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LONG-TERM MONITORING WORK PLANS
FOR
REMEDIAL INVESTIGATION SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

DECEMBER 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:

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PREFACE

These plans document the objectives and actions required to comply with the monitoring of Installation Restoration (IR) sites located throughout Marine Corps Base (MCB) Camp Lejeune, North Carolina. Sites for which monitoring has been proposed are presented in Figure P-1. For these sites, the Department of the Navy (DoN), Marine Corps Base Camp Lejeune , USEPA Region IV (USEPA), and North Carolina Department of Environment, Health, and Natural Resources (NC DEHNR) have agreed upon the selected remedial alternative for each site, as stipulated by their respective Record of Decision (ROD) documents. These plans provide the specifications to perform the environmental sampling portion of the long-term monitoring alternative. The specifications for environmental sampling, required as part of the monitoring program, include: frequency of sampling; report findings; sample locations; sample collection methods; and analytical requirements. The data collected during monitoring will be provided to the DoN, Marine Corps Base Camp Lejeune, and regulatory agencies, on a quarterly or semiannual basis as stated in the signed ROD for each site. In addition to the modifications and revisions to the monitoring plan for each of the sites will be provided and implemented based on regulator approval. The plans provided in this document will be subject to revision during the period of performance, prior to five year regulatory review.

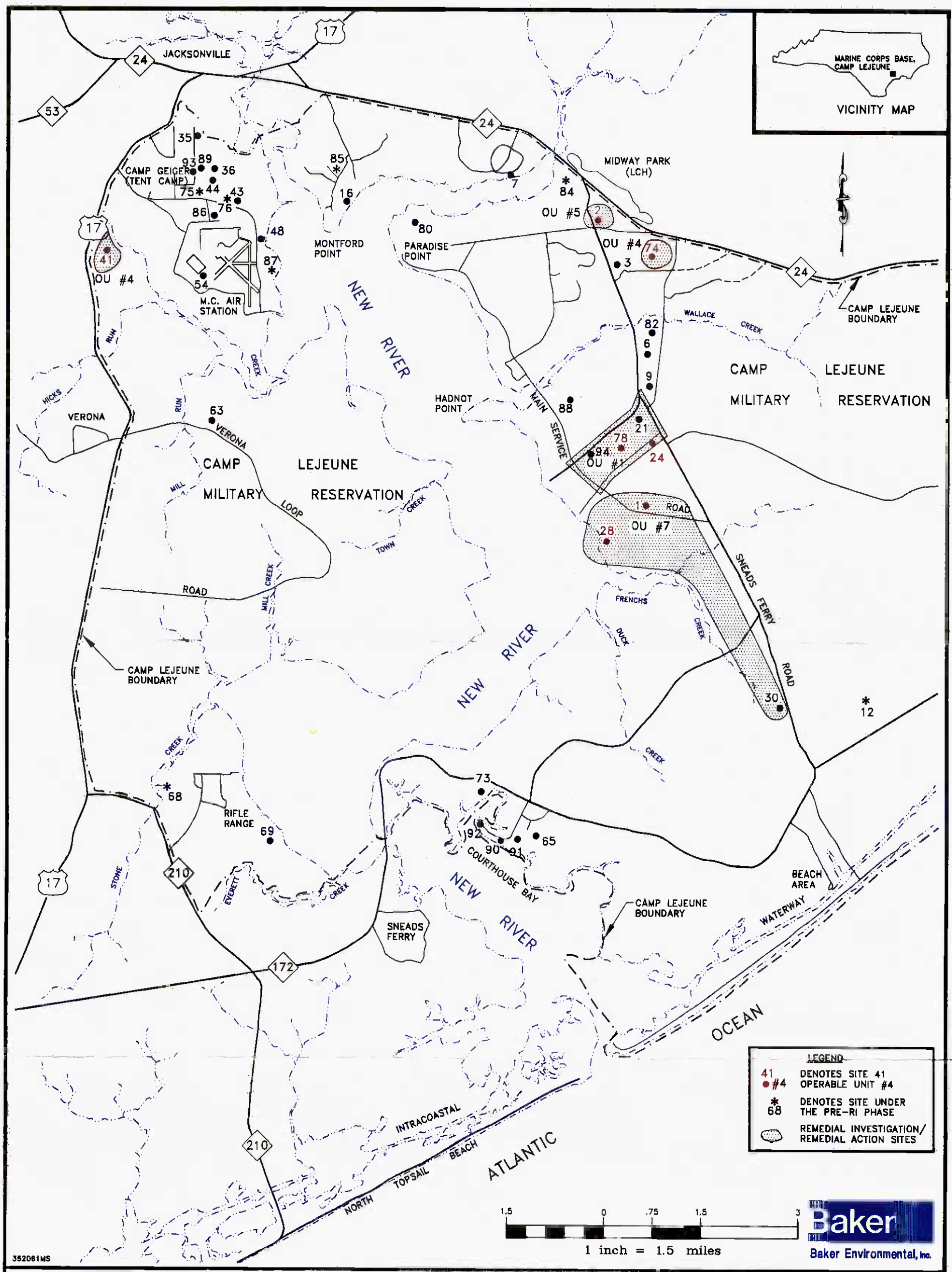

FIGURE P-1
LOCATIONS OF LONG-TERM MONITORING SITES AT
MARINE CORPS BASE CAMP LEJEUNE
LONG-TERM MONITORING WORK PLANS
CTO-0352
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

NOTE:
SITES MARKED IN RED INDICATE INCLUSION IN LONG-TERM MONITORING PROGRAM, OTHER EXISTING SITES MARKED IN BLACK.

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LIST OF ACRONYMS AND ABBREVIATIONS

OU	Operable Unit
PID	Photoionization Detector
POL	Petroleum, Oil, and Lubricants
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
ROD	Record of Decision
SOP	Standard Operating Procedure
TAL	Target Analyte List
VOC	Volatile Organic Compound
WQP	Water Quality Parameter

1.0 OBJECTIVE

The objective of this long-term monitoring work plan is to fulfill requirements stipulated in the Record of Decision (ROD) for Operable Unit (OU) Number 7 (Sites 1, 28, and 30), signed on May 16, 1996. The work plan describes monitoring activities to be performed semiannually at Sites 1 and 28. As presented in the ROD, Site 30 does not require any further monitoring or remedial activities. Documents which pertain to the accepted remedial alternatives for Sites 1, 28, and 30 are as follows:

- Final Remedial Investigation Report - June, 1995
- Final Feasibility Study - July, 1995
- Final Proposed Remedial Action Plan - July, 1995
- Final Record of Decision - December, 1995

The ROD for OU7 stipulates that long-term monitoring coupled with institutional controls be implemented at Sites 1 and 28. The selected remedy for Site 1 includes periodic groundwater sampling of existing monitoring wells and restriction of groundwater use in the vicinity of Site 1. The selected remedy for Site 28 includes periodic groundwater sampling of existing monitoring wells, periodic sampling of surface water and sediment from the New River, and restriction of groundwater use in the vicinity of Site 28. The selected remedy for Site 30 involves taking no further remedial actions whatsoever.

The selected remedial alternatives for Sites 1, 28, and 30 were approved by representatives of the following:

- Naval Facilities Engineering Command, Atlantic Division
- Marine Corps Base Camp Lejeune
- U.S. Environmental Protection Agency - Region IV
- North Carolina Department of Environment, Health, and Natural Resources

In addition to agency approval, a public meeting was held to solicit concerns from the community regarding the selected remedial alternatives. A 30-day comment period followed the public meeting. The ROD was signed after a responsiveness summary and final version of the decision document had been prepared. Remedies provided within the ROD for Sites 1 and 28 are permanent, long-term

solutions because contaminant levels at each site are minimal and periodic sampling is a reliable means of monitoring contaminant persistence and migration. Future amendments or modifications to the monitoring program will need to be recorded, once approved, in a post-decision document file. Changes to the monitoring program will also need to be documented as an amendment to this work plan.

In order to fulfill directives provided in the ROD, groundwater samples from eight existing monitoring wells will be sampled at Site 1. An additional ninth well, 01-GW18, was also identified in the ROD for sampling; however, the well was destroyed prior to initiation of monitoring activities at Site 1. During two previous supplemental investigations, no contaminants of concern were identified among samples obtained from 01-GW18. Groundwater samples from seven existing monitoring wells will be sampled at Site 28. In addition to groundwater, three surface water and three sediment samples from the New River will be collected. Surface water and sediment samples from the New River will be obtained from three sampling locations adjacent to an active pistol firing range. The sampling at both Site 1 and Site 28 will be conducted on a semiannual basis for selected analyses, as presented in Section 3.0 of this work plan.

2.0 BACKGROUND

Baker Environmental, Inc. conducted a Remedial Investigation (RI) of OU7 to evaluate potential threats posed by the release or threatened release of hazardous substances, pollutants, and contaminants at Sites 1, 28, and 30. The RI was initiated in February 1994 and concluded in May 1994. During December 1994, monitoring wells at Sites 1, 28, and 30 were re-sampled using a low-flow purging and sampling technique. The additional sampling was required to obtain total and dissolved metal results more representative of true groundwater conditions. In addition, selected groundwater samples were submitted for analyses that had been identified during the initial sampling round as potential contaminants of concern. The Final RI Report was submitted in June 1995. A Final Feasibility Study Report was completed in July 1995.

The monitoring program presented herein is based upon previous investigation findings, supplemental studies, and decision documents. Sampling locations have been selected within or immediately adjacent to portions of each site with known contamination. Seven shallow wells and one deep well were chosen to monitor the persistence and possible migration of known volatile organic compounds (VOCs) in the northern portion of Site 1. Five shallow wells and two deep wells were chosen to monitor the status of known metal contaminants at Site 28. In addition to groundwater samples from Site 28, surface water and sediment samples will be submitted for metal analyses from the New River upgradient, adjacent to, and downgradient of an active pistol firing range. Sampling at both Sites 1 and 28 will be conducted semiannually. Section 3.0 of this work plan provides a detailed discussion of sampling locations and procedures.

Additional background information pertaining to Sites 1 and 28 is provided within the following reports:

- Baker Environmental, Inc. Remedial Investigation Report, Operable Unit No. 7 (Sites 1 and 28) for MCB Camp Lejeune, North Carolina. Final. Prepared for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia. May 1995.

- Baker Environmental, Inc. Long-Term Monitoring Work Plan and Baseline Study, Operable Unit No. 7 (Sites 1 and 28) for MCB Camp Lejeune, North Carolina. Final.

Prepared for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia. 1996.

- Environmental Science and Engineering, Inc. Site Summary Report. Final. Marine Corps Base, Camp Lejeune, North Carolina. Prepared for the Department of the Navy, Naval Facilities Engineering Command, Atlantic Division, Norfolk, Virginia. ESE Project No. 49-02036. 1990.

- Water and Air Research, Inc. Initial Assessment Study of Marine Corps Base Camp Lejeune, North Carolina. Prepared for Naval Energy and Environmental Support Activity. 1983.

2.1 Site History

The following subsections briefly describe the history of Sites 1 and 28.

2.1.1 Site 1

Site 1 has been used by several different mechanized, armored, and artillery units since the 1940s. Reportedly, liquid wastes generated from vehicle maintenance were routinely poured onto the ground surface. During motor oil changes, vehicles were driven to a disposal point and drained of used oil. In addition, acid from dead batteries was reportedly hand carried from maintenance buildings to disposal points. As a result, the disposal areas at Site 1 are suspected to contain petroleum, oil, lubricants, and battery acid.

2.1.2 Site 28

Site 28 operated from 1946 to 1971 as a burn area for a variety of solid wastes. Reportedly, industrial waste, trash, oil-based paint, and construction debris were burned then covered with soil. In 1971, the burn dump ceased operations, was graded, and seeded with grass.

3.0 MONITORING TASKS

Section 3.0 provides specific procedures for implementing the monitoring program. In addition, sampling locations, sample analyses, and sample designations are included within this section.

3.1 Sampling

The sampling locations included in the monitoring program at Sites 1 and 28 are based upon laboratory results and observational data from both RI and a baseline monitoring study. Sampling locations stipulated in the baseline monitoring study were selected as a result of contaminant levels detected among RI samples. The following provides the number and location of samples to be obtained semiannually as part of the monitoring program at Sites 1 and 28.

3.1.1 Site 1

Seven shallow wells and one deep well will be sampled as part of the long-term monitoring program at Site 1. Shallow monitoring wells 01-GW01, 01-GW02, 01-GW03, 01-GW10, 01-GW11, 01-GW12, and 01-GW17 are located within the northern portion of the study area. Deep monitoring well 01-GW17DW is also located within the northern portion of Site 1. The seven shallow wells will be employed to monitor conditions within the uppermost portion of the surficial aquifer. Samples obtained from deep monitoring well 01-GW17DW will be representative of conditions within the deeper, Castle Hayne, aquifer. Table 3-1 provides construction details for each of the eight wells included in the monitoring program. The locations of monitoring wells throughout Site 1 are depicted in Figure 3-1.

3.1.2 Site 28

Five shallow wells and two deep wells will be sampled as part of the long-term monitoring program at Site 28. Shallow monitoring wells 28-GW01, 28-GW02, 28-GW07, and 28-GW08 are located within the western portion of the study area, west of Cogdels Creek. Deep monitoring wells 28-GW01DW and 28-GW07DW are also located within the western portion of Site 28. An additional shallow monitoring well, 28-GW04, is located within the eastern portion of the study area. The five shallow wells will be employed to monitor conditions within the uppermost portion of the surficial aquifer. Samples obtained from deep monitoring wells 28-GW01DW and 28-GW07DW will be representative of conditions within

the deeper, Castle Hayne, aquifer. Table 3-1 provides construction details for each of the monitoring wells included in the monitoring program. The locations of monitoring wells throughout Site 28 are depicted in Figure 3-2.

Surface water and sediment samples will be collected from three locations in the New River, adjacent to Site 28. Locations of the three surface water and sediment sampling stations are also depicted in Figure 3-2.

3.2 Sample Designations

In order to identify and accurately track the various samples, all samples collected during the monitoring program, including quality assurance and quality control (QA/QC) samples, will be designated with a unique identification number. The sample number will serve to identify the investigation, the site, the sample media, sampling location, QA/QC samples, and the quarter and year in which the samples were collected.

The sample designation format is as follows:

Site Number - Media and Station Number or QA/QC - Year and Quarter of Event

An explanation of each of these identifiers is given below.

Site Number	Monitoring activities will be conducted at Sites 1 and 28.
Media	GW = Groundwater SW = Surface Water SD = Sediment
Station Number	Each sample location or monitoring well will be identified with a unique identification number. Single digit location numbers must be proceeded by a zero (e.g., 01-GW01).
QA/QC	TB = Trip Blank

Year	The number will reference the calendar year the sample was obtained (e.g., 97 would represent 1997).
Quarter	The last letter of the sample designation corresponds to the quarter of the calendar year in which the sample was collected. A = First quarter (January - March) B = Second quarter (April - June) C = Third quarter (July - September) D = Fourth quarter (October - November)

Under this sample designation format the sample number 01-GW01DW-97A refers to:

01-GW01DW-97A	Site 1
01-GW01DW-97A	Groundwater sample
01-GW01DW-97A	Monitoring well number 01
01-GW01DW-97A	Deep monitoring well
01-GW01DW-97A	Year 1997
01-GW01DW-97A	First quarter

Under this sample designation format the sample number 28-SW01-97A

28-SW01-97A	Site 28
28-SW01-97A	Surface water sample
28-SW01-97A	Sampling station number 1
28-SW01-97A	Year 1997
28-SW01-97A	First quarter

Under this sample designation format the sample number 28-SD01-97A

28-SD01-97A	Site 28
28-SD01-97A	Sediment sample
28-SD01-97A	Sampling station number 1

28-SD01-97A	Year 1997
28-SD01-97A	First quarter

Under this sample designation format the sample number 01-TB01-97A

01-TB01-97A	Site 1
01-TB01-97A	Trip Blank
01-TB01-97A	Sequential number, in order of collection. The total number will depend upon how many trip blanks are required.
01-TB01-97A	Year 1997
01-TB01-97A	First quarter

This sample designation format will be followed throughout the project.

3.3 Sample Collection and Analyses

The following describes sample collection procedures and analytical requirements of the monitoring program. Periodic redevelopment of monitoring wells may be required prior to groundwater sample collection.

3.3.1 Site 1

Groundwater samples will be collected from the identified monitoring wells at Site 1. The following is the low-flow purge and sampling procedure used to obtain groundwater samples:

1. Remove well cap, measure escaping gases from well head using a Photoionization Detector or Flame Ionization Detector. The results of this test will determine if respiratory protection is required.

2. Allow groundwater level to stabilize, if a vent hole was not installed in the well.

3. Measure and record the static water level. Record total well depth from well construction tables. Calculate volume of water in well.

4. Lower unused sample tubing (i.e., virgin, 1/4-inch internal diameter polypropylene or polyethylene tubing) slowly into well, until the intake is within the screened interval of the well. Place water level probe just above the water, in well.

5. Commence purging using a peristaltic-type pump. Record the flow rate using a stopwatch and a calibrated container. The flow rate will be adjusted to ambient flow conditions (i.e., do not permit groundwater to be drawn down). Flow rates of less than 1 liter per minute are expected.

6. Investigation derived waste (i.e., purge water) will be discharged onto the ground surface.

7. Record water quality parameters (WQPs) including temperature, dissolved oxygen, turbidity, pH, and specific conductance at regular intervals. These measurements must be recorded in a field notebook.

8. Purging will be completed when a minimum of three well volumes have been removed and three successive WQP readings have stabilized or there is no further discernable upward or downward trend. At low values, certain WQPs (such as turbidity and dissolved oxygen) may vary more than 10 percent, but have reached a stable plateau. The U.S. Environmental protection Agency - Region IV defines stability of WQPs as having less than 10 nephlometric turbidity units, pH measurements which remain constant within 0.1 standard units, specific conductance varying no more than 10 percent, and a constant temperature for at least three consecutive readings.

9. Upon WQP stabilization, collect groundwater samples for volatile organic analysis (VOAs). Label and preserve containers prior to sample collection.

10. Store samples in a cooler with fresh ice until they are shipped to the laboratory.

The standard operation procedure (SOP) for collection and sampling is located in the SOP section of this document. Table 3-1 provides a summary of well construction details for each well included in the

monitoring program at Site 1. Table 3-2 provides the sampling and analysis program for groundwater samples obtained at Site 1.

3.3.2 Site 28

Groundwater samples will be collected from the identified monitoring wells at Site 28. With one exception, groundwater sampling procedures described for Site 1 should be followed for groundwater sampling at Site 28. The one exception to Site 28 sampling program activities is as follows:

1. Upon WQP stabilization, groundwater samples for target analyte list (TAL) metals will be collected. No samples will be retained for VOAs at Site 28; therefore, no trip blanks will be required.

Table 3-1 provides a summary of well construction details for each well included in the monitoring program at Site 28. Table 3-2 provides the sampling and analysis program for groundwater samples obtained at Site 28.

Surface water samples will be collected from three separate locations at Site 28. The following presents the sampling method to obtain the surface water samples:

1. Surface water samples must be collected from downstream locations first, to prevent potential migration of contaminants from upstream locations.

2. Collect samples by dipping transfer container directly into water. The unpreserved, laboratory-decontaminated transfer container will be used to fill preserved bottles. Rinse transfer container with surface water prior to use. Sample containers are to be labeled prior to collection.

3. Record temperature, pH, specific conductance, and dissolved oxygen in the field at each sampling station immediately following sample collection. These measurements must be recorded in a field notebook.

4. Store sample containers in a cooler with fresh ice until they are shipped to the laboratory.

One sediment sample will be collected from three separate locations at Site 28. The following presents the sampling method to obtain the sediment samples:

1. At each station one sediment sample will be collected after the surface water sample has been collected. Sediment samples will be collected from downstream locations first, to prevent potential migration of contaminants from upstream stations.

2. One sediment sample from 0- to 6- inches will be collected at each station.

3. The sediment sample interval at each station will be collected with a stainless steel, hand-held coring instrument. A disposable clear plastic liner tube, fitted with and eggshell catcher to prevent sample loss, will be used at each station.

4. The coring sleeve will be pushed into the sediment to a depth of 6-inches or until refusal is encountered. The sediment sample will be extruded from the liner with a decontaminated extruder and homogenized prior to being transferred to laboratory container.

5. Sediment will be placed into a decontaminated stainless steel bowl and throughly mixed using a stainless steel spoon. Sample jars will be labeled prior to sample collection.

6. Store sample containers in a cooler with fresh ice until they are shipped to the laboratory.

The SOPs for surface water and sediment sampling are located in the SOP section of this document. Table 3-2 presents the sampling and analysis program for surface water and sediment at Site 28. Surface water and sediment sampling locations at Site 28 are depicted in Figure 3-2 All sample locations will be marked by placing a pin flag at the nearest bank. The sample number will be marked on the pin flag with indelible ink.

3.4 Quality Assurance / Quality Control

Quality assurance and quality control requirements for the monitoring program are limited to trip blanks.

- Trip blanks are defined as samples comprised of analyte-free water from the laboratory, which are shipped to the sampling site, kept with the investigative samples throughout the sampling event, and returned to the laboratory with the VOC samples. The blanks will only be analyzed for volatile organics. The purpose of a trip blank is to determine if samples were contaminated during storage and transportation back to the laboratory. One trip blank will accompany each cooler containing samples for volatile analyses.

Equipment rinsates, field blanks, field duplicates, and matrix spike/matrix spike duplicates will not be collected during the monitoring program. The samples collected during the program will be considered confirmatory only; therefore, extraneous QA/QC samples have been eliminated from the program.

STANDARD OPERATING PROCEDURES (SOPS)

Groundwater Sample Acquisition

Surface Water and Sediment Sample Acquisition

Electronic Data Deliverable Standards and Procedures

ELECTRONIC DATA DELIVERABLE STANDARDS AND PROCEDURES

FINAL

CONTRACTOR ELECTRONIC DATA DELIVERABLE STANDARDS AND PROCEDURES

ENVIRONMENTAL MANAGEMENT DEPARTMENT
MARINE CORPS BASE CAMP LEJEUNE

SEPTEMBER 15, 1997

Prepared for:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
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1.0 PURPOSE AND SCOPE

The purpose of this document is to establish standards and procedures for the creation of electronic data deliverables (EDDs) by contractors working for the Environmental Management Department (EMD) of Marine Corps Base (MCB) Camp Lejeune (the Activity). The scope of this document covers data generated as part of environmental investigations and groundwater monitoring under the Activity's installation restoration (IR) and underground storage tank (UST) programs. This data includes sample location information for new sample locations (groundwater, soil, sediment, and surface water), well construction and geologic data for newly installed wells, hydrogeologic data, and laboratory analytical data for the environmental samples. These standards also apply to analytical data generated during routine sampling of the potable supply wells on board the Activity and future efforts associated with Solid Waste Management Unit (SWMU) sites.

It is anticipated that other departments at Camp Lejeune (e.g., public works) will have environmental data associated with other types of projects outside the EMD. It shall be the responsibility of the EMD to provide these standards and coordinate the data delivery with other departments. Furthermore, as new sample types and types of locations are added to future Camp Lejeune environmental programs, or new sampling technologies are developed, it shall be the responsibility of the EMD to update this document for future implementation.

2.0 CONTENTS OF DOCUMENT

The contents of this document include the following topics:

Standard Naming Conventions - Standard nomenclature for sample locations (groundwater monitoring wells, soil borings, sediment and surface water sample locations) and sample identifications (unique names for each analytical sample collected).

Guidance for Laboratory Deliverables - Guidance for contractors on the content and format of EDDs and/or paper analytical data reports which are requested and received by the contractor from analytical laboratory subcontractors.

New Sample Location and Well/Boring Deliverables - Requirements for the content and format of all contractor EDDs to Camp Lejeune containing data for new sample locations and newly installed groundwater monitoring wells and soil borings.

Sampling and Analysis Deliverables - Requirements for the content and format of all contractor EDDs to Camp Lejeune containing sampling and analysis data for the environmental samples collected.

Arc/Info Coverages - Requirements for the content and format for the generation of tabular data for Arc/Info coverages.

3.0 STANDARD NAMING CONVENTIONS

The naming of sample locations and analytical samples taken at those locations must comply with the following naming convention standards to insure uniformity across the Activity, the uniqueness of sample location and analytical sample names, and database integrity. For existing monitoring wells or previously established sediment or surface water sample stations where new samples are to be collected, the EMD will be responsible for providing contractors with the standard names already assigned to these locations. In the case of new sample locations, the EMD will provide contractors with the next available names for each type of sample location being established on the site.

Please note that not all historic naming conventions on board the Activity comply with the naming convention detailed below. All new sample locations and analytical samples must comply with this standard.

3.1 Location Names

Location names are assigned based on the following combination of location identifiers. The '&' indicates that the two indicators joined are concatenated to create the location name. See the example below.

(Site Type) & (Site #)-(Type of Location) & (Location) & (Well Depth *[Optional]*)

Definition of identifiers:

Site Type:

UST	=	Underground storage tank associated site
AST	=	Aboveground storage tank associated site
IR	=	Location associated with an IR site
PSW	=	Potable supply well
SWMU	=	Solid waste management unit site

Site #:

The site # is the number assigned to the site in the Initial Assessment Study (WAR, 1983); or the number, (i.e. building or tank system) of the associated UST or AST (if applicable).

Please note that PSW locations do not have site # or type of location indicators. Potable supply wells are named with only site type and location #.

Type of Location:

BG	=	Background location of any media
IS	=	In-situ location (i.e., hydropunch/geoprobe/soil gas)
MW	=	Monitoring well
PZ	=	Piezometer
RW	=	Recovery well (extraction well)

SB	=	Soil boring (depth > 1' below ground surface)
SD	=	Sediment location
SS	=	Surface soil location (depth < or = 1' below ground surface)
SW	=	Surface water location
TP	=	Test pit location
TW	=	Temporary well

Location #:

Each location of a given location type will be assigned a unique identification number for each site. If there are existing locations, a new location will be given the next available number for that location type on the site.

Depth [Optional]:

In cases where multiple screened wells (i.e., well cluster or nested wells) are installed by depth, the contractor has the option to use a two letter designation to distinguish between well depths:

IW	=	Intermediate well
DW	=	Deep well

Please note that the letter designations assigned to a depth refer to "relative" depths that are specific to a site (i.e., an intermediate well at one site can be a deep well at another).

Example 1: The location name **IR06-MW01IW** refers to:

IR06-MW01IW	=>	IR site
IR**06**-MW01IW	=>	Site 6
IR06-**MW**01IW	=>	Location is a monitoring well
IR06-MW**01**IW	=>	Monitoring well number 1
IR06-MW01**IW**	=>	Intermediate well

Example 2: The potable supply well name **PSW-HP617** refers to:

PSW-HP617	=>	Potable supply well
PSW-**HP617**	=>	Well number HP617

EDD Note: Sample location names are stored in the WELL_ID field for all EDDs regardless of the type of location. **The maximum character length for well_id is 30 characters.** See Section 5 for details.

3.2 Sample Identification Names

Sample identification names, or sample IDs, are assigned based on the following combination of sample identifiers. The '&' indicates that the two indicators joined are concatenated to create the sample identification name. The 'or' indicates that only one of the two indicators are used depending on the type of sample. See examples below.

(Site Type) & (Site #)-(Type of Sample) & (Location #) & (Dissolved Flag *[Optional]*)-(Depth) or **(Sample Round #)**

Definition of identifiers:

Site Type: Site type is defined the same as in sample location names. See Section 3.1.

Site #: Site # is defined the same as in sample location names. See Section 3.1.

Type of Sample:

BG	=	Sample collected from a background sample location (any media)
IS	=	Groundwater or soil sample collected from an in-situ sample location
GW	=	Groundwater sample collected from a monitoring well
MW	=	Soil sample collected from a soil boring which will be converted into a monitoring well
PZ	=	Groundwater sample collected from a piezometer
RW	=	Groundwater sample collected from a recovery well
SB	=	Soil sample collected from any depth of a soil boring that was not converted into a well
SD	=	Sediment sample
SS	=	Surface soil sample collected from a surface soil sample location other than a boring completed by a drill rig (e.g., spoon or hand auger)
SW	=	Surface water sample
TP	=	Soil sample collected from a test pit
TW	=	Groundwater sample collected from a temporary well
TW-S	=	Soil sample collected from a soil boring converted into a temporary well

Location #:

Location # is defined the same as in sample location names. See Section 3.1.

Dissolved Flag [Optional]:

The optional dissolved flag, the letter 'D', is used to flag those groundwater samples that are **field** filtered for dissolved metals analysis.

Depth:

The use of either depth or the sample round # is dependent upon the sample type. Soil samples are the only sample types where depth is used in the sample ID designation. Soil samples are identified by sample types BG, IS, MW, SB, SD, SS, TP, and TW-S. A number will reference the depth interval of the sample as follows (with the exception of SD samples, see below):

00	=	ground surface to 1 foot below ground surface (bgs)
01	=	1 to 3 feet bgs
02	=	3 to 5 feet bgs
03	=	5 to 7 feet bgs
04	=	7 to 9 feet bgs
05	=	9 to 11 feet bgs, etc.

Sediment samples are collected at depth intervals that are not consistent with soil sampling; therefore, a separate sample depth code will be used for sediment samples:

A	=	0 to 6 inches
B	=	6 to 12 inches, etc.

Sample Round #:

The sample round # is used for water sample types BG, IS, GW, PZ, SW, and TW. Sample round numbers are also used for potable supply wells, site type PSW, and sediment samples, sample type SD. (Sediment samples are the only sample types that are identified by both sample depth and sample round number.) A combination of the last 2 digits of the year in which the sample was collected and a letter corresponding to the quarter of the year during which the sample was collected will be used as the sample round #.

96B	=	1996, second quarter (April through June)

In the event that multiple samples are collected from the same water or SD location during a quarter, single-digits 1 - 9 may follow the quarter identifier:

98A2	=	1998, first quarter (January through March), second sample from this particular location during this quarter.

The quarter designations are as follows:

A	=	1st Quarter, January through March
B	=	2nd Quarter, April through June
C	=	3rd Quarter, July through September
D	=	4th Quarter, October through December

Example 3: The soil sample ID **IR02-MW05DW-01** indicates the following information:

IR02-MW05DW-01	=>	IR site
IR**02**-MW05DW-01	=>	Site 2
IR02-**MW**05DW-01	=>	Soil sample from a monitoring well boring
IR02-MW**05**DW-01	=>	Monitoring well location 5
IR02-MW05**DW**-01	=>	Deep monitoring well boring
IR02-MW05-DW**01**	=>	Soil sample collected from the 1 to 3 foot depth

Example 4: The groundwater sample ID **IR02-GW05DWD-97D** is for a groundwater sample taken from the same well.

IR02-GW05DWD-97D	=>	IR site
IR**02**-GW05DWD-97D	=>	Site 2
IR02-**GW**05DWD-97D	=>	Groundwater sample
IR02-GW**05**DWD-97D	=>	Monitoring well location 5
IR02-GW05**DW**D-97D	=>	Deep monitoring well
IR02-GW05DW**D**-97D	=>	Dissolved (field) analysis
IR02-GW05DWD-**97D**	=>	Sample collected in the 4th quarter of 1997

Example 5: The groundwater sample ID **PSW-HP617-98A** is for a groundwater sample taken from the same well.

PSW-HP617-98A	=>	Potable supply well
PSW-**HP617**-98A	=>	Well number HP617
PSW-HP617-**98A**	=>	Sample collected in the 1st quarter of 1998

Example 6: The surface water sample ID **IR28-SW02-97D** indicates the following information:

IR28-SW02-97D	=>	IR Site
IR**28**-SW02-97D	=>	Site 28
IR28-**SW**02-97D	=>	Surface Water Sample
IR28-SW**02**-97D	=>	Surface Water Station 2
IR28-SW02-**97D**	=>	Sample collected in the 4th quarter of 1997

Example 7: The sediment sample ID **IR28-SD02A-97D** indicates the following information:

IR28-SD02A-97D	=>	IR Site
IR**28**-SD02A-97D	=>	Site 28
IR28-**SD**02A-97D	=>	Sediment Sample
IR28-SD**02**A-97D	=>	Sediment Sample Station 2
IR28-SD02**A**-97D	=>	Sample depth of 0 to 6 inches
IR28-SD02A-**97D**	=>	Sample collected in the 4th quarter of 1997

EDD Note: Sample IDs will be stored in the field named SAMPLE_ID for the required EDDs. **The maximum character length for sample_id is 30 characters.** See Section 5 for details.

4.0 GUIDANCE FOR LABORATORY DELIVERABLES

Contractors who perform sampling and analysis of environmental media as part of the IR, UST, SWMU, or potable water supply well monitoring programs at the Activity establish content and format requirements for the electronic deliverables generated by their subcontracted laboratories. In order to guarantee that contractors request all of the required analytical data from their laboratories, a sample laboratory deliverable format for Camp Lejeune EMD contractors is provided in Table 4-1. This example contains the minimum set of laboratory analytical fields that must be received by the contractor from the laboratory. Using this simple deliverable format may facilitate the contractor's generation of the sampling and analysis EDD (See Section 6).

The example laboratory EDD structure is provided to EMD contractors as guidance not as a standard for their laboratory deliverables. Most environmental contractors have established data management systems that require different laboratory deliverable structures. Contractors who currently do no have their own internal standards or established requirements for laboratory EDDs can use the example laboratory deliverable structure. It is recommended that the laboratory EDD be provided as a .dbf file (dBase) although different deliverable file types can be requested at the contractor's discretion.

TABLE 4-1: EXAMPLE LABORATORY EDD

Field Name	Field Type	Length	Dec.	Description
SAMPLE_ID	Character	30	0	Sample ID given by contractor[1]
LAB_ID	Character	20	0	Sample ID given by laboratory
MATRIX	Character	2	0	Sample matrix/media[2]
DATE_SAMP	Date	8	0	Date sample was collected (MM/DD/YY)
SAMP_TIME	Character	4	0	24-hour time (i.e., 1:10pm = 1310)
LAB	Character	20	0	Laboratory name[2]
METHOD	Character	12	0	Analysis method (i.e. EPA method)[2]
CAS	Character	11	0	CAS Number of analyte[2]
PARAMETER	Character	40	0	Name for analyzed chemical
RESULT	Number	16	7	Concentration result
DET_LIMI	Number	16	7	Reported detection limit
UNITS	Character	6	0	Units of measure for result[2]
DATA_QUAL	Character	5	0	Data qualifiers[2]
CONC_FAC	Number	4	2	Dilution of sample (if none = 1.0)
TOT_DIS	Character	2	0	Total or dissolved result (T or D)

Notes:

[1] Name must comply with naming convention in Section 3.

[2] Domain values for these fields are defined in Section 6.

It is recommended that all EMD contractors who receive analytical results from laboratories do so both in paper and electronic formats. Upon receipt of the data, a contractor is responsible for a complete Quality Assurance/Quality Control (QA/QC) of the electronic files against the official paper report submitted by the laboratory. If a contractor receives only paper-based laboratory deliverables, manual data entry must be performed to create the required electronic sampling and analysis data deliverables detailed in Section 6. Whenever data entry tasks are performed, a complete QA/QC of the entered data must be done against the original paper report. It is recommended that the QA/QC performed be documented.

5.0 NEW SAMPLE LOCATION AND WELL/SOIL BORING DELIVERABLES

Contractors collecting samples from newly established sample locations or installing new groundwater monitoring wells or soil borings must provide EDDs to Camp Lejeune which contain specified sample location data. The data required about the sample location depends upon the location type. All location types require survey data (northing, easting, and elevation) and a limited number of location-specific data, which is detailed below. Both newly installed monitoring wells, soil borings, and test pits require that geologic information be provided regarding the lithologic units encountered during installation. Monitoring wells also require well construction data in the EDD.

5.1 Required EDD For All New Sample Locations

For every new sample location, regardless of location type, a separate record in a database table called WELL.dbf must be provided to the EMD. (Please discuss with the EMD the file naming convention and file delivery mechanism for all EDDs.) The structure of this database table is provided in Table 5-1 with the list of acceptable entries for restricted fields in Table 5-2. As detailed in Section 3.0, all newly established sample location names must comply with the sample location naming convention. The next available location numbers will be provided by the EMD.

TABLE 5-1: WELL.dbf

Field Name	Field Type	Length	Dec.	Description	Location Type
WELL_ID	Character	30	0	Sample location name	*
AREA	Character	20	0	Name of area within Camp Lejeune[1]	*
DATE_INST	Date	8	0	Date sample location established[2]	*
GRND_ELEV	Number	10	2	Ground surface elevation (ft msl)	*[3]
ELEV_UNIT	Character	6	0	Always 'FT'	*
XCOORD	Character	14	0	X UTM coordinate (meters)	*
YCOORD	Character	14	0	Y UTM coordinate (meters)	*
COORD_SYS	Character	15	0	Always 'UTM'	*
COORD_UNI	Character	6	0	Always 'M' for meters	*
FIELD1	Character	30	0	Well/boring total depth (ft bgs)	MW,SB
FIELD2	Character	30	0	Well/boring diameter (ft)	MW
FIELD3	Character	30	0	Depth to top of well screen (ft bgs)	MW
FIELD4	Character	30	0	Depth to bottom of well screen (ft bgs)	MW
FIELD5	Character	30	0	Measuring point elevation (ft msl)[4]	MW
WELL_TYPE	Character	12	0	Sample location type[1]	*
VALID	Logical	1	0	Always .F.	*
AQUIFER	Character	30	0	Aquifer in which well is screened[1]	MW
COMMENTS	Memo	10	0	Comments	*
WELL_PURP	Character	30	0	Sample location purpose	*

Notes:

* = All sample location types require this field.

1 These fields require an entry from the list of acceptable entries listed in Table 5-2.

2 Date in MM/DD/YY format

3 For some sample location types, surveyed ground surface elevations will not be possible (i.e. sediment stations). Provide estimated elevation in these cases.

[4] Typically the elevation of the top of inner well casing.
bgs = Below ground surface; msl = Mean sea level; UTM = Universal Transverse Mercator

TABLE 5-2: ACCEPTABLE FIELD ENTRIES FOR WELL.dbf

Field Name	Acceptable Entry	Description
AREA	A	Amphibious Area
	AS	Air Station
	BA	Beach Area
	BB	Courthouse Bay
	BM	Berkeley Manor
	CG	Camp Geiger
	FC	French Creek
	HP	Hadnot Point
	LCH	Midway Park
	MG	Maganize Area
	MP	Montford Point
	NH	Naval Hospital
	PP	Paradise Point
	RR	Rifle Range
	TT	Terrawa Terrace
	VL	Verona Loop
WELL_TYPE	ABN	Abandoned Well
	BG	Background Sample Location
	RW	Recovery Well
	IS	Insitu Sample Location
	MW	Monitoring Well
	PSW	Potable Supply Well (Public)
	PZ	Piezometer
	SB	Soil Boring
	SD	Sediment Sample Location
	SS	Surface Soil Sample Location
	SW	Surface Water Sample Location
	TP	Test Pit
	TW	Test/Temporary Well
AQUIFER	CASTLE HAYNE	Castle Hayne Aquifer
	SURFICIAL	Surficial Aquifer

5.2 Geologic Deliverable for New Wells and Soil Borings

The geologic data deliverables provided by contractors to Camp Lejeune will include lithologic descriptions of all soils encountered and documented when installing a well, boring, or test pit. Table 5-3 documents the table structure for the EDD database table LITHLOG.dbf.

TABLE 5-3: LITHLOG.dbf

Field Name	Field Type	Length	Decimals	Description
WELL_ID	Character	30	0	Well, soil boring, or test pit location name[1]
AREA	Character	20	0	Name of area within Camp Lejeune[1]
BEGDEPTH	Number	10	2	Beginning depth of lithologic sample
ENDDEPTH	Number	10	2	Ending depth of lithologic sample
USCS	Character	2	0	Universal Soil Classification Code[2,3]

Notes:

1 Entries MUST match the corresponding records in WELL.dbf exactly.

2 The USCS codes are typically assigned based on a grain size analysis, but USCS codes can be visually assigned based on ASTM guidance.

3 USCS codes are listed in Table 5-4. These are the only valid entries for this field.

TABLE 5-4: ACCEPTABLE FIELD ENTRIES FOR LITHLOG.dbf

Field Name	Code	Description
USCS	CH	Inorganic Clays of High Plasticity, Fat Clays.
	CL	Inorganic Clays of Low to Medium Plasticity; Gravelly Clays, Sandy, Silty, Lean Clays.
	GC	Clayey Gravels, Poorly Graded Sand-Clay Mixtures.
	GM	Silty Gravels, Poorly Graded Sand-Silt Mixture.
	GP	Poorly Graded Gravels, Gravel-Sand Mixtures; Little or No Fines.
	GW	Well Graded Gravels, Gravel-sand Mixtures; Little or No Fines.
	LS	Limestone
	MH	Inorganic Silts, Micaceous or Diamaceous Fine Sandy or Silty Soils, Elastic Silts.
	ML	Inorg. Silts & Very Fine Sands; Rock Flour, Silty or Clayey Find Sands w/Slight Plasticity
	OH	Organic Clays of Medium to High Plasticity.
	OL	Organic Silts and Organic Silt-Clays of Low Plasticity.
	PT	Peat, Highly Organic Soils
	SC	Clayey Sands, Poorly Graded Sand-Clay Mixtures.
	SM	Silty Sands, Poorly Graded Sand-Clay Mixtures.
	SP	Poorly Graded Sands, Gravelly Sands; Little or No Fines.
	SW	Well Graded Sands, Gravelly Sands; Little or No Fines.

5.3 Data Entry Program

Contractors will have the choice to create the required new sample location EDDs, up to two .dbf tables per deliverable, in one of two ways. With the documented table structures and valid entries or domains provided above, contractors can create the tables themselves. This is favorable if the contractor already manages these types of data electronically and has sufficient database experience. In order to facilitate the generation of the required tables, a data entry program has been created which will also be made available to contractors which will allow for this data to be easily entered electronically through user-friendly data entry screens. If a portion of the new sample location data is maintained electronically, a combination approach will also likely be possible for contractors to generate the required database files.

6.0 SAMPLING AND ANALYSIS DELIVERABLES

Contractors will supply the EMD with a sampling and analysis EDD whenever laboratory analytical sampling is performed, field measurements are taken (when directed specifically by the EMD), or depth to groundwater is measured. In order to simplify the process of generating the required EDD files for loading into the Camp Lejeune environmental data management system, a process has been developed which allows for a single flat file .dbf table, LABDATA.dbf, to be created and delivered to the EMD by its contractors. The table structure, which must be generated by EMD contractors, is presented in Table 6.1.

TABLE 6-1: FLAT FILE SAMPLING AND ANALYSIS EDD (LABDATA.dbf)

Field Name	Field Type	Length	Dec.	Description
WELL_ID	Character	30	0	Sample location name
SAMPLE_ID	Character	30	0	Sample ID given by contractor
LAB_ID	Character	20	0	Sample ID given by laboratory
LAB	Character	20	0	Laboratory name[1,2]
MATRIX	Character	2	0	Sample matrix/media[3]
SAMP_TYPE	Character	10	0	Sample type[2]
SAMP_TIME	Character	4	0	24-hour time (i.e., 1:10pm = 1310)
DATE_SAMP	Date	8	0	Date sample was collected
SAMPLE_BY	Character	30	0	Contractor performing sampling
BEGDEPTH	Number	16	6	Beginning depth for soil samples
ENDDEPTH	Number	16	6	Ending depth for soil samples
METHOD	Character	12	0	Analysis method (i.e. EPA method)[3]
PARAMETER	Character	40	0	Name for chemical or measurement
CAS	Character	11	0	CAS number (include hyphens)[4]
RESULT	Number	16	7	Concentration or measurement result
DET_LIMI	Number	16	7	Reported detection limit
UNITS	Character	6	0	Units of measure for result[3]
DATA_QUAL	Character	5	0	Data qualifiers[2]
TOT_DIS	Character	2	0	Total or dissolved results (T or D)
CONC_FAC	Number	4	2	Dilution of sample (if none = 1.0)
COMMENT	Memo	10	0	Specific comments on result

Notes:

1 Each laboratory will have one valid, unique LAB entry. If the laboratory name is not in Table 6.2, choose a name and document the need for the addition to the EMD.

2 Valid entries for this field are listed in Table 6-2. If additional entries are necessary, please inform the EMD.

3 Valid entries for this field are included in the tables in Attachment A.

4 The EMD has a database of CAS numbers (CHEMICAL.dbf) which is used in its data management system. All CAS numbers delivered must match those in CHEMICAL.dbf. This file is available to contractors from the EMD. If a parameter is analyzed which has a CAS

number, but is not in CHEMICAL.dbf, please document the need for this addition to the EMD. If a CAS number does not exist for the parameter measured or analyzed, leave this field blank.

TABLE 6-2: ACCEPTABLE FIELD ENTRIES FOR SAMPLING AND ANALYSIS EDD

Field Name	Acceptable Entry	Description
DATA-QUAL	B	Analyte detected in associated method blank
	D	Sample diluted and reanalyzed
	J	Estimated value
	N	Presumptive evidence of compound
	R	Rejected value
	U	Non-detection
	BJ	Definition of B and J combined
	NJ	Definition of N and J combined
	UJ	Definition of U and J combined
	UN	Definition of U and N combined
	UR	Definition of U and R combined
SAMP_TYPE	BG	Background sample
	GW	Monitoring well groundwater sample
	IS	In-situ Sample Location
	MW	Soil sample from monitoring well boring
	PZ	Piezometer groundwater sample
	RW	Recovery well groundwater sample
	SB	Soil boring sample
	SD	Sediment sample location
	SS	Surface soil sample location
	SW	Surface water sample location
	TP	Test pit sample
	TW	Temporary well groundwater sample
	TW-S	Soil sample from temporary well boring
LAB	TRIANGLE	Triangle Labs
	PRECISION	Precision Labs
	RAS	Radian Analytical Services

7.0 TABULAR DATA FOR ARC/INFO COVERAGES

In addition to providing an EDD for chemistry, geologic, and hydrogeologic data, the contractor is also responsible for preparing tabular data sets for importing into the Activities Arc/Info GIS. Attachment A includes examples of the tabular data requirements under the user defined attributes. Note that the requirements for IR, UST, and SWMU attributes are identical. Tabular data can be provided as either a .dfb or dBase file.

ATTACHMENT A
ACCEPTABLE ENTRIES FOR MATRIX, METHOD, AND UNITS

ATTACHMENT A
ACCEPTABLE ENTRIES FOR MATRIX

MATRIX CODE	MATRIX DECRIPTION
AG	SOIL GAS
SE	SEDIMENT (ASSOCIATED WITH SURFACE WATER)
SL	SLUDGE
SO	SOIL
SW	SWAB OR WIPE
WD	WELL DEVELOPMENT WATER
WG	GROUND WATER
WL	LEACHATE
WP	DRINKING WATER
WS	SURFACE WATER
WV	WATER FROM VADOSE ZONE

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
A303A	METALS (BY DIRECT ASPIRATION INTO AN AIR-ACETYLENE FLAME)
A303C	DTRMNTN OF AL,*BA,BE,*MO,OS,RE,SI,TH,TI AND V BY DIRECT ASPRTN INTO NITRS OX-ACETYLN FLME
A312B	CHROMIUM, HEXAVALENT (COLORIMETRIC METHOD)
A403	ALKALINITY
A405	BROMIDE
A406B	TITRIMETRIC METHOD FOR FREE CARBON DIOXIDE
A407A	CHLORIDE (ARGENTOMETRIC)
A407B	CHLORIDE (MERCURIC NITRATE METHOD)
A412D	COLORIMETRIC METHOD
A412E	CYANIDE, BY ION SELECTION ELECTRODE
A412F	CYANIDE, AMENABLE TO CHLORINATION
A413C	FLUORIDE (SPADNS)
A418B	NITRATE ELECTRODE SCREENING METHOD
A418F	NITROGEN (NITRATE, AUTOMATED CADMIUM REDUCTION METHOD)
A419	NITROGEN (NITRITE)
A424G	PHOSPHATE (ASCORBIC ACID REDUCTION)
A426D	SULFATE (AUTOMATED METHYLTHYMOL BLUE METHOD)
A429	ANIONS BY ION CHROMATOGRAPHY
A506	TOTAL ORGANIC HALIDES (TOX)
A508A	CHEMICAL OXYGEN DEMAND (COD)
A508B	CHEMICAL OXYGEN DEMAND (CLOSED REFLUX, TITRIMETRIC)
A509A	ORGANOCHLORINE PESTICIDES
A509B	CHLORINATED PHENOXY HERBICIDES
A510B	PHENOLS, CHLOROFORM EXTRACTION METHOD
A701C	GAMMA SPECTRALANALYSIS
A703	GROSS ALPHA-GROSS BETA
A704	TOTAL RADIOACTIVE STRONTIUM AND STRONTIUM 90 WATER
A705	TOTAL RADIUM
A706	RADIUM 226 BY RADON IN WATER (SOLUBLE, SUSPENDED AND TOTAL)
A707	RADIUM 228 (SOLUBLE, TENTATIVE)
A708	TRITIUM
A709	RADIOACTIVE CESIUM
A710A	RADIOACTIVE IODINE, PRECIPITATION METHOD
A711	URANIUM
A711A	URANIUM RADIOCHEMICAL (TENTATIVE)
A907A	TOTAL BACTERIA (POUR PLATE METHOD)
A907B	TOTAL BACTERIA (SPREAD PLATE METHOD)
A907C	TOTAL BACTERIA (MEMBRANE FILTER METHOD)
D1140	AMOUNT OF MATERIAL IN SOILS FINER THAN THE # 200 (75 UM) SIEVE
D1385	HYDRAZINE (SPECTROPHOTOMETRIC)
D1556	DENSITY OF SOIL IN PLACE BY THE SAND-CONE METHOD
D1890	BETA PARTICLE RADIOACTIVITY OF WATER
D1943	ALPHA PARTICLE RADIOACTIVITY OF WATER
D2166	UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOIL
D2167	DENSITY AND UNIT WEIGHT OF SOIL IN PLACE BY THE RUBBER BALLOON METHOD
D2216	PERCENT SOLID
D2325	CAPILLARY-MOISTURE RELATIONSHIPS FOR CRSE- AND MDM-TXTRD SOILS BY POROUS-PLATE APPARATUS
D2434	PERMEABILITY
D2460	RADIONUCLIDES OF RADIUM IN WATER
D2487	CLASSIFICATION OF SOILS, FOR ENGINEERING PURPOSES
D2937	DENSITY OF SOIL IN PLACE BY THE DRIVE-CYLINDER METHOD
D2974	TOTAL ORGANIC CONTENT
D3152	CAPILLARY-MOISTURE RELATIONSHIPS FOR FINE-TEXTURED SOILS BY PRESSURE-MEMBRANE APPARATUS
D3155	LIME CONTENT OF UNCURED SOIL-LIME MIXTURES
D3385	INFILTRATION RATE OF SOILS IN FIELD USING DOUBLE-RING INFILTROMETERS
D3695	VOLATILE ALCOHOLS IN WATER BY DIRECT AQUEOUS INJECTION GC
D421	DRY PREPARATION OF SOIL SAMPLES FOR PARTICLE-SIZE ANALYSIS AND DTRMNTN OF SOIL CONTENTS
D4219	UNCONFINED COMPRESSIVE STRENGTH INDEX OF CHEMICAL-GROUTED SOILS
D422	GRAIN SIZE
D4221	DISPERSIVE CHARACTERISTICS OF CLAY SOIL BY DOUBLE HYDROMETER

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
D427	SHRINKAGE FACTORS OF SOILS
D4318	LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS
D4373	CALCIUM CARBONATE CONTENT OF SOILS
D4380	DENSITY OF BENTONITIC SLURRIES
D4381	SAND CONTENT BY VOLUME OF BENTONITIC SLURRIES
D4452	X-RAY RADIOGRAPHY OF SOIL-SAMPLES
D4525	PERMEABILITY OF ROCKS BY FLOWING AIR
D4542	PORE WATER EXTRACTION AND DETERMINATION OF THE SOLUBLE SALT
D4564	DENSITY OF SOIL IN PLACE BY THE SLEEVE METHOD
D4643	DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL BY THE MICROWAVE
D854	SPECIFIC GRAVITY OF SOILS
E110.2	COLOR (COLORIMETRIC-PLATINUM-COBALT)
E110.3	COLOR (SPECTROPHOTOMETRIC)
E120.1	SPECIFIC CONDUCTANCE
E130.1	HARDNESS, TOTAL (COLORIMETRIC, AUTOMATED EDTA)
E130.2	HARDNESS, TOTAL (TITRIMETRIC)
E140.1	ODOR (THRESHOLD ODOR, CONSISTENT SERIES)
E150.1	PH, ELECTROMETRIC
E160.1	RESIDUE, FILTERABLE (TDS)
E160.2	RESIDUE, NON-FILTERABLE
E160.3	RESIDUE, TOTAL GRAVIMETRIC, DRIED AT 103-105 DEGREES CELSIUS
E160.4	RESIDUE, VOLATILE (GRAVIMETRIC, IGNITION AT 550 DEGREES CELSIUS)
E160.5	SETTLEABLE MATTER (VOLUMETRIC, IMHOFF CONE)
E162.4	VOLATILE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS
E162.5	SEMIVOLATILE ORGANIC COMPOUNDS BY ISOTOPE DILUTION GC/MS
E170.1	TEMPERATURE
E180.1	TURBIDITY (NEPHELOMETRIC)
E200.7	INDUCTIVELY COUPLED PLASMA (ICP) METAL SCREEN
E202.1	ALUMINUM
E202.2	ALUMINUM (AA, FURNACE TECHNIQUE)
E204.1	ANTIMONY (AA, DIRECT ASPIRATION)
E204.2	ANTIMONY (AA, FURNACE TECHNIQUE)
E206.2	ARSENIC (AA, FURNACE)
E206.3	ARSENIC (AA, HYDRIDE)
E208.1	BARIUM (AA, DIRECT ASPIRATION)
E208.2	BARIUM (AA, FURNACE)
E210.1	BERYLLIUM
E210.2	BERYLLIUM (AA, FURNACE TECHNIQUE)
E212.3	BORON (COLORIMETRIC, CURCUMIN)
E213.1	CADMIUM (AA, DIRECT ASPIRATION)
E213.2	CADMIUM (AA, FURNACE)
E215.1	CALCIUM (AA, DIRECT ASPIRATION)
E218.1	CHROMIUM (AA, DIRECT ASPIRATION)
E218.2	CHROMIUM (AA, FURNACE)
E218.4	CHROMIUM HEXAVALENT (AA, CHELATION-EXTRACTION)
E218.5	SOLUBLE CHROMIUM (AA,FURNACE)
E219.1	COBALT (AA, DIRECT ASPIRATION)
E219.2	COBALT (ATOMIC ABSORPTION, FURNACE TECHNIQUE)
E220.1	COPPER (AA, DIRECT ASPIRATION)
E220.2	COPPER (AA, FURNACE)
E236.1	IRON (AA, DIRECT ASPIRATION)
E236.2	IRON (AA FURNACE TECHNIQUE)
E239.1	LEAD (AA, DIRECT ASPIRATION)
E239.2	LEAD (AA, FURNACE)
E242.1	MAGNESIUM (AA, DIRECT ASPIRATION)
E243.1	MANGANESE (AA, DIRECT ASPIRATION)
E243.2	MANGANESE (AA, FURNACE TECHNIQUE)
E245.1	MERCURY (COLD VAPOR, MANUAL)
E245.2	MERCURY (COLD VAPOR, AUTOMATED)
E245.5	MERCURY (COLD VAPOR, SEDIMENTS)
E246.1	MOLYBDENUM (AA, DIRECT ASPIRATION)
E246.2	MOLYBDENUM (AA, FURNACE TECHNIQUE)
E249.1	NICKEL (AA, DIRECT ASPIRATION)
E249.2	NICKEL (AA, FURNACE)

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
E258.1	POTASSIUM BY AA, DIRECT ASPIRATION
E270.1	SELENIUM (AA, DIRECT ASPIRATION)
E270.2	SELENIUM (AA, FURNACE)
E270.3	SELENIUM (AA, HYDRIDE)
E272.1	SILVER (AA, DIRECT ASPIRATION)
E272.2	SILVER (AA, FURNACE)
E273.1	SODIUM (AA, DIRECT ASPIRATION)
E273.2	SODIUM (AA, FURNACE TECHNIQUE)
E279.1	THALLIUM (AA, DIRECT ASPIRATION)
E279.2	THALLIUM (AA, FURNACE)
E283.1	TITANIUM (AA, DIRECT ASPIRATION)
E283.2	TITANIUM (AA, FURNACE TECHNIQUE)
E286.1	VANADIUM (AA, DIRECT ASPIRATION)
E286.2	VANADIUM (AA, FURNACE TECHNIQUE)
E289.1	ZINC (AA, DIRECT ASPIRATION)
E289.2	ZINC (AA, FURNACE)
E300	DETERMINATION OF INORGANIC ANIONS IN WATER BY ION CHROMATOGRAPHY
E305.1	ACIDITY (TITRIMETRIC)
E310.1	ALKALINITY (TITRIMETRIC)
E310.2	ALKALINITY COLORIMETRIC, METHYL
E325.1	CHLORIDE (COLORIMETRIC, AUTOMATED FERRICYANIDE AAI)
E325.2	CHLORIDE, AS CL (COLORIMETRIC, AUTOMATED FERRICYANIDE AAII)
E325.3	CHLORIDE (TITRIMETRIC, MERCURIC NITRATE)
E330.2	CHLORINE, TOTAL RESIDUAL (TITRIMETRIC, BACK, IODOMETRIC)
E335.1	CYANIDES, AMENABLE TO CHLORINATION (TITRIMETRIC; SPECTROPHOTOMETRIC)
E335.2	TOTAL CYANIDE
E335.3	TOTAL CYANIDE (COLORIMETRIC, AUTOMATED UV)
E340.1	FLUORIDE (COLORIMETRIC)
E340.2	FLUORIDE (POTENTIOMETRIC, ION SELECTIVE ELECTRODE)
E340.3	FLUORIDE (COLORIMETRIC, AUTOMATED COMPLEXONE)
E345.1	IODIDE (TITRIMETRIC)
E350.1	NITROGEN (AMMONIA-COLORIMETRIC, AUTOMATED PHENATE)
E350.3	NITROGEN, AMMONIA (POTENTIOMETRIC, ION SELECTIVE ELECTRODE)
E351.2	NITROGEN, KJELDAHL, TOTAL (COLORIMETRIC SEMI-AUTOMATED BLOCK DIGESTER, AAII)
E351.3	NITROGEN, KJELDAHL, TOTAL (COLORIMETRIC; TITRIMETRIC; POTENTIOMETRIC)
E351.4	NITROGEN, KJELDAHL, TOTAL (POTENTIOMETRIC, ION SELECTIVE ELECTRODE)
E352.1	NITROGEN (NITRATE - COLORIMETRIC BRUCINE)
E353.1	NITROGEN, NITRATE-NITRITE (COLORIMETRIC AUTOMATED, HYDRAZINE
E353.2	NITROGEN, NITRATE-NITRITE (COLORIMETRIC AUTOMATED, CADMIUM REDUCTION)
E353.3	NITROGEN, NITRATE-NITRITE
E354.1	NITROGEN, NITRITE (SPECTROPHOTOMETRIC)
E360.1	OXYGEN DISSOLVED (MEMBRANE ELECTRODE)
E365.1	PHOSPHORUS, ALL FORMS (COLORIMETRIC, AUTOMATED, ASCORBIC ACID)
E365.2	PHOSPHORUS, ALL FORMS (AS P)
E365.3	PHOSPHORUS, ALL FORMS (COLORIMETRIC, ASCORBIC ACID, TWO REAGENT)
E365.4	PHOSPHORUS, TOTAL (COLORIMETRIC, AUTOMATED BLOCK DIGESTOR AAII)
E370.1	SILICA, DISSOLVED (COLORIMETRIC)
E375.1	SULFATE, COLORIMETRIC, AUTOMATED CHLORANILATE
E375.2	SULFATE, COLORIMETRIC, AUTOMATED METHYLTHYMOL BLUE, AAII
E375.3	SULFATE (AS SO4), GRAVIMETRIC
E375.4	SULFATE (AS SO4), TURBIDIMETRIC
E376.2	SULFIDE (COLORIMETRIC, METHYLENE BLUE)
E377.1	SULFITE (TITRIMETRIC)
E405.1	BIOCHEMICAL OXGEN DEMAND
E410.1	CHEMICAL OXYGEN DEMAND
E410.2	CHEMICAL OXYGEN DEMAND
E410.3	COD (TITRIMETRIC, HIGH LEVEL FOR SALINE WATERS)
E410.4	CHEMICAL OXYGEN DEMAND (COLORIMETRIC, AUTOMATED MANUAL)
E413.1	OIL AND GREASE, TOTAL RECOVERABLE (GRAVIMETRIC)
E413.2	OIL AND GREASE, TOTAL RECOVERABLE (SPECTROPHOTOMETRIC IR)
E415.1	TOTAL ORGANIC CARBON (COMBUSTION OR OXIDATION)
E415.2	TOTAL ORGANIC CARBON (UV PROMOTED, PERSULFATE OXIDATION)
E418.1	PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE (SPECTROPHOTO IR)

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
E420.1	PHENOLICS, TOTAL RECOVERABLE (SPECTROPHOTOMETRIC, MAN. 4-AAP)
E425.1	METHYLENE BLUE ACTIVE SUBSTANCES (MBAS)
E430.2	NTA (COLORIMETRIC, AUTOMATED, ZINC-ZINCON)
E450.1	TOTAL ORGANIC HALIDES (TOX)
E501.1	TRIHALOMETHANES
E502.1	VOLATILE HALOGENATED ORGANIC COMPOUNDS
E502.2	VOC IN WATER,PRGE/TRAP CAPLARY COLMN GC (PHOTOIONIZATN/ELECTROLYTC COND. DETECTORS SERIES)
E503.1	VOLATILE AROMATIC AND UNSATURATED ORGANIC COMPOUNDS
E504	1,2-DIBROMOETHANE AND 1,2-DIBROMO-3-CHLOROPROPANE
E505	ORGANOHALIDE PESTICIDES AND AROCLORS (MICROEXTRACTION)
E507	DETERMINATION OF NITROGEN AND PHOSPHORUS CONTAINING PESTICIDES IN
E508	DETERMINATION OF CHLORINATED PESTICIDES IN GROUND WATER
E510.1	DETERMINATION OF THE MAXIMUM TOTAL TRIHALOMETHANE POTENTIAL
E515	DETERMINATION OF CHLORINATED HERBICIDES IN DRINKING WATER
E524	MEASUREMENT OF PURGEABLE ORGANIC COMPOUNDS IN DRINKING WATER
E524.1	VOLATILE ORGANIC COMPOUNDS IN WATER BY PURGE AND TRAP GC/MS
E524.2	VOLATILE ORGANIC COMPOUNDS IN PURGE AND TRAP CAPILLARY COLUMN GC/MS
E601	PURGEABLE HALOCARBONS
E602	PURGEABLE AROMATICS
E603	ACROLEIN AND ACRYLONITRILE
E604	PHENOLS
E605	BENZIDINES
E606	PHTHALATE ESTERS
E607	NITROSAMINES
E608	ORGANOCHLORINE PESTICIDES AND PCBS
E609	NITROAROMATICS AND ISOPHORONE
E610	POLYNUCLEAR AROMATIC HYDROCARBONS
E611	HALOETHERS
E612	CHLORINATED HYDROCARBONS
E613	2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN
E614	DETERMINATION OF ORGANOPHOSPHORUS PESTICIDES IN WASTEWATER
E615	CHLORINATED HERBICIDES IN INDUSTRIAL AND MUNICIPAL WASTEWATER
E617	DETERMINATION OF CARBOPHENOTHION IN WASTEWATER
E619	DETERMINATION OF TRIAZINE PESTICIDES IN WASTEWATER
E624	VOLATILE ORGANICS GC/MS
E625	EXTRACTABLE PRIORITY POLLUTANTS (BASE/NEUTRAL AND ACID)
E632	DETERMINATION OF CARBAMATE AND UREA PESTICIDES IN WASTEWATER
G51	PH OF SOIL FOR USE IN CORROSION TESTING
N0500	TOTAL DUST
N0600	NUISANCE DUST, RESPIRABLE
N1000	ALLYL CHLORIDE
N1002	CHLOROPRENE
N1003	HALOGENATED HYDROCARBONS
N1004	SYM-DICHLOROETHYL ETHER
N1005	METHYLENE CHLORIDE
N1007	VINYL CHLORIDE
N1008	ETHYLENE DIBROMIDE
N1009	VINYL BROMIDE
N1010	EPICHLOROHYDRIN
N1011	ETHYL BROMIDE
N1012	DIBROMODIFLUOROMETHANE
N1013	1,2-DICHLOROPROPANE
N1014	METHYL IODIDE
N1300	KETONES I
N1301	KETONES II
N1400	ALCOHOLS I
N1401	ALCOHOLS II
N1402	ALCOHOLS III
N1403	ALCOHOLS IV
N1450	ESTERS I
N1500	HYDROCARBONS, BP 36-126 C
N1501	AROMATIC HYDROCARBONS IN AIR
N1550	NAPHTHAS

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
N1551	TURPENTINE
N1600	CARBON DISULFIDE
N1601	1,1-DICHLORO-1-NITROETHANE
N1602	DIOXANE
N1603	ACETIC ACID
N1604	ACRYLONITRILE
N1606	ACETONITRILE
N1607	ETHYLENE OXIDE
N1608	GLYCIDOL
N1609	TETRAHYDROFURAN
N1610	ETHYL ETHER
N1611	METHYLAL
N1612	PROPYLENE OXIDE
N173	METAL BY ATOMIC ABSORTION
N189	ANTIMONY
N2000	METHANOL
N2001	CRESOL, ALL ISOMERS
N2002	AMINES, AROMATIC
N2003	1,1,2,2-TETRABROMOETHANE (ACETYLENETETRA BROMIDE)
N2004	DIMETHYLACETAMIDE AND DIMETHYLFORMAMIDE
N2005	NITROBENZENES
N2007	AMINOETHANOL COMPOUNDS
N209	CHLORINE
N217	BENZENE SOLUBLES
N219	PHOSGENE
N221	ALIPHATIC AMINES
N236	4,4'-METHYLENE-BIS-(2-CHLOROANILINE)
N2500	2-BUTANONE
N2501	ACROLEIN
N2502	FORMALDEHYDE
N2503	MEVINPHOS
N2504	TETRAETHYL PYROPHOSPHATE
N2506	ACETONE CYANOHYDRIN
N2507	NITROGLYCERIN AND ETHYLENE GLYCOL DINITRATE
N2508	ISOPHORONE
N2510	1-OCTANETHIOL
N2513	ETHYLENE CHLOROHYDRIN
N2514	ANISIDINE
N2515	DIAZOMETHANE
N2516	DICHLOROFLUOROMETHANE
N2517	PENTACHLOROETHANE
N2518	HEXACHLORO-1,3-CYCLOPENTADIENE
N2519	ETHYL CHLORIDE
N2520	METHYL BROMIDE
N2521	METHYLCYCLOHEXANONE
N2523	1,3-CYCLOPENTADIENE
N2524	DIMETHYL SULFATE
N269	4-AMINOBIPHENYL
N272	2-NITROPROPANE
N273	4-NITROBIPHENYL
N276	ETHYLENE DIAMINE
N278	VINYL ACETATE
N331	METHYL ETHYL KETONE PEROXIDE
N3500	FORMALDEHYDE
N3501	FORMALDEHYDE
N3502	PHENOL
N3503	HYDRAZINE
N3505	TETRAMETHYL THIOUREA
N3506	ACETIC ANHYDRIDE
N5000	CARBON BLACK
N5001	2,4-D AND 2,4,5-T
N5002	WARFARIN
N5003	PARAQUAT
N5004	HYDROQUINONE

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
N5005	THIRAM
N5006	CARBARYL
N5007	ROTENONE
N5008	PYRETHRUM
N5009	BENZOYL PEROXIDE
N5010	BROMOXYNIL AND BROMOXYNIL OCTANOATE
N5011	ETHYLENE THIOUREA
N5012	EPN, MALATHION, AND PARATHION
N5013	DYES, BENZIDINE-, O-TOLIDINE, O-DIANISIDINE
N5014	CHLORINATED TERPHENYL (60% CHLORINE)
N5016	STRYCHNINE
N5017	DIBUTYL PHOSPHATE
N5018	2,4,7-TRINITROFLUOREN-9-ONE
N5019	AZELAIC ACID
N5020	DIBUTYL PHTHALATE AND DI (2-ETHYLHEXYL) PHTHALATE
N5021	O-TERPHENYL
N5022	ARSENIC, ORGANO
N5023	COAL TAR PITCH VOLATILES
N5500	ETHYLENE GLYCOL
N5502	ALDRIN AND LINDANE
N5503	POLYCHLOROBIPHENYLS (PCB'S)
N5505	ISOCYANATE GROUP
N5506	POLYNUCLEAR AROMATIC HYDROCARBONS (HPLC)
N5508	KEPONE
N5509	BENZIDINE AND 3,3'-DICHLOROBENZIDINE
N5514	DEMETON
N5515	POLYNUCLEAR AROMATIC HYDROCARBONS (GC)
N6000	MERCURY
N6001	ARSINE
N6402	PHOSPHORUS TRICHLORIDE
N6600	NITROUS OXIDE
N6601	OXYGEN
N6700	NITROGEN DIOXIDE
N6701	AMMONIA
N7013	ALUMINUM AND COMPOUNDS, AS AL
N7020	CALCIUM AND COMPOUNDS, AS CA
N7024	CHROMIUM AND COMPOUNDS, AS CR
N7027	COBALT AND COMPOUNDS, AS CO
N7029	COPPER (DUST AND FUME)
N7030	ZINC AND COMPOUNDS, AS ZN
N7048	CADMIUM AND COMPOUNDS, AS CD
N7074	TUNGSTEN (SOLUBLE AND INSOLUBLE)
N7082	LEAD
N7102	BERYLLIUM AND COMPOUNDS, AS BE
N7200	WELDING AND BRAZING FUME
N7300	ELEMENTS (INDUCTIVELY COUPLED PLASMA)
N7400	FIBERS, ASBESTOS IN AIR
N7500	SILICA, CRYSTALLINE, RESPIRABLE
N7501	SILICA, AMORPHOUS
N7502	ZINC OXIDE
N7505	LEAD SULFIDE
N7506	BORON CARBIDE
N7600	CHROMIUM, HEXAVALENT
N7601	SILICA, CRYSTALLINE
N7602	SILICA, CRYSTALLINE (IR)
N7900	ARSENIC AND COMPOUNDS, AS AS
N7901	ARSENIC TRIOXIDE, AS AS
N7902	FLUORIDES (AEROSOL AND GAS)
N7903	ACIDS, INORGANIC
N7904	CYANIDES, AEROSOL AND GAS
S100	HEXACHLORONAPHTHALENE
S102	FLUOROTRICHLOROMETHANE
S108	DICHLOROTETRAFLUOROETHANE
S111	DICHLORODIFLUOROMETHANE

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
S124	1,1,2,2-TETRACHLOROETHANE
S125	TRIFLUOROBROMOMETHANE
S126	1,2,3-TRICHLOROPROPANE
S128	TRICHLORONAPHTHALENE
S129	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE
S130	TETRACHLORONAPHTHALENE
S131	1,1,1,2-TETRACHLORODIFLUOROETHANE
S132	1,1,2,2-TETRACHLORODIFLUOROETHANE
S134	1,1,2-TRICHLOROETHANE
S149	METHYL HYDRAZINE
S150	MORPHOLINE
S153	MONOMETHYLANILINE
S155	TETRAMETHYL SUCCINONITRILE
S158	2-AMINOPYRIDINE
S160	PHENYL HYDRAZINE
S161	PYRIDINE
S179	PHTHALIC ANHYDRIDE
S181	QUINONE
S187	TELLURIUM HEXAFLUORIDE
S188	RHODIUM (FUME AND DUST)
S189	RHODIUM (SOLUBLE)
S208	TRIBUTYL PHOSPHATE
S209	TRIORTHOCRESYL PHOSPHATE
S210	TRIPHENYL PHOSPHATE
S214	DINITROBENZENE
S215	DINITROTOLUENE
S219	NITROETHANE
S224	TETRANITROMETHANE
S225	TETRYL
S227	N-PROPYL NITRATE
S228	PICRIC ACID
S24	DIPHENYL
S244	SULFUR HEXAFLUORIDE
S249	CARBON DIOXIDE
S272	OIL MIST
S274	DDT ISOMERS
S278	CHLORDANE
S293	NICOTINE
S297	PENTACHLOROPHENOL
S308	SULFUR DIOXIDE
S335	TETRACHLOROETHYLENE
S336	TRICHLOROETHYLENE (TCE)
S340	CARBON MONOXIDE
S346	ALLYL GLYCIDYL ETHER
S350	N-BUTYL MERCAPTAN
S36	ETHYL FORMATE
S365	FURFURYL ALCOHOL
S368	ISOPROPYL ETHER
S374	METHYLCYCLOHEXANOL
S38	METHYL ACRYLATE
S383	TETRAETHYL LEAD
S385	TITANIUM DIOXIDE
S39	METHYL CELLUSOLVE ACETATE
S4	HYDROGEN SULFIDE
S42	METHYL ACETATE
S49	ETHYL ACETATE
S50	ISOPROPYL ACETATE
S67	CHLORINATED CAMPHENE (TOXAPHENE)
S69	DIPROPYLENE GLYCOL METHYL ETHER
S72	PHENYL ETHER
S73	PHENYL ETHER-BIPHENYL MIXTURE
S74	PHENYL GLYCIDYL ETHER
S77	ISOPROPYL GLYCIDYL ETHER
S8	OZONE

ATTACHMENT A
ACCEPTABLE ENTRIES FOR METHOD

METHOD	METHOD DESCIPTION
S81	N-BUTYL GLYCIDYL ETHER
S87	PROPANE
S91	BUTADIENE
S93	LIQUID PETROLEUM GAS
S96	PENTACHLORONAPHTHALENE
S97	OCTACHLORONAPHTHALENE
S99	METHYL CHLORIDE
SW1010	FLASH POINT (CLOSED CUP TESTER)
SW1020	SETAFLASH CLOSED-CUP METHOD FOR DETERMINING IGNITABILITY
SW1110	CORROSIVITY TOWARD STEEL
SW3810	HEADSPACE
SW3820	HEXADECANE EXTRACTION AND SCREENING OF PURGEABLE ORGANICS
SW6010	INDUCTIVELY COUPLED PLASMA ATOMIC EMISSION SPECTROSCOPY
SW7020	ALUMINUM (AA, DIRECT ASPIRATION)
SW7040	ANTIMONY (AA, DIRECT ASPIRATION)
SW7041	ANTIMONY (AA, FURNACE TECHNIQUE)
SW7060	ARSENIC (AA, FURNACE TECHNIQUE)
SW7061	ARSENIC (AA, GASEOUS HYDRIDE)
SW7080	BARIUM (AA, DIRECT ASPIRATION)
SW7090	BERYLLIUM (AA, DIRECT ASPIRATION)
SW7091	BERYLLIUM (AA, FURNACE TECHNIQUE)
SW7130	CADMIUM (AA, DIRECT ASPIRATION)
SW7131	CADMIUM (AA, FURNACE TECHNIQUE)
SW7140	CALCIUM (AA, DIRECT ASPIRATION)
SW7190	CHROMIUM (AA, DIRECT ASPIRATION)
SW7191	CHROMIUM (AA, FURNACE TECHNIQUE)
SW7195	CHROMIUM, HEXAVALENT (COPRECIPITATION)
SW7196	CHROMIUM, HEXAVALENT (COLORIMETRIC)
SW7197	CHROMIUM, HEXAVALENT (CHELATION/EXTRACTION)
SW7198	CHROMIUM, HEXAVALENT (DIFFERENTIAL PULSE POLAROGRAPHY)
SW7200	COBALT (AA, DIRECT ASPIRATION)
SW7201	COBALT (AA, FURNACE TECHNIQUE)
SW7210	COPPER (AA, DIRECT ASPIRATION)
SW7211	COPPER (FURNACE)
SW7380	IRON (AA, DIRECT ASPIRATION)
SW7420	LEAD (AA, DIRECT ASPIRATION)
SW7421	LEAD (AA, FURNACE TECHNIQUE)
SW7450	MAGNESIUM (AA, DIRECT ASPIRATION)
SW7460	MANGANESE (AA, DIRECT ASPIRATION)
SW7470	MERCURY IN LIQUID WASTE (MANUAL COLD-VAPOR TECHNIQUE)
SW7471	MERCURY IN SOLID OR SEMISOLID WASTE (MANUAL COLD-VAPOR TECH)
SW7480	MOLYBDENUM (AA, DIRECT ASPIRATION)
SW7481	MOLYBDENUM (AA, FURNACE TECHNIQUE)
SW7520	NICKEL (AA, DIRECT ASPIRATION)
SW7550	OSMIUM (AA, DIRECT ASPIRATION)
SW7610	POTASSIUM (AA, DIRECT ASPIRATION)
SW7740	SELENIUM (AA, FURNACE TECHNIQUE)
SW7741	SELENIUM (AA, GASEOUS HYDRIDE)
SW7760	SILVER (AA, DIRECT ASPIRATION)
SW7770	SODIUM (AA, DIRECT ASPIRATION)
SW7840	THALLIUM (AA, DIRECT ASPIRATION)
SW7841	THALLIUM (AA, FURNACE TECHNIQUE)
SW7870	TIN (AA, DIRECT ASPIRATION)
SW7910	VANADIUM (AA, DIRECT ASPIRATION)
SW7911	VANADIUM (AA, FURNACE TECHNIQUE)
SW7950	ZINC (AA, DIRECT ASPIRATION)
SW8010	HALOGENATED VOLATILE ORGANICS
SW8015	NONHALOGENATED VOLATILE ORGANICS
SW8020	AROMATIC VOLATILE ORGANICS
SW8030	ACROLEIN, ACRYLONITRILE, ACETONITRILE
SW8040	PHENOLS
SW8060	PHTHALATE ESTERS
SW8080	ORGANOCHLORINE PESTICIDES AND PCBS
SW8090	NITROAROMATICS AND CYCLIC KETONES

ATTACHMENT A
ACCEPTABLE ENTRIES FOR UNIT

UNIT	UNIT DESCIPTION
%	PERCENT
%MASS	PERCENT MASS
%RECOV	PERCENT RECOVERED
%VOL	PERCENT VOL
BBL	BARRELS
CONC	CONCENTRATION
CUYD	CUBIC YARDS
DAY	DAYS
DEG C	DEGREES CENTIGRADE
DEG F	DEGREES FAHRENHEIT
FT	FEET
G	GRAMS
G/CM3	GRAMS PER CUBIC CENTIMETER
G/L	GRAMS PER LITER
G/ML	GRAMS PER MILLILITER
G/SEC	GRAMS PER SECOND
GAL	GALLONS
GAL/M	GALLONS PER MINUTE
GL	GALLONS
GPM	GALLONS PER MINUTE
L/HR	LITERS PER HR
L/M	LITERS PER MINUTE
LB	POUNDS
LB/CF	POUNDS PER CUBIC FT
LB/DAY	POUNDS PER DAY
LB/GAL	POUNDS PER GALLON
LB/HR	POUNDS PER HOUR
LB/YR	POUNDS PER YEAR
LT	LITERS
MG	MILLIGRAMS
MG/KG	MILLIGRAMS PER KILOGRAM
MG/L	MILLIGRAMS PER LITER
MGAL	1000 GALLONS
MGD	MILLION GALLONS PER DAY
ML	MILLILITERS
ML/SEC	MILLILITERS PER SECOND
MMGD	MILLION GALLONS PER DAY
MPCT	MASS PERCENT
NA	NOT APPLICABLE
NA(PH)	N/A STANDARD UNITS FOR PH
PPB	PARTS PER BILLION
PPBV	PARTS PER BILLION BY VOLUME
PPM	PARTS PER MILLION
PPMM	PARTS PER MILLION BY MASS
PPMV	PARTS PER MILLION BY VOLUME
SG H20	SPECIFIC GRAVITY OF WATER
TGAL	1000 GALLONS

ATTACHMENT A
ACCEPTABLE ENTRIES FOR UNIT

UNIT	UNIT DESCIPTION
UG	MICROGRAMS
UG/KG	MICROGRAMS PER KILOGRAM
UG/L	MICROGRAMS PER LITER
UL	MICROLITERS
VCONC	CONCENTRATION BY VOLUME

ATTACHMENT B
ARC/INFO DATA REQUIREMENTS

ENVIRONMENTAL

DoD Underground Storage Tank (UST) Groundwater Monitoring Well Locations

Description	**UST Groundwater Monitoring Well Locations**	
Coverage Type	**Point**	
Creation Date	**May 22, 1997**	
File Name	**ehustloc**	
Attribute Information	**Points attributed by well ID, coordinates, site, purpose, status, source, and coordinate system**	
Time Period of Content	**September 1996 through May 1997**	
Status	Progress:	**Complete - Last Update: June 23, 1997**
Source Information	Scale: Media:	
	Process Description:	**Conventional surveying or survey grade GPS unit used to collect coordinate data. Tabular data used to generate the coverage in ARC/INFO.**
Spatial Reference System	Coordinate System: Horizontal Datum:	**UTM GRS 1980 Spheriod** **NAD 1983**
Point of Contact	**Mr. Rich Bonelli** **Mr. Mike Kuhn**	**(412) 269-2033** **(412) 269-6149**

USER-DEFINED ATTRIBUTES

1	2	3	4	5	6	7	8
WELL_ID	XCOORD	YCOORD	SITE	WELL_PURP	STATUS	SOURCE	COORD_SYS
X(30)	X(14)	X(14)	X(10)	X(30)	X(10)	X(10)	X(15)

1. WELL_ID — Well Identification
2. XCOORD — UTM Easting Coordinate
3. YCOORD — UTM Northing Coordinate
4. SITE — Site Designation
5. *WELL_PURP — Well Purpose Description
6. **STATUS — Well Activity
7. ***SOURCE — Coordinate Source
8. COORD_SYS — Coordinate System

* **MONITORING WELL**
RECOVERY WELL

** **ACTIVE** = Well currently at site
ABANDONED = Well removed or destroyed

*** **SURVEYED** = Surveyed coordinates (GPS or conventional)
MAPPING = Estimated coordinates using hardcopy mapping provided by contractor

ENVIRONMENTAL

DoD Installation Restoration Program (IRP) Groundwater Monitoring Well Locations

Description	**IRP Groundwater Monitoring Well Locations**	
Coverage Type	**Point**	
Creation Date	**May 22, 1997**	
File Name	**ehirloc**	
Attribute Information	**Points attributed by well ID, coordinates, site, purpose, status, source, and coordinate system**	
Time Period of Content	**September 1996 through May 1997**	
Status	Progress:	**Complete - Last Update: June 23, 1997**
Source Information	Scale: Media:	
	Process Description:	**Conventional surveying or survey grade GPS unit used to collect coordinate data. Tabular data used to generate the coverage in ARC/INFO.**
Spatial Reference System	Coordinate System: Horizontal Datum:	**UTM GRS 1980 Spheriod** **NAD 1983**
Point of Contact	**Mr. Rich Bonelli** **Mr. Mike Kuhn**	**(412) 269-2033** **(412) 269-6149**

USER-DEFINED ATTRIBUTES

1	2	3	4	5	6	7	8
WELL_ID	XCOORD	YCOORD	SITE	WELL_PURP	STATUS	SOURCE	COORD_SYS
X(30)	X(14)	X(14)	X(10)	X(30)	X(10)	X(10)	X(15)

1. WELL_ID — Well Identification
2. XCOORD — UTM Easting Coordinate
3. YCOORD — UTM Northing Coordinate
4. SITE — Site Designation
5. *WELL_PURP — Well Purpose Description
6. **STATUS — Well Activity
7. ***SOURCE — Coordinate Source
8. COORD_SYS — Coordinate System

* **MONITORING WELL**
RECOVERY WELL

** **ACTIVE** = Well currently at site
ABANDONED = Well removed or destroyed

*** **SURVEYED** = Surveyed coordinates (GPS or conventional)
MAPPING = Estimated coordinates using hardcopy mapping provided by contractor

ENVIRONMENTAL

DoD Potable Water Supply Well Locations

Description	**Potable Supply Well Locations**	
Coverage Type	**Point**	
Creation Date	**May 22, 1997**	
File Name	**ehsuploc**	
Attribute Information	**Points attributed by well ID, coordinates, region, status, source, and coordinate system**	
Time Period of Content	**September 1996 through May 1997**	
Status	Progress:	**Complete - Last Update: June 23, 1997**
Source Information	Scale: Media:	
	Process Description:	**Survey grade GPS unit used to collect coordinate data. Tabular data used to generate the coverage in ARC/INFO.**
Spatial Reference System	Coordinate System: Horizontal Datum:	**UTM GRS 1980 Spheriod** **NAD 1983**
Point of Contact	**Mr. Rich Bonelli** **Mr. Mike Kuhn**	**(412) 269-2033** **(412) 269-6149**

USER-DEFINED ATTRIBUTES

1	2	3	4	5	6	7
WELL_ID	XCOORD	YCOORD	REGION	STATUS	SOURCE	COORD_SYS
X(30)	X(14)	X(14)	X(30)	X(10)	X(10)	X(15)

1. WELL_ID — Well Identification
2. XCOORD — UTM Easting Coordinate
3. YCOORD — UTM Northing Coordinate
4. REGION — Area Designation
5. *STATUS — Well Activity
6. **SOURCE — Coordinate Source
7. COORD_SYS — Coordinate System

* **ACTIVE** = Well in production
INACTIVE = Well not in use
ABANDONED = Well removed or destroyed

** **SURVEYED** = Survey grade GPS coordinates

TABLES

TABLE 3-1

SUMMARY OF WELL CONSTRUCTION DETAILS
LONG-TERM MONITORING PLAN
OPERABLE UNIT NO. 7 - SITES 1 AND 28
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number	Date Installed	Top of Casing Elevation (feet, msl)	Ground Surface Elevation (feet, msl)	Boring Depth (feet, bgs)	Well Depth (feet, bgs)	Screen Interval Depth (feet, bgs)	Depth to Bentonite (feet, bgs)	Depth to Sand Pack (feet, bgs)	Stick-Up (feet, ags)
SITE 1									
1-GW01	1984	16.5	13.3	NA	24	NA	NA	NA	3.2
1-GW02	1984	17.95	15.7	NA	23	9.0 - 23.0	NA	NA	2.3
1-GW03	1984	21.78	19.7	NA	23	9.0 - 23.0	NA	NA	2.1
1-GW10	1994	18.07	15.3	24	24	9.1 - 23.4	5.0	7.0	2.8
1-GW11	1994	13.18	10.4	17	17	2.0 - 16.4	0.5	1.0	2.8
1-GW12	1994	16.33	13.8	17	17	3.1 - 17.3	0.5	2.0	2.5
1-GW17	1994	23.00	20.1	25	25	10 - 24.3	6.0	8.0	3.0
1-GW17DW	1994	21.91	19.1	122	122	105 - 120	92.0	97.0	2.8
SITE 28									
28-GW01	1994	7.34	4.8	17	17	2.5 - 16.2	0.0	1.5	2.5
28-GW01DW	1994	7.49	5.5	134	133	117 - 132	107.0	111.0	2.1
28-GW02	1984	5.96	4.8	NA	16.5	2.5 - 16.5	NA	NA	1.6
28-GW04	1984	8.17	4.4	NA	29.02	NA	NA	NA	3.8
28-GW07	1994	6.62	3.8	18	18	2.5 - 17.5	0.0	0.5	2.8
28-GW07DW	1994	6.03	3.6	132	131	114 - 129	104.0	109.0	2.4
28-GW08	1994	14.16	11.6	24	24	7.9 - 22.7	4.0.0	6.0	2.6

Notes:

ags = above ground surface
msl = mean sea level
bgs = below ground surface
NA = Information not available

TABLE 3-2

SAMPLE SUMMARY MATRIX
LONG-TERM MONITORING PLAN
OPERABLE UNIT NO. 7 - SITES 1 AND 28
MCB, CAMP LEJEUNE, NORTH CAROLINA

Location	Media	TCL Volatiles[1]	TAL Metals[2]
SITE 1			
1-GW01	GW	X	
1-GW02	GW	X	
1-GW03	GW	X	
1-GW10	GW	X	
1-GW11	GW	X	
1-GW12	GW	X	
1-GW17	GW	X	
1-GW17DW	GW	X	
SITE 28			
28-GW01	GW		X
28-GW01DW	GW		X
28-GW02	GW		X
28-GW04	GW		X
28-GW07	GW		X
28-GW07DW	GW		X
28-GW08	GW		X
28-SW01	SW		X
28-SW02	SW		X
28-SW03	SW		X
28-SD01	SD		X
28-SD02	SD		X
28-SD03	SD		X
Totals		8	13

Notes:

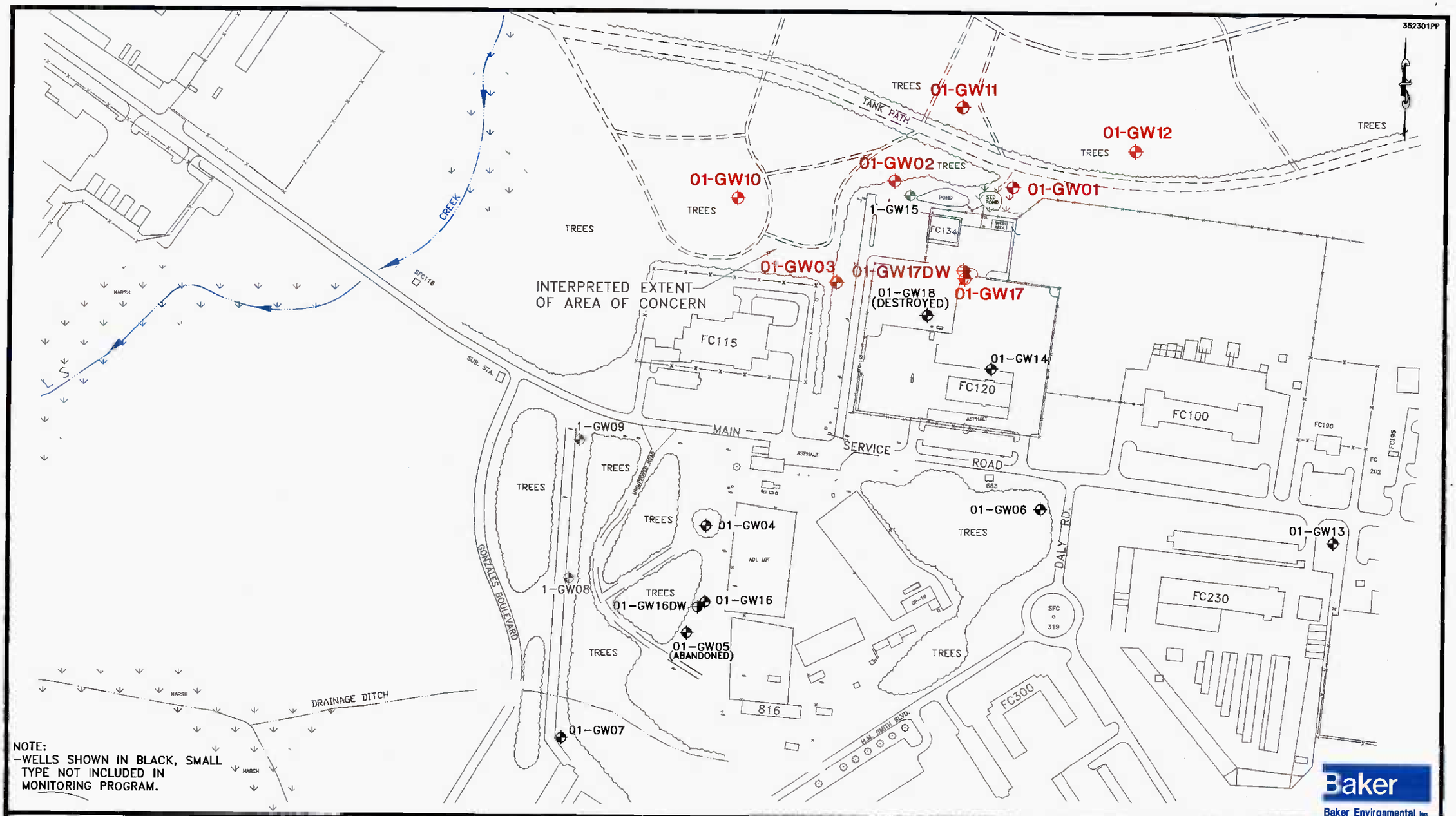
(1) Target Compound List Volatiles by U.S. Environmental Protection Agency, Contract Laboratory Program, Statement of Work, Document Number OLM01.8.

(2) Target Analyte List Metals by U.S. Environmental Protection Agency, Contract Laboratory Protocol, Statement of Work, Document Number ILM03.0.

X = Requested analysis
GW = Groundwater
SW = Surface Water
SD = Sediment

FIGURES

352301PP



NOTE:
–WELLS SHOWN IN BLACK, SMALL TYPE NOT INCLUDED IN MONITORING PROGRAM.

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LEGEND

- 01–GW07 — SHALLOW MONITORING WELL
- 01–GW16DW — DEEP MONITORING WELL
- APPROXIMATE SURFACE WATER FLOW DIRECTION
- 1–GW18 — NOTE: MONITORING WELL 01–GW18 WAS DESTROYED

SOURCE: LANTDIV, FEBRUARY 1992 AND W.K. DICKSON & ASSOC., JUNE 1994

300 0 150 300 600

1 inch = 300 ft.

FIGURE 3–1
SAMPLING LOCATION MAP
OPERABLE UNIT NO. 7 – SITE 1
MONITORING WORK PLANS, CTO – 0352

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

01769JJB1Y

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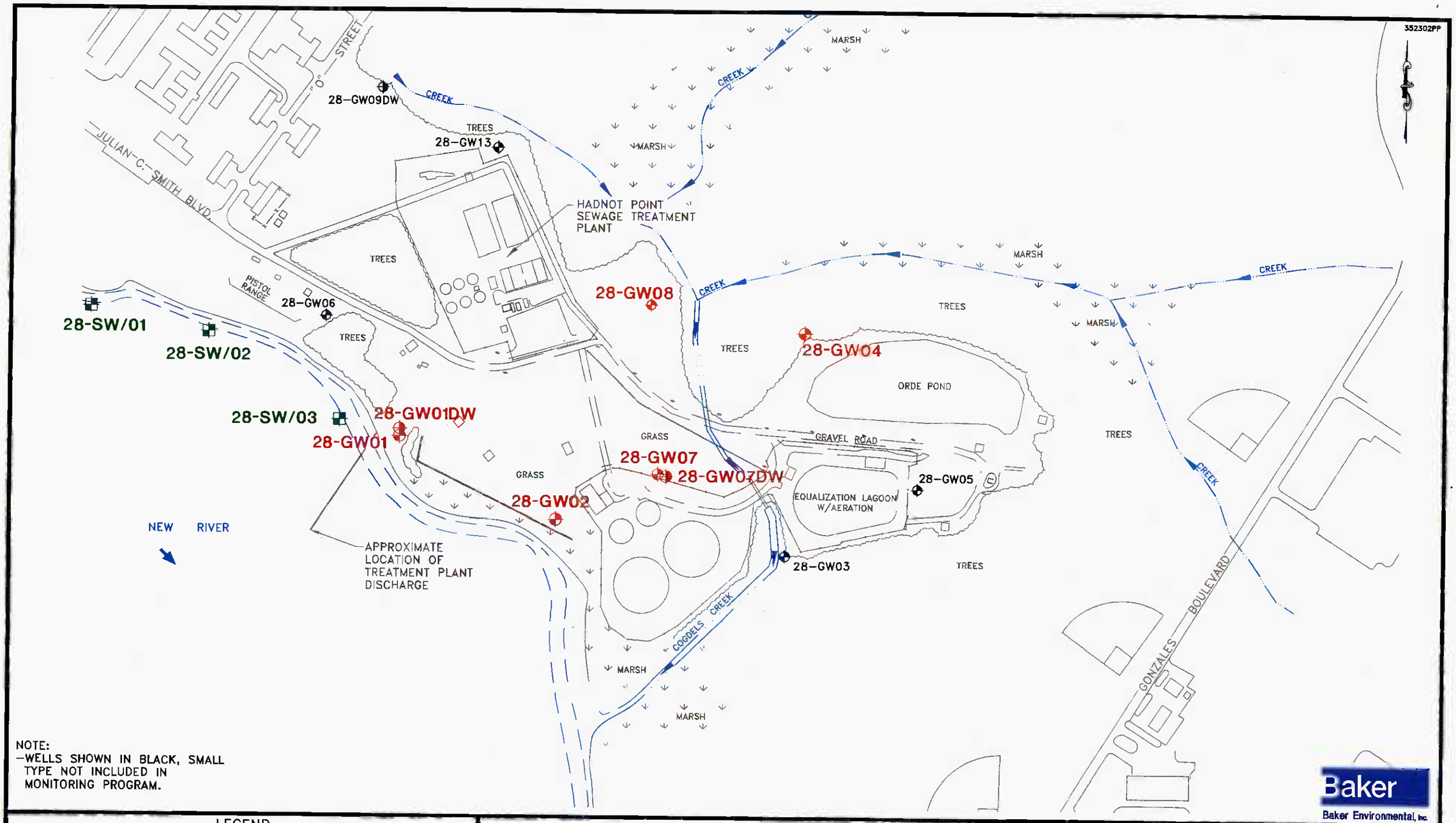

NOTE:
-WELLS SHOWN IN BLACK, SMALL TYPE NOT INCLUDED IN MONITORING PROGRAM.

LEGEND

- 28-GW01 — SHALLOW MONITORING WELL
- 28-GW01DW — DEEP MONITORING WELL
- 28-SW/SD01 — SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- APPROXIMATE SURFACE WATER FLOW DIRECTION

SOURCE: LANTDIV, FEBRUARY 1992 AND W.K. DICKSON, JUNE 1994

300 0 150 300 600

1 inch = 300 ft.

FIGURE 3-2
SAMPLING LOCATION MAP
OPERABLE UNIT NO. 7 – SITE 28
MONITORING WORK PLANS, CTO – 0352

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

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LIST OF ACRONYMS AND ABBREVIATIONS

OU	Operable Unit
FID	Flame Ionization Detector
PID	Photoionization Detector
QA/QC	Quality Assurance/Quality Control
RI	Remedial Investigation
ROD	Record of Decision
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WQP	Water Quality Parameter