

**MARINE CORPS BASE CAMP LEJEUNE**  
**UNDERGROUND STORAGE TANK MANAGEMENT PROGRAM**  
**PROGRAM STRATEGY PLAN**



**JUNE 22, 2009**

**NAVY CONTRACT NO.: N62470-05-D-6200**  
**DELIVERY ORDER NO.: 0074**

**PREPARED FOR:**

**NAVFAC MID-ATLANTIC**  
**and**  
**ENVIRONMENTAL QUALITY BRANCH**  
**ENVIRONMENTAL MANAGEMENT DIVISION**  
**MARINE CORPS BASE**  
**CAMP LEJEUNE, NORTH CAROLINA**

**PREPARED BY:**



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**MARINE CORPS BASE CAMP LEJEUNE**  
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**PROGRAM STRATEGY PLAN**

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**1.0 INTRODUCTION**

The Marine Corps Base (MCB) Camp Lejeune Underground Storage Tank (UST) Management Program (hereinafter referred to as the *Program*) may be defined as an organized set of activities, procedures and documents designed to address monitoring of leaking USTs, leaking above-ground storage tanks (ASTs), pipeline leaks, and petroleum oil and lubricant (POL) spill sites under the jurisdiction of the MCB Camp Lejeune Environmental Quality Branch (EQB). The primary objectives of the *Program* are to enable MCB Camp Lejeune to:

*Cost-Effectively Manage Monitoring Of Active UST Incidents*

*Meet Regulatory Permitting, Monitoring And Reporting Requirements*

*Achieve Site Closure At The Earliest Possible Date and at the Lowest Cost*

**2.0 SCOPE OF THE PROGRAM**

Although the primary emphasis of the *Program* is monitoring of UST incidents, the *Program* also encompasses releases of petroleum hydrocarbons from AST leaks, underground pipelines and POL spills. For reasons of simplicity, it is inferred herein that AST leaks, underground pipeline leaks and POL spill incidents are included whenever this document refers to UST sites.

The scope of the *Program* includes monitoring activities at both "monitoring only" sites and sites at which equipment-based active remediation systems are in place and operating. With respect to sites containing active remediation systems, the *Program* **does not** intend to cover operation and maintenance of remediation systems equipment per se; however, the *Program* **does** include collection of field data and analysis of samples at active remediation sites for the purpose of monitoring contaminant recovery rates, maintaining compliance with wastewater discharge permits, monitoring air emissions, and tracking groundwater and surface water quality.

Geographically speaking, the *Program* area includes MCB Camp Lejeune and Marine Corps Air Station (MCAS) New River. Management of all UST incidents at these locations falls within the jurisdiction of the EQB at MCB Camp Lejeune.

### 3.0 PROGRAM STEPS AND ELEMENTS

The benefits of the *Program* will include enhancement of EQB's ability to make informed management decisions without having to perform intensive reviews of voluminous data and information. Three steps necessary to enable EQB managers to make effective, timely and informed decisions include:

***Step 1: Collection Of Quality Field And Laboratory Data***

***Step 2: Effective Organization And Storage Of The Data***

***Step 3: Presentation Of Data, Findings And Conclusions In A Concise Format***

The major elements of the *Program*, through which the three program steps are carried out, are listed below and described in further detail herein. This *Program Strategy Plan* document is intended to describe, in general terms, the concept and operations of the *Program*. Figure 1 includes a *Conceptual Overview* of how the steps and major elements of the *Program* fit together.

### 4.0 STEP 1: DATA COLLECTION

At present, several contractors are involved in sampling and monitoring at UST sites including contractors performing petroleum hydrocarbon assessment and remedial design; remedial action construction; installation restoration activities; operation and maintenance of remedial systems; UST closures; and interim free product removal. Field and laboratory data will be transmitted by the various contractors to CATLIN for input into the *Geographic Information System (GIS) and Database*. To enhance efficiency and consistency in the transmittal and storage of data, the MCB Camp Lejeune Contractor's Electronic Data Deliverable Standards and Procedures and CATLIN's EDD Manual (see Appendix A) will be utilized by all contractors transmitting data.

Collection of quality data will be performed with the aid of a cost-effective monitoring plan. The *Sampling Plan* will be developed to act as a guide and/or workplan for EQB and contractors involved in monitoring UST sites. The *Sampling Plan*, developed by CATLIN for MCB Camp Lejeune, specifies locations, schedules, procedures and protocols designed to collect data at each UST incident site. It is envisioned that the data collected under the *Program* will consist primarily of field measurements obtained from groundwater monitoring wells and remediation system components; and laboratory analytical data associated with analysis of samples collected from groundwater monitoring wells, water supply wells, surface waters and remediation system wastestreams. More specifically, these data will typically include:

*Depth To Groundwater*  
*Free Product Thickness*  
*Groundwater pH*  
*Groundwater Temperature*  
*Dissolved Oxygen*  
*Laboratory Analytical Results*

In recognition that monitoring requirements will change over time, the *Sampling Plan* is structured in a manner that makes it easy to update. Copies of the *Sampling Plan* will be provided to contractors prior to each scheduled gauging/sampling event.

## **5.0 STEP 2: DATA ORGANIZATION AND STORAGE**

Organization and storage of the data will be accomplished using a database and shapefiles within a custom-designed *Geographic Information System (GIS)*. CATLIN will utilize the MCB Camp Lejeune GIS layers to produce an in-house GIS to accept, store and organize data in a manner that will provide for ease of data input and report generation.

The *GIS* will include, but not be limited to, site location maps, site base maps, monitoring well details, field measurements, and laboratory data. This *GIS* will be maintained at the office of CATLIN Engineers and Scientists in Wilmington, North Carolina. As indicated previously, CATLIN will receive data from contractors providing monitoring services to EQB and continually update the *GIS*.

## **6.0 STEP 3: PRESENTATION OF DATA, FINDINGS AND CONCLUSIONS**

Data, findings and conclusions will be presented in *Annual Monitoring Reports* prepared by CATLIN and/or monitoring contractors. These documents will be used to report results of monitoring performed during the preceding monitoring period.

*Annual Monitoring Reports* will be prepared and submitted to EQB following the monitoring period in which the monitoring activities were performed. Upon approval by EQB of suggested modifications to the activities specified in the *Sampling Plan*, updates to the *Sampling Plan* will be prepared by CATLIN and distributed to all *Sampling Plan* recipients.

### **6.1 ANNUAL MONITORING REPORTS**

The *Annual Monitoring Reports* will be structured to accomplish the dual objective of minimizing redundancy in reporting while providing for easy review by Navy and State personnel because of the standardized structure of the report. An example report Table of Contents is contained in Appendix B of this document.

The *Annual Monitoring Reports* are intended for use by a variety of potential "end-users" including EQB, environmental regulatory agencies, Naval Facilities Engineering Command – Mid-Atlantic (NAVFAC Mid-Atlantic), MCB Camp Lejeune Resident Officer in Charge of Construction (ROICC), and O&M Contractors. These reports will aid decision-makers, including EQB managers and regulatory officials, in their efforts to:

*Track Migration And Attenuation Of Dissolved-Phase Plumes*

*Track Migration And/Or Volume Reduction Of Free Product Plumes*

*Ensure Compliance With Surface Water Quality Standards*

*Monitor Quality Of Water Well Supplies*

*Evaluate Effectiveness Of Active Remediation Systems*

*Ensure Compliance With Treatment System Wastewater Discharge Permits*

*Monitor Treatment System Air Emissions*

There is a significant diversity in the status of UST incidents at MCB Camp Lejeune and MCAS New River. By categorizing the sites, we can refer to a "type" of site and communicate information regarding the status and magnitude of the UST incident without having to write a lengthy description. This will also allow writeups in the *Annual Monitoring Reports* to be brief. In general, UST sites subject to periodic monitoring under the *Program* fall into five main "types". For purposes of the *Program*, these types will be identified as follows:

**Type "A": *Pre-CAP Monitoring***

Sites for which the Corrective Action Plan (CAP) is in progress but not yet approved by North Carolina Department of Environment and Natural Resources (NCDENR).

**Type "B": *CAP Compliance Monitoring***

Sites for which the CAP and associated monitoring plan has been approved by NCDENR; however, the planned active remediation system has not been completed.

**Type "C": *Interim and Product Recovery***

Typically small, low priority/low risk *Monitoring* sites characterized by low levels of dissolved-phase hydrocarbons and/or low volume product

recovery for which a CAP may not be prepared.

**Type "D": *Remediation System Start-Up***

Sites at which remediation systems have recently been constructed and monitoring is being performed to optimize system operation and establish baseline, environmental quality.

**Type "E": *Active Remediation and Natural Attenuation Monitoring***

Sites at which an active remediation system is in full operation and sites at which natural degradation and attenuation is being employed as the primary cleanup technology; CAP has typically been prepared and approved by NCDENR for these sites.

## **7.0 MONITORING STRATEGY**

As indicated in Section 4.0, details of monitoring requirements and protocols will be specified in the *Sampling Plan*. This section of the *Program Strategy Plan* is intended to describe the rationale for:

*Establishing Monitoring Schedules*

*Selecting Monitoring Points*

*Targeting Field and Laboratory Parameters*

During the course of conducting an assessment and implementing a remediation strategy at UST sites, several project documents are typically produced which may contain references to monitoring schedules, monitoring points and target parameters. These documents include:

- *Site Assessment Reports*
- *Corrective Action Plans*
- *Remediation System Design Specifications*
- *RAC Workplans*
- *Reports of Historical Monitoring Activities*

In addition to the above-referenced project documents, regulatory rules and guidelines produced by NCDENR also contain references to monitoring requirements and protocols that must be considered when developing a site-specific monitoring plan. Specifically, these rules and guidelines include:

- *NCAC Title 15A Subchapter 2L Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina*
- *NCAC Title 15A Subchapter 2B Surface Water and Wetland Standards*
- *Guidelines for Assessment and Corrective Action for UST Releases, Division of Waste Management, Underground Storage Tank Section, July 15, 2008 (2008 Guidelines)*
- *UST Section Guidelines for The Investigation and Remediation of Contamination from Non-UST Petroleum Releases, Division of Waste Management, Underground Storage Tank Section, July 1, 2007 (2007 Guidelines)*
- *Guidelines for Sampling, Division of Waste Management, Underground Storage Tank Section, December 1, 2008 (2008 Guidelines for Sampling)*
- *Guidelines for Site Checks, Tank Closure and Initial Response and Abatement for UST Releases, Division of Waste Management, Underground Storage Tank Section, December 1, 2008*

Complete citations for these references are contained in Section 9.0 of this *Program Strategy Plan* document.

Lastly, at sites where active remediation systems are being constructed and operated, permits and registrations issued by NCDENR may include requirements for monitoring of the following discharges:

*Air Emissions to Atmosphere*

*Wastewater to Public Owned Treatment Works (POTW) Pursuant to Pre-Treatment Permit*

*Wastewater to Land Pursuant to Non-Discharge Permit*

*Wastewater to Surface Water Pursuant to NPDES Permit*

Each of the above-referenced project documents, regulatory rules and guidelines, and permits and registrations will be consulted for information in the process of selecting monitoring schedules, monitoring points and target parameters. This information will be coupled with general guidelines contained in the following Sections 7.1 through 7.3 in developing site-specific monitoring plans to be included in the *Sampling Plan* and in making recommendations for modifications to the *Sampling Plan*.

## **7.1 ESTABLISHING MONITORING SCHEDULES**

In general, monitoring schedules will be established based on site priority rankings, site risk classifications, remediation system operations, approved CAPs, and permit requirements. Additional guidance which may be used in establishing schedules is found in the *2008 Guidelines* and in the *2007 Guidelines*. Since schedules for checking the operation and maintenance of remediation system equipment will likely be dictated by site-specific O & M Manuals, which may require frequent (weekly or biweekly) inspections, these schedules will be considered independent of the environmental monitoring schedules covered by the *Program*.

Sites ranked as "high risk" sites (as defined in *15A NCAC 2L .0406*) and sites with active remediation systems may be monitored on a quarterly basis. For "intermediate risk" sites and "low risk" sites (as defined in *15A NCAC 2L .0406*), monitoring will typically take place on an annual or semi-annual basis. Depending upon the operational characteristics and history of the product recovery system, quarterly monitoring of product recovery rates/volume and system downtime may be specified.

## **7.2 SELECTING MONITORING POINTS**

In most cases, only a select number of available monitoring points require periodic sampling in order to meet the goals outlined in Section 6.1. In the case of monitored natural attenuation sites, specific wells will be selected to track potential horizontal migration of dissolved-phase and free-phase product plumes upgradient, crossgradient, and downgradient; monitor degradation of the plume "interior"; and provide adequate "early warning" in the presence of downgradient receptors.

With respect to active remediation systems, monitoring points may be specified by operating permits, RAC Workplans and/or remediation system specifications. Although the *Program* is not intended to cover monitoring of the operation and maintenance of remediation equipment per se, field measurements and sampling performed for the purpose of satisfying objectives listed in Section 6.1 will be managed by the *Program*.

Additional guidance for selection of monitoring points is contained in the *2008 Guidelines* and the *2007 Guidelines*.

## **7.3 TARGETING FIELD AND LABORATORY PARAMETERS**

Field data collected will typically consist of product thickness and depth to water in each monitoring well selected for the monitoring program. Sites for which monitored natural attenuation has been selected as the remediation strategy may also be targeted for other parameters such as groundwater pH, specific conductance, groundwater temperature, redox potential, total organic

carbon, or dissolved oxygen measurements.

With respect to sites with active remediation systems, field measurements may be dictated by requirements imposed by operating permits such as flow rates and volatile organic compound (VOC) concentrations for air emissions and flow rates (and possible pH, temperature, and dissolved oxygen) for wastewater effluent.

With respect to groundwater sample analysis, guidelines are specified in *15A NCAC 2L .0413* and Table 5 of the *2008 Guidelines* for USTs, Table 3 of the *2008 Guidelines for Sampling*; and Table 5 of the *2007 Guidelines* for Non-USTs. Parameters to be included in the analysis of wastestreams from active remediation systems will typically be specified by the applicable permit and may include parameters such as oil and grease, biochemical oxygen demand (BOD) and chemical oxygen demand (COD) for wastewater effluent. Benzene, toluene, ethylbenzene, xylenes (BTEX) and/or total VOCs may be specified for air emissions.

## **8.0 STRATEGY FOR NO FURTHER ACTION**

Guidance to be used in evaluating a site for purposes of no further action are found in Sections 2.8 and 3.8 of the *2008 Guidelines* for USTs and Section 9.0 of the *2007 Guidelines* for Non-USTs. In general, sites will be considered qualified for no further action based on the following guidelines:

### **8.1 FREE-PHASE PRODUCT SITES**

For sites at which free-phase product has been detected; no measurable (>0.125 inches; 0.01 feet) free product detected for four consecutive quarterly or semi-annual monitoring events over a period not to exceed two years and not less than one year.

### **8.2 GROUNDWATER REMEDIATION SITES**

#### **8.2.1 High Risk UST Sites**

For high risk UST sites as determined by *15A NCAC 2L .0406 (1)*, the goal of groundwater remediation shall be restoration to the levels of *15A NCAC 2L .0202* as closely thereto as is economically and technologically feasible and monitored natural attenuation shall be used to the maximum extent possible.

#### **8.2.2 Intermediate Risk UST Sites**

For intermediate risk sites as determined by paragraph *15A NCAC 2L .0406 (2)*, the goal of groundwater remediation shall be, at a minimum,

50 percent of the solubility of the contaminant at 25 degrees Celsius or 1,000 times the groundwater standard or interim standard as established in 15A NCAC 2L .0202, except ethylene dibromide, benzene and alkane and aromatic carbon fractions. Ethylene dibromide and benzene shall be cleaned up to a level of 1,000 times the federal drinking water standard. In addition, the responsible party shall demonstrate that the cleanup levels are sufficient to prevent a violation of the following: 1) the surface water standards contained in 15A NCAC 2B; 2) the 15A NCAC 2L .0202 standards in a deep aquifer as defined in 15A NCAC 2L .0400; and 3) the 15A NCAC 2L .0202 standards at a location no closer than one year time of travel upgradient of a designated wellhead protection area. Monitored natural attenuation shall be used to the maximum extent possible.

### **8.2.3 Non-UST Sites**

For non-UST sites, the requirements of 15A NCAC 2L .0106 shall apply. The goal of groundwater remediation shall be restoration to the levels of 15A NCAC 2L .0202 or as economically and technologically feasible.

### **8.2.4 Active Remediation Systems**

In general to obtain no further action for on-going active remediation systems, the groundwater remediation goals as established above, must be met and remain so for four consecutive quarterly or semi-annual monitoring events over a period not exceeding two years and not less than one year. After remediation system shut down, the groundwater remediation goals as established above must be met and remain so for four consecutive quarterly or semi-annual monitoring events over a period not exceeding two years and not less than one year.

### **8.2.5 Natural Attenuation Sites**

In general, to obtain no further action for natural attenuation sites, the groundwater remediation goals as established above must be met and remain so for four consecutive quarterly or semi-annual monitoring events over a period not to exceed two years and not less than one year.

## **8.3 VADOSE (SOIL) CONTAMINATION SITES**

For sites at which vadose contamination is present, demonstration via sample collection and analysis that soil contamination has been remediated in accordance with 15A NCAC 2L .0400 and Section 2.8 of the *2008 Guidelines* for USTs and Section 9.0 of the *2007 Guidelines* for Non-USTs, whichever is

applicable. Laboratory methods for analysis of soil samples are specified in 15A NCAC 2L .0412 and Tables 3 and 4 of the *2008 Guidelines for USTs*, Tables 1 and 2 of the *2008 Guidelines for Sampling*, and Tables 1 and 2 of the *2007 Guidelines for Non-USTs*.

### **8.3.1 High or Intermediate Risk UST Sites**

For high or intermediate risk sites as determined by 15A NCAC 2L .0406 (1) or (2), soil contamination must be remediated to the lowest of the following:

- 1) the residential or industrial/commercial maximum soil contaminant concentration, whichever is applicable; or
- 2) the soil-to-groundwater maximum soil contaminant concentration.

### **8.3.2 Low Risk UST Sites**

For low risk UST sites as determined by 15A NCAC 2L.0406 (3), soil contamination must be remediated to either the residential or industrial/commercial maximum soil contaminant concentration, whichever is applicable.

### **8.3.3 Non-UST Sites**

For non-UST sites, the requirements of Section 5.0 and Table 3 of the *2007 Guidelines* shall apply. Contaminated soil must be cleaned up to the TPH Action Levels or soil-to-groundwater maximum contaminant concentrations.

## **8.4 NOTICE OF RESIDUAL PETROLEUM OR LAND USE RESTRICTIONS**

Any site that is considered qualified for no further action where soil or groundwater contamination has not been remediated to “unrestricted use standards” is required by the North Carolina General Statute (NCGS) 143B-279.9 and 143B-279.11 to file a Notice of Residual Petroleum (NRP) with the Register of Deeds in the county where the release is located. The Notice is required prior to the site receiving a Notice of No Further Action for a release if soil contamination caused by the release has not been remediated to below the residential maximum soil contaminant concentrations established in Title 15A NCAC 2L .0400 or if groundwater contamination caused by the release has not been remediated to below the Title 15A NCAC 2L .0202 groundwater quality standards or interim standards.

## 9.0 REFERENCES

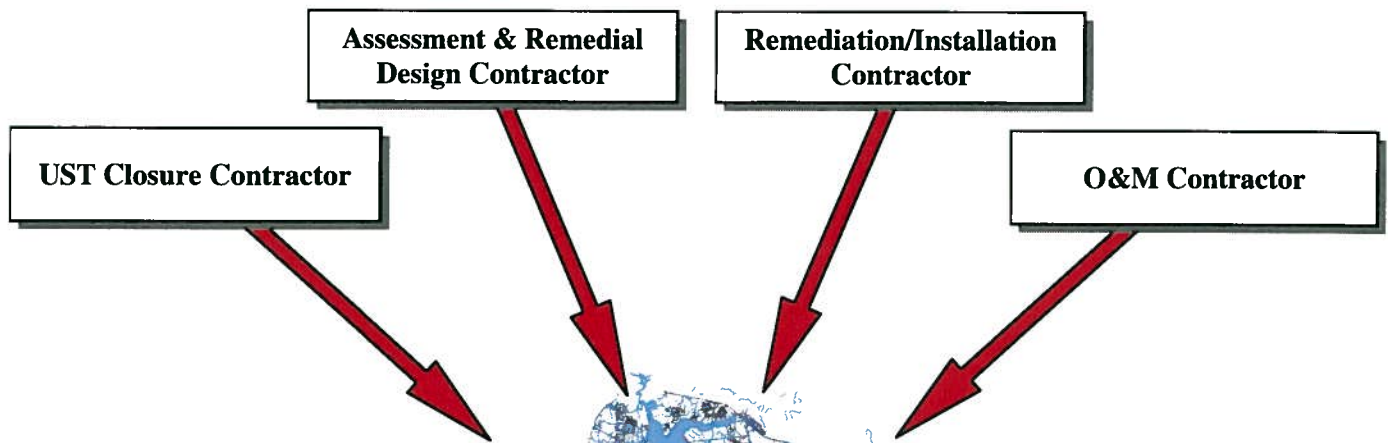
- Environmental Management Commission, Raleigh, North Carolina, *15A NCAC 2L Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina*, Amended effective December 7, 2006.
- Marine Corps Base Camp Lejeune, *Final Contractor Electronic Data Deliverable Standards And Procedures, Environmental Management Division, Marine Corps Base Camp Lejeune*, August 1, 2004.
- North Carolina Department of Environment and Natural Resources, *15A NCAC 2L .0400 Risk-Based Assessment and Corrective Action For Petroleum Underground Storage Tanks*, Amended effective December 1, 2005.
- State of North Carolina, Department of Environment and Natural Resources, Division of Waste Management, Underground Storage Tank Section, *Guidelines for Assessment and Corrective Action for UST Releases*, July 15, 2008.
- State of North Carolina, Department of Environment and Natural Resources, Division of Waste Management, Underground Storage Tank Section, *Guidelines for Sampling*, December 1, 2008.
- State of North Carolina, Department of Environment and Natural Resources, Division of Waste Management, Underground Storage Tank Section, *Guidelines for Site Checks, Tank Closure and Initial Response and Abatement for UST Releases*, December 1, 2008.
- State of North Carolina, Department of Environment and Natural Resources, Division of Waste Management, Underground Storage Tank Section, *UST Section Guidelines For The Investigation and Remediation of Contamination from Non-UST Petroleum Releases*, July 1, 2007.

## FIGURES

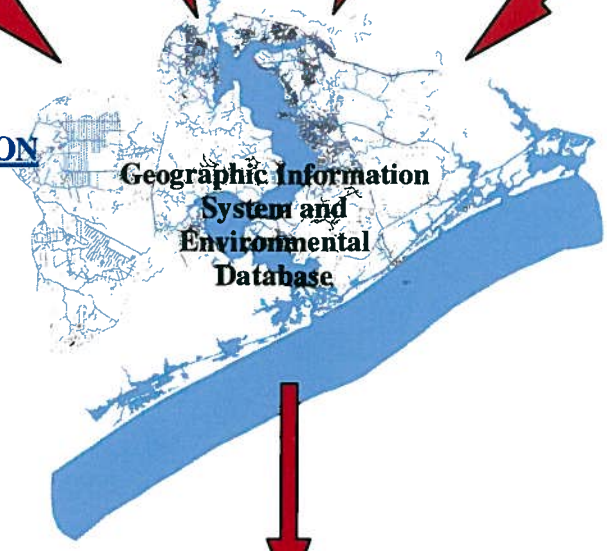
**FIGURE 1**  
**CONCEPTUAL OVERVIEW**

**MCB CAMP LEJEUNE**  
**UST MANAGEMENT PROGRAM**

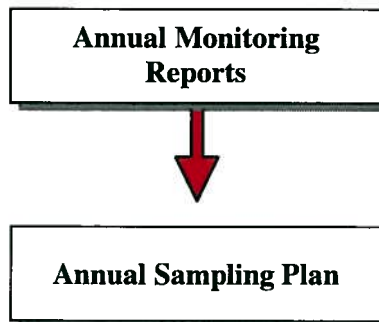
**STEP 1 DATA COLLECTION**



**STEP 2 DATA ORGANIZATION AND STORAGE**



**STEP 3 PRESENTATION OF DATA FINDINGS AND CONCLUSIONS**



**APPENDIX A**  
**CATLIN EDD GUIDANCE DOCUMENT**

**MARINE CORPS BASE CAMP LEJEUNE**  
**UNDERGROUND STORAGE TANK MANAGEMENT PROGRAM**  
**FINAL**  
**ELECTRONIC DATA DELIVERABLES (EDD)**  
**STANDARDS AND PROCEDURES**



**JUNE 22, 2009**

**NAVY CONTRACT NO.: N62470-05-D-6200**  
**DELIVERY ORDER NO.: 0074**

**PREPARED FOR:**

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**PREPARED BY:**



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### APPENDIX I - ACCEPTABLE DOMAIN VALUES FOR RESTRICTED FIELDS

## **PREFACE**

This document was originally prepared as a component of the "Sampling Plan" developed in accordance with the Marine Corps Base (MCB) Camp Lejeune Underground Storage Tank (UST) Management Program. When taken in its entirety, the Sampling Plan is intended to specify the location, schedules, procedures, and protocols for data collection at each UST incident site. When taken by itself, this electronic data deliverables (EDD) document provides standards and procedures for the creation of EDD by contractors working for NAVFAC Mid-Atlantic and MCB Camp Lejeune Environmental Quality Branch (EQB) and submitting data to CATLIN Engineers and Scientists (CATLIN).

**CONTRACTOR ELECTRONIC DATA DELIVERABLE  
STANDARDS AND PROCEDURES  
MARINE CORPS BASE  
CAMP LEJEUNE, NORTH CAROLINA**

**JUNE 22, 2009**

**1.0 PURPOSE AND SCOPE**

The purpose of this document is to establish standards and procedures for the creation of EDD by contractors working for the EQB of MCB Camp Lejeune (the Activity). The scope of this document covers data generated as part of environmental investigations and groundwater monitoring under the MCB Camp Lejeune UST Management Program. This data includes well construction information for new wells, field measurement data, and laboratory analytical data for the environmental samples.

**2.0 TRANSMITTAL OF DATA**

Organization and storage of the monitoring data will be accomplished using database files within a custom-designed Microsoft Access Database and a Geographic Information System (GIS).

**2.1 Guidance For Laboratory Deliverables**

Contractors who perform groundwater sampling and analysis as part of the UST Management Program at Camp Lejeune shall submit laboratory data to CATLIN in the EDD format established in the *Final Contractor Electronic Data Deliverable Standards and Procedures* (Camp Lejeune EDD Guidance Document) dated August 1, 2004. Contractors will submit laboratory data for sites in the MCB Camp Lejeune UST Management Program directly to CATLIN in lieu of submitting this data to Camp Lejeune. The data submitted to CATLIN should be submitted only after QA/QC by the contractor. CATLIN will subsequently submit the laboratory data to Camp Lejeune for incorporation into their database(s) and/or upload the data in the Naval Installation Restoration Information System (NIRIS).

Contractors who perform sampling of environmental media in association with any well monitoring programs aboard the Base will receive Laboratory Data Deliverables generated by their respective subcontracted laboratories. All EDD data must be presented as a bar-delimited (|) text file (by the Lab to the Contractor) within the strict limitations of the format described in Table 2-1. In order to guarantee that contractors request all of the required analytical data from their laboratories, a list of the **minimum set of analytical fields that must be generated by the laboratory are highlighted in yellow in Table 2-1.**

**TABLE 2-1: LABORATORY ANALYTICAL TABLE**

	<i>Field Name</i>	<i>Field Type</i>	<i>Length</i>	<i>Description</i>
1	Laboratory ID	Text	6	Laboratory's facility identifier ( <b>ASSIGNED BY PROJECT MANAGER</b> ) Only one LAB ID is permissible in a single EDD file. Any analyses subcontracted to different facilities should be submitted in separate EDD files with different LAB IDs to specify the different location. SGS – SGS Environmental Services
2	Project ID	Integer		Major divisions (or projects) of historical data.  Some Examples of typical TerraBase Project IDs are:  100 = NPDES Monitoring,  200 = Fugitive Emissions Monitoring  300 = Stormwater Monitoring  etc&ldots;  <b>(PROJECT NUMBERS ARE ONLY ASSIGNED BY CAMP LEJEUNE PROJECT MANAGERS) Do NOT use unless authorized by Client/Project Manager responsible for specific projects.</b>
3	Sample Round (SDG)	Text	8	A combination of the last 2 digits of the year in which the sample was collected, a letter corresponding to the quarter of the year during which the sample was collected and the Lab facility identifier (See # 1, Lab ID) will be used as the sample round #.  09B-SGS = 2009, second quarter (April through June), SGS Lab.  The quarter designations are as follows:  A = 1 <sup>st</sup> Quarter, January through March B = 2 <sup>nd</sup> Quarter, April through June C = 3 <sup>rd</sup> Quarter, July through September D = 4 <sup>th</sup> Quarter, Oct. through December
4	Analytical Fraction	Text	1	"V" = Volatiles  "S" = Semivolatiles  "P" = Pesticides/PCB's  "M" = Metals

				"C" = Conventionals
				"T" = Total Petroleum Hydrocarbons
				"F" = Dioxin/Furans
				"X" = BTEX screen analyses
				"H" = Herbicides
				"R" = Radiological analyses
5	Site Sample ID	Text	25	The sample name exactly as it appears on the associated chain of custody.
6	Sampling Date/Time	Date/Time		Date sample was collected in the format "mm/dd/yyyy hh:mm" (i.e., "05/04/2007 13:27") If no time component is applicable or known, "00:00" should be used.
7	Top Depth	Number		Top depth at which sample was taken (groundwater/soil)
8	Middle Depth	Number		Middle depth at which sample was taken (groundwater/soil)
9	Bottom Depth	Number		Bottom depth at which sample was taken (groundwater/soil)
10	Sample Point ID	Text	20	Georeferenced data point from which a sample was taken. <b>(INITIALLY ASSIGNED BY CAMP LEJEUNE PROJECT MANAGER)</b> This entry is often similar to (if not identical to) the "Site Sample ID" field noted above. However, <i>it must have consistent nomenclature over repetitive sampling events</i> since it represents the name of a physical location on a facility map (such as using "MW-01" to always represent the "Monitor Well #01" map location).
11	Lab Sample ID	Text	15	Sample name as assigned by laboratory.
12	Lab Sample Type	Text	5	Type of sample such as site sample or field duplicate.
13	Matrix	Text	1	"S" = Soil/Sediment
				"W" = Surface/Ground Water or Aqueous
				"A" = Air
				"O" = Oil
				"T" = Tissue
				"L" = Leachate
14	Field Sample Classification	Text	3	BG - Background sample TB- Trip Blank
				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
				TWS - Soil sample from temporary well boring
				PW- Pumping Well
				PSW - Potable Supply Well
15	Filtration Method	Text	1	Filtration method where applicable (applies only to metals):
				"U" = Unfiltered (Total)
				"F" = Filtered (Dissolved)
				"L"= any TCLP extraction procedures
				No other codes may be applied.
16	Extraction Date/Time	Date/Time		Applies mainly to Pesticides/PCB's and Semivolatiles. Reported in same format as Sampling Date/Time (mm/dd/yyyy hh:mm) If no time component is applicable or known, "00:00" should be used.
17	Preparation Date/Time	Date/Time		Applies mainly to Metals. Reported in same format as Sampling Date/Time (mm/dd/yyyy hh:mm) If no time component is applicable or known, "00:00" should be used.
18	Analysis Date/Time	Date/Time		Date sample was analyzed in the format "mm/dd/yyyy hh:mm". If no time component is applicable or known, "00:00" should be used.
19	Instrument ID	Text	10	Laboratory instrument which analyzed the sample.
20	Rough Percent Moisture	Decimal		Percent moisture found. This field should be left blank for all aqueous samples and does not reflect the Quantitative result of a "Karl-Fischer" or other "percent moisture" parameter test. The data in this field only serve to alert the Project Manager to potential calculation and correction issues that may need to be elsewhere applied during data review and reporting operations, which take place outside the Lab.
21	Dilution Factor	Number		Dilution of Sample (If None = 1.0)
22	Analyte Type	Text	1	"A" = Analyte
				"T" = Tentatively Identified Compound
				"I" = Internal Standard
				"S" = Surrogate Compound

				No other values are acceptable
23	Analytical Method	Text	13	Standardized code representing the approved Analytical method used in instrumental or classical chemistry evaluation which produced the final result for the reported parameter (e.g.: 150.1, SM9222B, 8260B, etc.).
24	CAS Number Equivalent	Text	9	Chemical Abstract Service Number <i>without hyphens</i> where applicable (i.e., "000012345" will equate to "000012-34-5"). synonyms.
25	Parameter Name	Text	67	The assigned name of the compound or parameter being tracked. The Analyte Name <i>must</i> be reported consistently on all deliverables (especially for TICs, when CAS Numbers are not provided).
26	Retention Time	Number		Required for TICs in the format mm.hh (minutes and hundredths of a minute) in lieu of CAS values.
27	Detection/Reporting Limit	Number		As dictated by the Camp Lejeune Project Manager. However, the detection/reporting limit must be reported in the same Result Units as an analyte's Quantitative Result, and should only be corrected for any applied analytical dilutions as directed by the Project Manager. Otherwise this value should reflect only the routine, undiluted detection/reporting limit for each analyte.
				The detection limit threshold is typically based upon one or more of the following:
				1. The instrument detection limit (IDL) for the analytical method utilized (where applicable).
				2. The associated method detection limit (MDL),
				3. The practical quantitation limits (PQL),
				4. The contract required detection/reporting limits (such as the CRDL and CRQL commonly used for CLP procedures).
28	Laboratory Quantitative Result	Number		Concentrations or other numerical, quantifiable, readings such as pH or temperature. <b>If a value is non-detect, put the detection/reporting limit value in this field and use the "Lab Qualifier" field to denote the non-detect.</b> Symbols such as "<" or ">" are not acceptable in this field.
				For any analytical methods which properly produce a "text" result (such as "Color"), or for those which cannot produce a precise numerical value (such as "Total Coliform" which can be "Too Numerous to Count"), this field must be left <i>empty</i> (i.e., "null") and the text-value or an acceptable abbreviation (not to exceed five characters) must be placed in the associated "Lab Qualifier" field
29	Laboratory Qualifier	Text	5	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
30	Result Units	Text	8	Examples of typical Result Units (others may also be used as appropriate if directed by the Camp Lejeune Project Manager):  1. mg/L, mg/Kg, or PPM for various analytes 2. ug/L, ug/Kg, or ppb for various analytes 3. mg/m <sup>3</sup> , ppmv or ppbv for air analyses 4. ug/g for tissue analyses 5. S.U. (standard units) for pH 6. Umhos/cm for specific conductivity 7. C (centigrade) or F (Fahrenheit) for flashpoint 8. % for lower explosive limit (LEL) 9. pCi/L for radiologicals
31	Contractor	Text	50	Contractor performing work
32	Comments	Text	50	Comments

**It is recommended that all 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. 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.**

## **2.2 Guidance for Field Measurement Deliverables**

Contractors who perform field measurements (i.e. gauging of monitoring wells) as part of the UST Management Program at the Activity shall provide this data in a standardized format. In order to ensure that all information is collected while in the field, a sample field measurement deliverable is provided (Refer to Table 2-2). It is recommended that the field measurement EDD be provided as a .xls file (Microsoft Excel). The file naming convention shall be:

(FMD)\_(Site ID)\_(MM - two characters)\_(YYYY - four characters).xls

Example 1: The field measurement deliverable **FMD\_645\_08\_2009** indicates the following information:

FMD\_645\_08\_2009 = Field Measurement Data  
 FMD\_645\_08\_2009 = Site 645  
 FMD\_645\_08\_2009 = August  
 FMD\_645\_08\_2009 = 2009

An example of what the actual Excel file should look like is illustrated below:

ID	SITE ID	WELL NO	MEASUREMENT	RESULTS	UNITS	DATE	TIME	MEASURED BY	COMMENT
645	UST645-MW01		DTW	10.95	ft	02/08/05	14:45	Osage	Free Product in well
645	UST645-MW01		Product Thickness	0.24	ft	02/08/05	14:45	Osage	Free Product in well
645	UST645-MW02		DTW	12.00	ft	02/08/05	14:55	Osage	
645	UST645-MW02		Product Thickness	0.73	ft	02/08/05	14:55	Osage	
645	UST645-MW03		DTW		ft	02/08/05	15:55	Osage	Well not accessible
645	UST645-MW03		Product Thickness		ft	02/08/05	15:55	Osage	Well not accessible
645	UST645-MW04		DTW	9.67	ft	02/08/05	16:05	Osage	
645	UST645-MW04		Product Thickness	0.00	ft	02/08/05	16:05	Osage	

Information about the required fields is explained in Table 2-2 below:

TABLE 2-2				
EXAMPLE FIELD MEASUREMENT EDD				
Field Name	Data Type	Field Size	Decimals	Description
ID	Number	--	Integer	Primary Key for Data Table (Leave Blank)
SITE ID	Text	40	--	Site Identification
WELL NO	Text	30	--	Well Number
MEASUREMENT	Text	30	--	Type of Field Measurement
RESULTS	Number	--	Auto	Field measurement Result
UNITS	Text	16	--	Applicable units
DATE	Date/Time	--	--	Field Measurement Date
TIME	Date/Time	--	--	Time Measured
MEASURED BY	Text	30	--	Contractor Responsible for Field Measurement
COMMENT	Text	255	--	Any Comments about Well or Measurement

Definitions of allowable field contents for the field measurement EDD are as follows:

ID	Primary key for data table. This field will be filled in when the CATLIN UST database is being populated. <b>Contractor should leave blank.</b>
WELL NO	Number assigned to well that measurement was taken. The well number shall be exactly as it appears in the <u>MCB Camp Lejeune UST Management Program Sampling Plan</u> .
SITE ID	The domain for this field shall consist of only values found in Table I.A of Appendix I.
MEASUREMENT	The domain for this field shall consist of only values found in Table I.B of Appendix I.
RESULTS	This field shall consist of only numerical data without any text characters (i.e. units of measure). If data was not collected, leave this field blank.
UNITS	This field shall contain the specific units of measure. Acceptable values for this field are contained in Table I.C of Appendix I.
DATE	The date each measurement was made shall be included in the EDD in the following format: MM/DD/YY Examples: Input 01/14/10 for January 14, 2010 Input 12/03/09 for December 3, 2009
TIME	The time each measurement was taken shall be stored in this field in the following format: Examples: Input 14:25 for 2:25 PM Input 7:15 for 7:15 AM
MEASURED BY	This field shall contain information necessary to identify the contractor who made the measurement.
COMMENT	This field shall contain any comments about the well or measurements obtained.

### 2.3 New Well Location Deliverables

Contractors installing new wells (i.e. monitoring and recovery wells) must provide well construction data in accordance with the EDD format

established in the Camp Lejeune EDD Guidance Document. Contractors will submit well construction data for sites in the MCB Camp Lejeune UST Management Program directly to CATLIN in lieu of submitting this data to Camp Lejeune. The data submitted to CATLIN should be submitted only after QA/QC by the contractor. CATLIN will subsequently submit the well data to Camp Lejeune for incorporation into their database(s) and/or upload the data into NIRIS.

**All new monitoring wells require survey data (northing, easting, elevation, coordinate system information – UTM, Zone 18N, NAD83 with northing and easting in meters, elevation data in feet).** Newly installed monitoring wells require that geologic information be provided regarding the lithologic units encountered during installation. Monitoring wells also require well construction data in the EDD.

**The structure of each of the three database tables (Sample Point, Monitoring Well and Soil Lithology) is provided in Tables 2-3, 2-4 & 2-5 with minimum required fields highlighted.** The monitoring well IDs will be provided by the EMD and/or CATLIN.

**TABLE 2-3: MONITORING WELL TABLE**

Excel Column	Field Description	Data Type: Length	Description
A	Sample Point	Text: 20	Georeferenced data point; the permanent identifier for the Monitoring Well. This field is required for data that is to be modeled, and is <b>INITIALLY ASSIGNED BY THE PROJECT MANAGER</b> . It must have consistent nomenclature with the Sample Point Id's found in the client database or associated "SP" edd file.
B	Well Installation Date	Date	Well Installation Date (format mm/dd/yyyy).
C	Well Depth	Number	Total depth of well in feet
D	Top Of Casing	Number	Depth to top of casing in feet
E	Well Screen Top Depth	Number	Depth to top of well screen in feet
F	Well Screen Bottom Depth	Number	Depth to bottom of well screen in feet

G	Well Construction Comment	Text: 255	Well construction installation comments. Do not use special characters such as "Tabs" or "Carriage Returns".
H	Borehole Diameter	Number	Borehole Diameter (in inches)
I	Casing Diameter	Number	Well casing diameter (in inches)
J	Casing Material	Text: 3	Well casing material
K	Screen Material	Text: 3	Well screen material
L	Land Surface Elevation	Number	Land Surface Elevation in feet
M	Slotted Screen Size	Number	Slotted Screen Size in inches
N	Installed By	Text: 50	Installed By: Name of individual or company that installed the well.
O	Installation Method	Text: 20	Installation Method
P	Logged By	Text: 50	Logged By: Name of individual or company recording the well log.
Q	Rig Type	Text: 20	Drill rig or direct push type
R	Completion Method	Text: 50	Text Field for entering user defined completion method (Ex: Protective Cover Type III Well)
S	Well Diameter	Number	Well Diameter (in inches)
T	Well Status	Text: 15	Well Status
U	Well Designation	Text: 15	Well Designation

V	Lithology Screened	Text: 3	Soil type in which the well screen resides (i.e., USCS code)
W	InSitu Hydraulic Cond	Text: 50	In Situ Hydraulic Conductivity – represent the reported value and units of measure in the same manner as displayed upon any associated hard copy report (Ex: "1x10 <sup>-7</sup> cm/sec.", etc.)
X	Sampling Equipment	Text: 20	Sampling Equipment (i.e., Bailer)
Y	Remediation Equipment	Text: 15	Remediation Equipment if applicable
Z	State ID Number	Text: 15	State ID Number (if applicable)
AA	Riser Stickup	Number	Riser Stickup recorded as a positive or negative value (in feet or meters) dependent upon whether the Top-Of-Casing is above or below ground level. For example, a Top-Of-Casing that is located below ground will always have a negative value for riser stickup.
AB	Riser Length	Number	Riser Length in feet
AC	Screen Length	Number	Screen Length in feet
AD	Sump Length	Number	Sump Length in feet
AE	Riser Material	Text: 3	Riser Material
AF	Sump Material	Text: 3	Sump Material
AG	Cover Type	Text: 20	Cover Type
AH	Grout Material	Text: 20	Grout Material
AI	Well Seal Material	Text: 20	Well Seal Material
AJ	Filter Pack Material	Text: 20	Filter Pack Material

AK	Top Of Well Seal	Number	Depth to top of well seal in feet
AL	Top Of Filter Pack	Number	Depth to top of filter pack in feet
AM	Bottom Of Sump	Number	Depth to bottom of sump in feet
AN	Bottom Of Borehole	Number	Depth to bottom of borehole in feet
AO	Top Of Casing Elevation Units	Text: 20	Top Of Casing Elevation Units (NGVD, MSL or Arbitrary Benchmark)
AP	Land Surface Elevation Units	Text: 20	Top Of Casing Elevation Units (NGVD, MSL or Arbitrary Benchmark)
AQ	Depth Groundwater First Noted	Number	Depth in feet that groundwater (if present) was noted during well installation. This depth entry will appear in Soil Lithology reports and boring logs.
AR	Boring Comments	Text: 255	General comment field. This entry will appear in Soil Lithology reports. Example: Boring was terminated at 17 feet and completed as monitor well MW-6. Do not use special characters such as "Tabs" or "Carriage Returns".

**TABLE 2-4: SAMPLE POINT TABLE**

Excel Column	Field Name	Data Type: Length	Description
A	Sample Point	Text: 20	Georeferenced data point; the permanent identifier for the Monitoring Well. This field is required for data that is to be modeled, and is <b>INITIALLY ASSIGNED BY THE PROJECT MANAGER</b> . It must have consistent nomenclature over repetitive sampling events since it represents the name of a physical location on a facility map (such as using "MW-01" to always represent the "Monitor Well #01" map location).
B	Sample Point Classification	Text: 5	Site Classification code

C	Sample Point Description	Text: 50	Sample Point Description. Free text entry field to further define the sample point location.
D	Facility Area	Text: 50	Facility Area (as assigned by Camp Lejeune Project Manager, otherwise leave blank).
E	Latitude	Number decimal	Latitude Degrees – represent the exact/surveyed Latitude value (i.e., degrees, minutes, and seconds) in the appropriate coordinate system. Include all values after the decimal as needed (Ex: 22706.8321). Negative values will be converted upon import and the correct latitude direction will be assigned.
F	Longitude	Number decimal	Longitude Degrees - represent the exact/surveyed Longitude value (i.e., degrees, minutes, and seconds) in the appropriate coordinate system. Include all values after the decimal as needed (Ex: 3988.2783). Negative values will be converted upon import and the correct longitude direction will be assigned.
G	Geographic Elevation	Number decimal	National Geodetic Vertical Datum (NGVD) Elevation for geographical (latitude/longitude) coordinates
H	Plant Easting	Number decimal	Plant Easting Coordinate. Plant coordinates are usually based on a Facility specific grid
I	Plant Northing	Number decimal	Plant Northing Coordinate. Plant coordinates are usually based on a Facility specific grid
J	Plant Elevation	Number decimal	Plant elevation above mean sea level (MSL)
K	UTM NAD	Integer	North American Datum (NAD) for Universal Transverse Mercator (UTM) coordinates: 19(27) or 19(83). Enter 27 or 83.
L	UTM NAVD	Integer	National Geodetic Vertical Datum (NGVD) for UTM coordinates: 19(29) or 19(88). Enter 29 or 88.
M	UTM Grid Zone	Text: 50	UTM coordinate grid zone (Ex. Louisiana, South)

N	UTM Easting	Number decimal	UTM Easting Coordinate
O	UTM Northing	Number decimal	UTM Northing Coordinate
P	UTM Elevation	Number decimal	UTM elevation in feet
Q	State Plane NAD	Integer	State Plane North American Datum (NAD): 19(27) or 19(83). Enter 27 or 83.
R	State Plane NAVD	Integer	State Plane National Geodetic Vertical Datum (NAVD): 19(29) or 19(88). Enter 29 or 88.
S	State Plane Grid Zone	Text: 50	State Plane coordinate grid zone (Ex. Louisiana, South)
T	State Plane Easting	Number decimal	State Plane Easting Coordinate
U	State Plane Northing	Number decimal	State Plane Northing Coordinate
V	State Plane Elevation	Number decimal	State Plane elevation
W	Screened Layer ID	Integer	Site Layer identified for screen interval. Leave null if unknown

**TABLE 2-5: SOIL LITHOLOGY TABLE**

Excel Column	Field Name	Data Type: Length	Description
A	Sample Point	Text: 20	Georeferenced data point from which lithology samples were taken. This field is required for data that is to be modeled, and is <b>INITIALLY ASSIGNED BY THE CAMP LEJEUNE PROJECT MANAGER</b> . It must have consistent nomenclature with the Sample Point Id's found in the client database or associated "SP" add file.
B	Geologic Unit Top Depth	Number decimal	Lithology Unit Top Depth – Shallowest Depth (in feet below Land Surface) where this lithological layer is encountered in the same core/boring.
C	Geologic Unit Bottom Depth	Number decimal	Lithology Unit Bottom Depth - Deepest Depth (in feet below Land Surface) where this lithological layer is encountered in the same core/boring.
D	Soil Type	Text: 3	Soil Type (i.e., USCS code)
E	Field Log Soil Type	Text: 15	Soil Type as logged by sampler. (e.g. "Silty Clay")
F	Lithology Comments	Text: 255	Lithology Comments - include any text comments related to the lithology measurement reported in this record. The comment should only include details regarding the specific core/boring under study... avoid generic information which is related to the USCS code applications. Do not use special characters such as "Tabs" or "Carriage Returns"
G	Sampler Type	Text: 20	Sampler Type – (Ex: "Shelby Tube" or "Split Spoon", etc.)
H	Field Screening Reading	Number decimal	Field Screening Reading (in ppm)
I	Std Pen Test Results	Number decimal	Standard Pen Test

### **3.0 EDD COMPLIANCE**

All deliverables shall be prepared in accordance with this document or as specified in the MCB Camp Lejeune EDD Guidance Document. If compliance with this document is not possible, a request for variations can be made to CATLIN Engineers and Scientists, Attention: Mr. Shane Chasteen, 220 Old Dairy Road, Wilmington, NC 28404, telephone (910) 452-5861, facsimile (910) 452-7563, e-mail [shane.chasteen@catlinusa.com](mailto:shane.chasteen@catlinusa.com). No deviations from this document will be allowed until written permission is obtained from CATLIN.

#### **4.0 REFERENCES**

Environmental Management Division, Marine Corps Base Camp Lejeune. *Final Contractor Electronic Data Deliverable Standard and Procedures*. August 1, 2004

**APPENDIX I**

**ACCEPTABLE DOMAIN VALUES FOR RESTRICTED FIELDS**

**TABLE I.A****Field: Site ID****Contained In:** Field Measurements EDD

<b>SITE ID DOMAIN</b>	<b>DESCRIPTION</b>
1613	Building 1613
645	Building 645
820	Building 820
AS-4141	JP-5 Line Leak Area around Building AS-4141
AS-4158	Building AS-4158
AS-843	Building AS-843
BB-190	Building BB-190
HPFF	Hadnot Point Fuel Farm
LCH-4015	Building LCH-4015
M-232-236	Buildings M-232 through M-236
Rapid Refueler	Rapid Refueler

\*Note – New sites added to the program will be assigned a Site ID by the Camp Lejeune Project Manager.

**TABLE I.B****Field: Measurement****Contained In:** Field Measurement EDD

<b>MEASUREMENT DOMAIN</b>	<b>DESCRIPTION</b>
DTW	Depth to Water Measured from TOC (ft)
pH	PH (unit less)
Product Thickness	Free Product Thickness (ft)
Purge Water Volume	Purge Water Volume (gallons)
Specific Conductance	Specific Conductance ( $\mu$ MHOS/cm)
Temperature	Temperature (Degrees C)
Dissolved Oxygen	Dissolved Oxygen (mg/L)

**TABLE I.C**

**Field:           Units**

**Contained In:** Field Measurement EDD

<b>UNITS DOMAIN</b>	<b>DESCRIPTION</b>
ft	Feet
gallons	gallons
u MHOS/cm	u MHOS/cm
°C	Degrees Celsius

## **APPENDIX B**

### **EXAMPLE TABLE OF CONTENTS FOR ANNUAL MONITORING REPORT**

The proposed Annual Monitoring Report Table of Contents is as follows:

- A. SITE INFORMATION
  - 1. Site ID
  - 2. Contacts
  - 3. Release Information
  - 4. Monitoring Events
  - 5. Certification
- B. EXECUTIVE SUMMARY
- C. SITE HISTORY
  - 1. Description of Release
  - 2. Site Characteristics
  - 3. Receptors
  - 4. CAP Implementation
  - 5. Remediation Progress
- D. CURRENT MONITORING
  - 1. Gauging Data & Hydrogeology
  - 2. Groundwater Sampling Results
  - 3. Surface Water Sampling Results
  - 4. Soil Sampling Results
  - 5. Evaluation & Comparison of Results
- E. FREE PRODUCT REMOVAL
  - 1. Volume Removed this Period
  - 2. Free Product Thickness
  - 3. Conclusions
- F. SOIL REMEDIATION
  - 1. Remediation this Period
  - 2. Conclusions
- G. GROUNDWATER REMEDIATION
  - 1. Remediation this Period
  - 2. Conclusions
- H. SUMMARY AND CONCLUSIONS

**TABLES**

- 1. Site History
- 2. Receptor Information
- 3. Site Rehabilitation Goals
- 4. Summary of Current and Historic Soil Sampling Results
- 5. Summary of Current and Historic Groundwater Sampling Results
- 6. Well Construction Information
- 7. Current and Historic Well Gauging Information
- 8. Free Product Recovery Information

## ***FIGURES***

1. Site Vicinity Map with Receptors
2. Site Map with Monitoring Wells and Remediation System
3. Groundwater Elevations
4. Groundwater Sample Results (One for each analytical method)
5. Extent of Free Product

## ***APPENDICES***

- Appendix A New Well Construction Records
- Appendix B Remediation and Field Data
- Appendix C Laboratory Data