07/27/96	07/27/96	07/27/96	07/27/96
WET CHEMISTRY					
TOTAL ORGANIC CARBON (%)	1.5	0.8	1.2	0.83	0.27

DUPLICATE SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SW05D
LAB ID	9607G440-008
DATE SAMPLED	07/26/96
UNITS	UG/L
VOLATILES	
CHLOROMETHANE	10 U
BROMOMETHANE	10 U
VINYL CHLORIDE	10 U
CHLOROETHANE	10 U
METHYLENE CHLORIDE	10 U
ACETONE	10 UJ
CARBON DISULFIDE	10 U
1,1-DICHLOROETHENE	10 U
1,1-DICHLOROETHANE	10 U
1,2-DICHLOROETHENE (TOTAL)	73
CHLOROFORM	10 U
1,2-DICHLOROETHANE	10 U
2-BUTANONE	10 UJ
1,1,1-TRICHLOROETHANE	10 U
CARBON TETRACHLORIDE	10 U
BROMODICHLOROMETHANE	10 U
1,2-DICHLOROPROPANE	10 U
CIS-1,3-DICHLOROPROPENE	10 U
TRICHLOROETHENE	24
DIBROMOCHLOROMETHANE	10 U
1,1,2-TRICHLOROETHANE	10 U
BENZENE	10 U
TRANS-1,3-DICHLOROPROPENE	10 U
BROMOFORM	10 U
4-METHYL-2-PENTANONE	10 UJ
2-HEXANONE	10 UJ
TETRACHLOROETHENE	10 U
1,1,2,2-TETRACHLOROETHANE	79
TOLUENE	10 U
CHLOROBENZENE	10 U
ETHYLBENZENE	10 U
STYRENE	10 U
XYLENE (TOTAL)	10 U

DUPLICATE SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SW05D	
LAB ID	9607G440-008	
DATE SAMPLED	07/26/96	
UNITS	UG/L	
SEMIVOLATILES		
PHENOL	11	U
BIS(2-CHLOROETHYL)ETHER	11	U
2-CHLOROPHENOL	11	U
1,3-DICHLOROBENZENE	11	U
1,4-DICHLOROBENZENE	11	U
1,2-DICHLOROBENZENE	11	U
2-METHYLPHENOL	11	U
2,2'-OXYBIS(1-CHLOROPROPANE)	11	U
4-METHYLPHENOL	11	U
N-NITROSO-DI-N-PROPYLAMINE	11	U
HEXACHLOROETHANE	11	U
NITROBENZENE	11	U
ISOPHORONE	11	U
2-NITROPHENOL	11	UJ
2,4-DIMETHYLPHENOL	11	U
BIS(2-CHLOROETHOXY)METHANE	11	U
2,4-DICHLOROPHENOL	11	U
1,2,4-TRICHLOROBENZENE	11	U
NAPHTHALENE	11	U
4-CHLOROANILINE	11	U
HEXACHLOROBUTADIENE	11	U
4-CHLORO-3-METHYLPHENOL	11	U
2-METHYLNAPHTHALENE	11	U
HEXACHLOROCYCLOPENTADIENE	11	U
2,4,6-TRICHLOROPHENOL	11	U
2,4,5-TRICHLOROPHENOL	27	U
2-CHLORONAPHTHALENE	11	U
2-NITROANILINE	27	U
DIMETHYLPHTHALATE	11	U
ACENAPHTHYLENE	11	U
2,6-DINITROTOLUENE	11	U
3-NITROANILINE	27	U
ACENAPHTHENE	11	U

DUPLICATE SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SW05D	
LAB ID	9607G440-008	
DATE SAMPLED	07/26/96	
UNITS	UG/L	
SEMIVOLATILES (cont)		
2,4-DINITROPHENOL	27	U
4-NITROPHENOL	27	U
DIBENZOFURAN	11	U
2,4-DINITROTOLUENE	11	U
DIETHYLPHTHALATE	11	U
4-CHLOROPHENYL-PHENYLETHER	11	U
FLUORENE	11	U
4-NITROANILINE	27	UJ
4,6-DINITRO-2-METHYLPHENOL	27	UJ
N-NITROSODIPHENYLAMINE (1)	11	U
4-BROMOPHENYL-PHENYLETHER	11	U
HEXACHLOROBENZENE	11	U
PENTACHLOROPHENOL	27	UJ
PHENANTHRENE	11	U
ANTHRACENE	11	U
CARBAZOLE	11	U
DI-N-BUTYLPHTHALATE	11	U
FLUORANTHENE	11	U
PYRENE	11	U
BUTYLBENZYLPHTHALATE	11	U
3,3'-DICHLOROBENZIDINE	11	UJ
BENZO(A)ANTHRACENE	11	U
CHRYSENE	11	U
BIS(2-ETHYLHEXYL)PHTHALATE	11	U
DI-N-OCTYLPHTHALATE	11	U
BENZO(B)FLUORANTHENE	11	U
BENZO(K)FLUORANTHENE	11	U
BENZO(A)PYRENE	11	U
INDENO(1,2,3-CD)PYRENE	11	U
DIBENZO(A,H)ANTHRACENE	11	U
BENZO(G,H,I)PERYLENE	11	U

DUPLICATE SUMMARY
SURFACE WATER
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SW05D
LAB ID	9607G440-008
DATE SAMPLED	07/26/96
UNITS	UG/L
PESTICIDES/PCBS	
ALPHA-BHC	0.056 UJ
BETA-BHC	0.056 UJ
DELTA-BHC	0.056 UJ
GAMMA-BHC (LINDANE)	0.056 UJ
HEPTACHLOR	0.056 UJ
ALDRIN	0.056 UJ
HEPTACHLOR EPOXIDE	0.056 UJ
ENDOSULFAN I	0.056 UJ
DIELDRIN	0.11 UJ
4,4'-DDE	0.11 UJ
ENDRIN	0.11 UJ
ENDOSULFAN II	0.11 UJ
4,4'-DDD	0.11 UJ
ENDOSULFAN SULFATE	0.11 UJ
4,4'-DDT	0.11 UJ
METHOXYCHLOR	0.56 UJ
ENDRIN KETONE	0.11 UJ
ENDRIN ALDEHYDE	0.11 UJ
ALPHA-CHLORDANE	0.056 UJ
GAMMA-CHLORDANE	0.056 UJ
TOXAPHENE	5.6 UJ
AROCLOR-1016	1.1 UJ
AROCLOR-1221	2.2 UJ
AROCLOR-1232	1.1 UJ
AROCLOR-1242	1.1 UJ
AROCLOR-1248	1.1 UJ
AROCLOR-1254	1.1 UJ
AROCLOR-1260	1.1 UJ

DUPLICATE SUMMARY
SURFACE WATER
INORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SW05D	
LAB ID	9607G440-008	
DATE SAMPLED	07/26/96	
UNITS	UG/L	
TOTAL METALS		
ALUMINUM, TOTAL	294	
ANTIMONY, TOTAL	14.4	U
ARSENIC, TOTAL	1.4	U
BARIUM, TOTAL	20.6	
BERYLLIUM, TOTAL	0.7	U
CADMIUM, TOTAL	2.6	U
CALCIUM, TOTAL	39200	
CHROMIUM, TOTAL	3.3	U
COBALT, TOTAL	3.6	U
COPPER, TOTAL	2.5	
IRON, TOTAL	1250	
LEAD, TOTAL	2	
MAGNESIUM, TOTAL	2330	
MANGANESE, TOTAL	27.8	
MERCURY, TOTAL	0.1	U
NICKEL, TOTAL	8.7	UJ
POTASSIUM, TOTAL	2690	
SELENIUM, TOTAL	1.8	U
SILVER, TOTAL	3.1	U
SODIUM, TOTAL	12000	
THALLIUM, TOTAL	1.5	U
VANADIUM, TOTAL	2.6	
ZINC, TOTAL	12.6	

DUPLICATE SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD05-06D	89-EC-SD05-612D
LAB ID	9607G440-003	9607G440-004
DATE SAMPLED	07/26/96	07/26/96
UNITS	UG/KG	UG/KG
VOLATILES		
CHLOROMETHANE	12 U	12 U
BROMOMETHANE	12 U	12 U
VINYL CHLORIDE	12 U	12 U
CHLOROETHANE	12 U	12 U
METHYLENE CHLORIDE	12 U	12 U
ACETONE	12 UJ	12 UJ
CARBON DISULFIDE	12 UJ	12 UJ
1,1-DICHLOROETHENE	12 UJ	12 UJ
1,1-DICHLOROETHANE	12 U	12 U
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U
CHLOROFORM	12 U	12 U
1,2-DICHLOROETHANE	12 U	12 U
2-BUTANONE	12 UJ	12 UJ
1,1,1-TRICHLOROETHANE	12 U	12 U
CARBON TETRACHLORIDE	12 U	12 U
BROMODICHLOROMETHANE	12 U	12 U
1,2-DICHLOROPROPANE	12 U	12 U
CIS-1,3-DICHLOROPROPENE	12 U	12 U
TRICHLOROETHENE	12 U	12 U
DIBROMOCHLOROMETHANE	12 U	12 U
1,1,2-TRICHLOROETHANE	12 U	12 U
BENZENE	12 U	12 U
TRANS-1,3-DICHLOROPROPENE	12 U	12 U
BROMOFORM	12 UJ	12 UJ
4-METHYL-2-PENTANONE	12 U	12 U
2-HEXANONE	12 U	12 U
TETRACHLOROETHENE	12 U	12 U
1,1,2,2-TETRACHLOROETHANE	12 U	12 U
TOLUENE	12 U	12 U
CHLOROBENZENE	12 U	12 U
ETHYLBENZENE	12 U	12 U
STYRENE	12 U	12 U
XYLENE (TOTAL)	12 U	12 U

DUPLICATE SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD05-06D	89-EC-SD05-612D
LAB ID	9607G440-003	9607G440-004
DATE SAMPLED	07/26/96	07/26/96
UNITS	UG/KG	UG/KG
SEMIVOLATILES		
PHENOL	380 U	410 U
BIS(2-CHLOROETHYL)ETHER	380 U	410 U
2-CHLOROPHENOL	380 U	410 U
1,3-DICHLOROBENZENE	380 U	410 U
1,4-DICHLOROBENZENE	380 U	410 U
1,2-DICHLOROBENZENE	380 U	410 U
2-METHYLPHENOL	380 U	410 U
2,2'-OXYBIS(1-CHLOROPROPANE)	380 U	410 U
4-METHYLPHENOL	380 U	410 U
N-NITROSO-DI-N-PROPYLAMINE	380 U	410 U
HEXACHLOROETHANE	380 U	410 U
NITROBENZENE	380 UJ	410 UJ
ISOPHORONE	380 U	410 U
2-NITROPHENOL	380 U	410 U
2,4-DIMETHYLPHENOL	380 U	410 U
BIS(2-CHLOROETHOXY)METHANE	380 U	410 U
2,4-DICHLOROPHENOL	380 U	410 U
1,2,4-TRICHLOROBENZENE	380 U	410 U
NAPHTHALENE	380 U	410 U
4-CHLOROANILINE	380 U	410 U
HEXACHLOROBUTADIENE	380 U	410 U
4-CHLORO-3-METHYLPHENOL	380 U	410 U
2-METHYLNAPHTHALENE	380 U	410 U
HEXACHLOROCYCLOPENTADIENE	380 U	410 U
2,4,6-TRICHLOROPHENOL	380 U	410 U
2,4,5-TRICHLOROPHENOL	960 U	1000 U
2-CHLORONAPHTHALENE	380 U	410 U
2-NITROANILINE	960 U	1000 U
DIMETHYLPHTHALATE	380 U	410 U
ACENAPHTHYLENE	380 U	410 U
2,6-DINITROTOLUENE	380 U	410 U
3-NITROANILINE	960 UJ	1000 UJ
ACENAPHTHENE	380 U	410 U

DUPLICATE SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD05-06D	89-EC-SD05-612D
LAB ID	9607G440-003	9607G440-004
DATE SAMPLED	07/26/96	07/26/96
UNITS	UG/KG	UG/KG
SEMIVOLATILES (cont)		
2,4-DINITROPHENOL	960 UJ	1000 UJ
4-NITROPHENOL	960 U	1000 U
DIBENZOFURAN	380 U	410 U
2,4-DINITROTOLUENE	380 U	410 U
DIETHYLPHTHALATE	380 U	410 U
4-CHLOROPHENYL-PHENYLETHER	380 U	410 U
FLUORENE	380 U	410 U
4-NITROANILINE	960 U	1000 U
4,6-DINITRO-2-METHYLPHENOL	960 U	1000 U
N-NITROSODIPHENYLAMINE (1)	380 U	410 U
4-BROMOPHENYL-PHENYLETHER	380 U	410 U
HEXACHLOROBENZENE	380 U	410 U
PENTACHLOROPHENOL	960 U	1000 U
PHENANTHRENE	380 U	410 U
ANTHRACENE	380 U	410 U
CARBAZOLE	380 U	410 U
DI-N-BUTYLPHTHALATE	380 U	410 U
FLUORANTHENE	46 J	410 U
PYRENE	56 J	410 U
BUTYLBENZYLPHTHALATE	380 U	410 U
3,3'-DICHLOROBENZIDINE	380 U	410 U
BENZO(A)ANTHRACENE	380 U	410 U
CHRYSENE	380 U	410 U
BIS(2-ETHYLHEXYL)PHTHALATE	110 J	180 J
DI-N-OCTYLPHTHALATE	380 U	410 U
BENZO(B)FLUORANTHENE	380 U	410 U
BENZO(K)FLUORANTHENE	380 U	410 U
BENZO(A)PYRENE	380 U	410 U
INDENO(1,2,3-CD)PYRENE	380 U	410 U
DIBENZO(A,H)ANTHRACENE	380 U	410 U
BENZO(G,H,I)PERYLENE	380 U	410 U

DUPLICATE SUMMARY
SEDIMENT
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD05-06D	89-EC-SD05-612D
LAB ID	9607G440-003	9607G440-004
DATE SAMPLED	07/26/96	07/26/96
UNITS	UG/KG	UG/KG
PESTICIDES/PCBS		
ALPHA-BHC	1.9 U	2 UJ
BETA-BHC	1.9 U	2 UJ
DELTA-BHC	1.9 UJ	2 UJ
GAMMA-BHC (LINDANE)	1.9 U	2 UJ
HEPTACHLOR	1.9 U	2 UJ
ALDRIN	1.9 U	2 UJ
HEPTACHLOR EPOXIDE	1.9 U	2 UJ
ENDOSULFAN I	1.9 U	2 UJ
DIELDRIN	3.8 U	4.1 UJ
4,4'-DDE	23 J	14 J
ENDRIN	3.8 U	4.1 UJ
ENDOSULFAN II	3.8 U	4.1 UJ
4,4'-DDD	39 J	19 J
ENDOSULFAN SULFATE	3.8 U	4.1 UJ
4,4'-DDT	3.4 J	3.3 J
METHOXYCHLOR	19 UJ	20 UJ
ENDRIN KETONE	3.8 U	4.1 UJ
ENDRIN ALDEHYDE	3.8 U	4.1 UJ
ALPHA-CHLORDANE	1.9	2 UJ
GAMMA-CHLORDANE	1.9 J	2 UJ
TOXAPHENE	190 U	200 UJ
AROCLOR-1016	38 U	41 UJ
AROCLOR-1221	76 U	82 UJ
AROCLOR-1232	38 U	41 UJ
AROCLOR-1242	38 U	41 UJ
AROCLOR-1248	38 U	41 UJ
AROCLOR-1254	38 U	41 UJ
AROCLOR-1260	38 U	41 UJ

DUPLICATE SUMMARY
SEDIMENT
INORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-SD05-06D	89-EC-SD05-612D
LAB ID	9607G440-003	9607G440-004
DATE SAMPLED	07/26/96	07/26/96
UNITS	MG/KG	MG/KG
TOTAL METALS		
ALUMINUM, TOTAL	1320 J	893 J
ANTIMONY, TOTAL	2.9 U	3.1 U
ARSENIC, TOTAL	0.24 UJ	0.27
BARIUM, TOTAL	13.7	2.2
BERYLLIUM, TOTAL	0.19	0.15 U
CADMIUM, TOTAL	0.72	0.56 U
CALCIUM, TOTAL	54300 J	179
CHROMIUM, TOTAL	2.9	1.1
COBALT, TOTAL	0.72 U	0.77 U
COPPER, TOTAL	2 U	2 U
IRON, TOTAL	1400 J	711
LEAD, TOTAL	10.1 J	15.5
MAGNESIUM, TOTAL	917	209
MANGANESE, TOTAL	13.7	5.2
MERCURY, TOTAL	0.04 U	0.06 U
NICKEL, TOTAL	1.7 U	1.9 U
POTASSIUM, TOTAL	138 U	148 U
SELENIUM, TOTAL	0.31 U	0.31 U
SILVER, TOTAL	0.62 U	0.67 U
SODIUM, TOTAL	154	683
THALLIUM, TOTAL	0.26 UJ	0.26 UJ
VANADIUM, TOTAL	3.6	2.4
ZINC, TOTAL	22.8	5.9

QA/QC SUMMARY
RINSATE AND TRIP BLANKS
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	89-TB01	89-TB02
LAB ID	9607G440-012	9607G440-010	9607G440-011
DATE SAMPLED	07/27/96	07/26/96	07/27/96
UNITS	UG/L	UG/L	UG/L
VOLATILES			
CHLOROMETHANE	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U
ACETONE	10 UJ	10 UJ	10 UJ
CARBON DISULFIDE	10 U	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U
CHLOROFORM	10 U	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U
2-BUTANONE	10 UJ	10 UJ	10 UJ
1,1,1-TRICHLOROETHANE	10 U	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U
DIBROMOCHLOROMETHANE	10 U	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U
BROMOFORM	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 UJ	10 UJ	10 UJ
2-HEXANONE	10 UJ	10 UJ	10 UJ
TETRACHLOROETHENE	10 U	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 UJ	10 U	10 UJ
TOLUENE	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U
STYRENE	10 U	10 U	10 U
XYLENE (TOTAL)	10 U	10 U	10 U

QA/QC SUMMARY
RINSATE AND TRIP BLANKS
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	89-TB01	89-TB02
LAB ID	9607G440-012	9607G440-010	9607G440-011
DATE SAMPLED	07/27/96	07/26/96	07/27/96
UNITS	UG/L	UG/L	UG/L
SEMIVOLATILES			
PHENOL	12 U	NA	NA
BIS(2-CHLOROETHYL)ETHER	12 U	NA	NA
2-CHLOROPHENOL	12 U	NA	NA
1,3-DICHLOROBENZENE	12 U	NA	NA
1,4-DICHLOROBENZENE	12 U	NA	NA
1,2-DICHLOROBENZENE	12 U	NA	NA
2-METHYLPHENOL	12 U	NA	NA
2,2'-OXYBIS(1-CHLOROPROPANE)	12 U	NA	NA
4-METHYLPHENOL	12 U	NA	NA
N-NITROSO-DI-N-PROPYLAMINE	12 U	NA	NA
HEXACHLOROETHANE	12 U	NA	NA
NITROBENZENE	12 U	NA	NA
ISOPHORONE	12 U	NA	NA
2-NITROPHENOL	12 U	NA	NA
2,4-DIMETHYLPHENOL	12 UJ	NA	NA
BIS(2-CHLOROETHOXY)METHANE	12 U	NA	NA
2,4-DICHLOROPHENOL	12 U	NA	NA
1,2,4-TRICHLOROBENZENE	12 U	NA	NA
NAPHTHALENE	12 U	NA	NA
4-CHLOROANILINE	12 U	NA	NA
HEXACHLOROBUTADIENE	12 U	NA	NA
4-CHLORO-3-METHYLPHENOL	12 U	NA	NA
2-METHYLNAPHTHALENE	12 U	NA	NA
HEXACHLOROCYCLOPENTADIENE	12 U	NA	NA
2,4,6-TRICHLOROPHENOL	12 U	NA	NA
2,4,5-TRICHLOROPHENOL	30 U	NA	NA
2-CHLORONAPHTHALENE	12 U	NA	NA
2-NITROANILINE	30 U	NA	NA
DIMETHYLPHTHALATE	12 U	NA	NA
ACENAPHTHYLENE	12 U	NA	NA
2,6-DINITROTOLUENE	12 U	NA	NA
3-NITROANILINE	30 U	NA	NA
ACENAPHTHENE	12 U	NA	NA

QA/QC SUMMARY
RINSATE AND TRIP BLANKS
ORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	89-TB01	89-TB02
LAB ID	9607G440-012	9607G440-010	9607G440-011
DATE SAMPLED	07/27/96	07/26/96	07/27/96
UNITS	UG/L	UG/L	UG/L
SEMIVOLATILES (cont)			
2,4-DINITROPHENOL	30 U	NA	NA
4-NITROPHENOL	30 U	NA	NA
DIBENZOFURAN	12 U	NA	NA
2,4-DINITROTOLUENE	12 U	NA	NA
DIETHYLPHTHALATE	12 U	NA	NA
4-CHLOROPHENYL-PHENYLETHER	12 U	NA	NA
FLUORENE	12 U	NA	NA
4-NITROANILINE	30 UJ	NA	NA
4,6-DINITRO-2-METHYLPHENOL	30 UJ	NA	NA
N-NITROSODIPHENYLAMINE (1)	12 U	NA	NA
4-BROMOPHENYL-PHENYLETHER	12 U	NA	NA
HEXACHLOROBENZENE	12 U	NA	NA
PENTACHLOROPHENOL	30 UJ	NA	NA
PHENANTHRENE	12 U	NA	NA
ANTHRACENE	12 U	NA	NA
CARBAZOLE	12 U	NA	NA
DI-N-BUTYLPHTHALATE	12 U	NA	NA
FLUORANTHENE	12 U	NA	NA
PYRENE	12 U	NA	NA
BUTYLBENZYLPHTHALATE	12 U	NA	NA
3,3'-DICHLOROBENZIDINE	12 UJ	NA	NA
BENZO(A)ANTHRACENE	12 U	NA	NA
CHRYSENE	12 U	NA	NA
DI-N-OCTYLPHTHALATE	12 U	NA	NA
BENZO(B)FLUORANTHENE	12 U	NA	NA
BENZO(K)FLUORANTHENE	12 U	NA	NA
BENZO(A)PYRENE	12 U	NA	NA
INDENO(1,2,3-CD)PYRENE	12 U	NA	NA
DIBENZO(A,H)ANTHRACENE	12 U	NA	NA
BENZO(G,H,I)PERYLENE	12 U	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	120 R	NA	NA

FIXED BASE QA/QC SUMMARY
RINSATE AND TRIP BLANKS
OPERABLE UNIT NO. 16
SITES 89
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	89-TB01	89-TB02
LAB ID	9607G440-012	9607G440-010	9607G440-011
DATE SAMPLED	07/27/96	07/26/96	07/27/96
UNITS	UG/L	UG/L	UG/L
VOLATILES			
CHLOROMETHANE	10 U	10 U	10 U
BROMOMETHANE	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U
CHLOROETHANE	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U
ACETONE	10 UJ	10 UJ	10 UJ
CARBON DISULFIDE	10 U	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U
CHLOROFORM	10 U	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U
2-BUTANONE	10 UJ	10 UJ	10 UJ
1,1,1-TRICHLOROETHANE	10 U	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U
DIBROMOCHLOROMETHANE	10 U	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U
BROMOFORM	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 UJ	10 UJ	10 UJ
2-HEXANONE	10 UJ	10 UJ	10 UJ
TETRACHLOROETHENE	10 U	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 UJ	10 U	10 UJ
TOLUENE	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U
STYRENE	10 U	10 U	10 U
XYLENE (TOTAL)	10 U	10 U	10 U

FIXED BASE QA/QC SUMMARY
RINSATE AND TRIP BLANKS
OPERABLE UNIT NO. 16
SITES 89
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	89-TB01	89-TB02
LAB ID	9607G440-012	9607G440-010	9607G440-011
DATE SAMPLED	07/27/96	07/26/96	07/27/96
UNITS	UG/L	UG/L	UG/L
SEMIVOLATILES			
PHENOL	12 U	NA	NA
BIS(2-CHLOROETHYL)ETHER	12 U	NA	NA
2-CHLOROPHENOL	12 U	NA	NA
1,3-DICHLOROBENZENE	12 U	NA	NA
1,4-DICHLOROBENZENE	12 U	NA	NA
1,2-DICHLOROBENZENE	12 U	NA	NA
2-METHYLPHENOL	12 U	NA	NA
2,2'-OXYBIS(1-CHLOROPROPANE)	12 U	NA	NA
4-METHYLPHENOL	12 U	NA	NA
N-NITROSO-DI-N-PROPYLAMINE	12 U	NA	NA
HEXACHLOROETHANE	12 U	NA	NA
NITROBENZENE	12 U	NA	NA
ISOPHORONE	12 U	NA	NA
2-NITROPHENOL	12 U	NA	NA
2,4-DIMETHYLPHENOL	12 UJ	NA	NA
BIS(2-CHLOROETHOXY)METHANE	12 U	NA	NA
2,4-DICHLOROPHENOL	12 U	NA	NA
1,2,4-TRICHLOROBENZENE	12 U	NA	NA
NAPHTHALENE	12 U	NA	NA
4-CHLOROANILINE	12 U	NA	NA
HEXACHLOROBUTADIENE	12 U	NA	NA
4-CHLORO-3-METHYLPHENOL	12 U	NA	NA
2-METHYLNAPHTHALENE	12 U	NA	NA
HEXACHLOROCYCLOPENTADIENE	12 U	NA	NA
2,4,6-TRICHLOROPHENOL	12 U	NA	NA
2,4,5-TRICHLOROPHENOL	30 U	NA	NA
2-CHLORONAPHTHALENE	12 U	NA	NA
2-NITROANILINE	30 U	NA	NA
DIMETHYLPHTHALATE	12 U	NA	NA
ACENAPHTHYLENE	12 U	NA	NA
2,6-DINITROTOLUENE	12 U	NA	NA
3-NITROANILINE	30 U	NA	NA
ACENAPHTHENE	12 U	NA	NA
2,4-DINITROPHENOL	30 U	NA	NA

FIXED BASE QA/QC SUMMARY
RINSATE AND TRIP BLANKS
OPERABLE UNIT NO. 16
SITES 89
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	89-TB01	89-TB02
LAB ID	9607G440-012	9607G440-010	9607G440-011
DATE SAMPLED	07/27/96	07/26/96	07/27/96
UNITS	UG/L	UG/L	UG/L
SEMIVOLATILES (cont)			
4-NITROPHENOL	30 U	NA	NA
DIBENZOFURAN	12 U	NA	NA
2,4-DINITROTOLUENE	12 U	NA	NA
DIETHYLPHTHALATE	12 U	NA	NA
4-CHLOROPHENYL-PHENYLETHER	12 U	NA	NA
FLUORENE	12 U	NA	NA
4-NITROANILINE	30 UJ	NA	NA
4,6-DINITRO-2-METHYLPHENOL	30 UJ	NA	NA
N-NITROSODIPHENYLAMINE (1)	12 U	NA	NA
4-BROMOPHENYL-PHENYLETHER	12 U	NA	NA
HEXACHLOROBENZENE	12 U	NA	NA
PENTACHLOROPHENOL	30 UJ	NA	NA
PHENANTHRENE	12 U	NA	NA
ANTHRACENE	12 U	NA	NA
CARBAZOLE	12 U	NA	NA
DI-N-BUTYLPHTHALATE	12 U	NA	NA
FLUORANTHENE	12 U	NA	NA
PYRENE	12 U	NA	NA
BUTYLBENZYLPHTHALATE	12 U	NA	NA
3,3'-DICHLOROBENZIDINE	12 UJ	NA	NA
BENZO(A)ANTHRACENE	12 U	NA	NA
CHRYSENE	12 U	NA	NA
DI-N-OCTYLPHTHALATE	12 U	NA	NA
BENZO(B)FLUORANTHENE	12 U	NA	NA
BENZO(K)FLUORANTHENE	12 U	NA	NA
BENZO(A)PYRENE	12 U	NA	NA
INDENO(1,2,3-CD)PYRENE	12 U	NA	NA
DIBENZO(A,H)ANTHRACENE	12 U	NA	NA
BENZO(G,H,I)PERYLENE	12 U	NA	NA
BIS(2-ETHYLHEXYL)PHTHALATE	120 R	NA	NA

FIXED BASE QA/QC SUMMARY
RINSATE AND TRIP BLANKS
INORGANIC COMPOUNDS
OPERABLE UNIT NO. 16 (SITE 89)
MCB, CAMP LEJEUNE, NORTH CAROLINA
CTO-0356

SAMPLE NO	89-EC-RS01	
LAB ID	9607G440-012	
DATE SAMPLED	07/27/96	
UNITS	UG/L	
TOTAL METALS		
ALUMINUM, TOTAL	25.1	
ANTIMONY, TOTAL	14.4	U
ARSENIC, TOTAL	1.4	U
BARIUM, TOTAL	1.4	U
BERYLLIUM, TOTAL	0.7	U
CADMIUM, TOTAL	2.6	U
CALCIUM, TOTAL	45.9	
CHROMIUM, TOTAL	3.3	U
COBALT, TOTAL	3.6	U
COPPER, TOTAL	2	U
IRON, TOTAL	4.5	U
LEAD, TOTAL	1.2	U
MAGNESIUM, TOTAL	20.8	U
MANGANESE, TOTAL	1.6	U
MERCURY, TOTAL	0.1	U
NICKEL, TOTAL	8.7	UJ
POTASSIUM, TOTAL	690	U
SELENIUM, TOTAL	1.8	U
SILVER, TOTAL	3.1	U
SODIUM, TOTAL	114	
THALLIUM, TOTAL	1.5	U
VANADIUM, TOTAL	2.5	U
ZINC, TOTAL	2.3	U