

**COMPREHENSIVE SITE ASSESSMENT
AND
CORRECTIVE ACTIONS**

FOR

LCH-4023

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

NCDENR INCIDENT NO.: PENDING

August 5, 2009

**CONTRACT NO.: N62470-05-D-6200
DELIVERY ORDER NO.: 0054 and 0070
CATLIN PROJECT NO.: 208-018 and 209-025**



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August 5, 2009

EXECUTIVE SUMMARY

The LCH-4023 project site is located in the Midway Housing Area aboard Marine Corps Base, Camp Lejeune in Onslow County, North Carolina. During excavation activities associated with the installation of a new wastewater line on October 28, 2008 at the location of former Building LCH-4023, the contractor noted petroleum odor in the excavated soils and trench area. In response to the potential petroleum impact, OSAGE of Virginia (OSAGE) was tasked by the Camp Lejeune Environmental Management Division (EMD) to perform initial site assessment activities including collection and analysis of representative soil samples from the sidewall and bottom of the excavation. Soils excavated from the area of potential petroleum impact were segregated then transported and disposed at an appropriate facility. Analytical results confirmed a petroleum based impact to the site soils. CATLIN Engineers and Scientists (CATLIN) was subsequently tasked by the EMD to complete a Comprehensive Site Assessment (CSA) at the LCH-4023 project site.

Although no source area was confirmed during the investigation, the closest identified potential source was an aboveground storage tank (AST) associated with former Building LCH-4023, all of which was demolished approximately two years ago. Therefore, the CSA was completed as directed in the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Waste Management, *UST Section Guidelines for the Investigation and Remediation of Contamination from Non-UST Petroleum Releases*, effective July 1, 2007.

As part of the CSA investigation, CATLIN personnel installed 12 direct push technology (DPT) soil borings from which representative soil samples were collected and analyzed for total petroleum hydrocarbons (TPH) per Environmental Protection Agency (EPA) Methods 8015 Diesel Range Organics (DRO) and 8015 Gasoline Range Organics (GRO). Subsequent to a review of the analytical data, five "shallow" Type II and one "deep" Type III groundwater monitoring wells were installed. Representative soil samples were collected from each Type II soil boring and analyzed for TPH DRO/GRO. Groundwater samples were collected from each monitoring well and analyzed per EPA Methods 602 and 625.

Analytical results from soil samples revealed exceedances of the NCDENR Action Level for TPH-DRO (40 mg/kg) in four of the 18 soil samples submitted for analysis at concentrations ranging from 84.1 mg/kg to 547 mg/kg. Additionally, three of the 18 soil samples were identified with exceedances of the NCDENR Action Level for TPH-GRO (10 mg/kg) at concentrations ranging from 12.6 mg/kg to 32.1 mg/kg. The estimated extent of soil impacted with TPH DRO/GRO contamination in excess of NCDENR Action Levels was delineated to an area of approximately 1,000 square feet.

Review of groundwater gauging data, in addition to field data recorded during excavation activities, indicates the depth to groundwater beneath the project site to be approximately six feet or greater with a generalized groundwater flow direction to the northwest.

Laboratory analytical results for the groundwater samples revealed only one sample (USTLCH4023-MW05) with any target constituents above current North Carolina Administrative Code (NCAC) T15A:02L Groundwater Quality Standards (2L GWQS). Naphthalene was identified at a concentration of 76.6 µg/L in sample USTLCH4023-MW05 which is above the current 2L GWQS of 21 µg/L for Naphthalene. Naphthalene was the only EPA 602 or 625 compound identified above current 2L GWQS. All additional constituents were either below 2L GWQS or laboratory method detection limits.

Based on the data generated during preparation of this CSA, CATLIN recommended excavation and disposal as the remedial method for petroleum impacted soil and Natural Attenuation as the recommended method addressing petroleum impacted groundwater.

Due to pending activities associated with the ongoing construction, CATLIN expedited corrective actions to address the petroleum impacted soils prior to installation of a paved parking lot over a portion of the impacted area. As part of the corrective actions, approximately 520 tons of petroleum impacted soils were excavated and disposed. Details of the corrective actions are included in this document. Analytical results of confirmatory soil samples collected from the excavation walls and floor indicate that the excavation activities were successful in removing soils impacted with petroleum constituents at concentrations in excess of applicable action levels. The Corrective Action Plan (CAP) Report outline as presented in the UST Section Guidelines for the Investigation and Remediation of Contamination from Non-UST Petroleum Releases was used to determine what additional information and or data is necessary. This additional information is presented herein.

**COMPREHENSIVE SITE ASSESSMENT
AND
CORRECTIVE ACTIONS**

A. SITE IDENTIFICATION

DATE OF REPORT: August 5, 2009
Facility ID: N/A UST Incident Number (if known): Pending
Site Name: LCH-4023
Site Location: Marine Corps Base, Camp Lejeune
Nearest City/Town: Jacksonville County: Onslow
Risk Classification: Not Applicable Land Use Classification: Not Applicable

AST Owner: Commanding Officer / Attn: Director I&E/EMD/EQB
Address: PSC Box 2004, MCB, Camp Lejeune, NC Phone: 910-451-5068
AST Operator: Same as above
Address: Same as above Phone: Same as above
Property Owner: Same as above
Address: Same as above Phone: Same as above
Property Occupant: None
Address: None Phone: Same as above
Consultant/Contractor: CATLIN Engineers and Scientists
Address: 220 Old Dairy Road Phone: (910) 452-5861
Wilmington, North Carolina 28405

Release Information

Date Discovered: October 28, 2008
Longitude: 77° 20' 22.949" W Latitude: 34° 43' 41.728" N
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (e.g. Piping/UST):
Unknown. Closest known potential source is former heating oil aboveground storage tank
(AST) associated with former Building LCH-4023

Sizes and contents of AST system(s) from which the release occurred:
Unknown. Suspected to be approximately 550 gallon capacity AST containing #2-Fuel Oil

I, Steven V. Hudson a Professional Engineer/Licensed Geologist (circle one) for CATLIN Engineers and Scientists, (NC Corp. Engineering License No. C-5857 NC Corp. Geology License No.: C-118) do certify that the information contained in this report is correct and accurate to the best of my knowledge.



(Please Affix Seal and Signature)

B. INTRODUCTION

1. Purpose of Investigation

This Comprehensive Site Assessment (CSA) with corrective actions investigation focused on defining the horizontal and vertical extent of petroleum based soil and groundwater impact at site LCH-4023 aboard Marine Corps Base (MCB), Camp Lejeune, North Carolina. The site vicinity is presented on Figure 1.

Results of an Initial Assessment Report completed by OSAGE of Virginia (OSAGE) and a letter dated November 5, 2008 by Mr. John R. Townson, MCB, Environmental Management Director, summarizing Building LCH-4023 Analytical Results and Supporting Documents indicated soil in the vicinity of former Building LCH-4023 had been impacted by petroleum constituents. The initial assessment was conducted as a result of petroleum odor noted during utility installation (trench excavation) conducted on the site. In addition to defining the limits of potentially impacted soil and groundwater, the following items are addressed in this CSA:

- Assess the potential for exposure to possible subsurface petroleum-related contaminants;
- Determine geologic/hydrogeologic characteristics relative to petroleum hydrocarbon transport;
- Provide a CSA with corrective actions summarizing the findings, corrective actions, and conclusions for the project site.

Based on site reconnaissance and review of previous investigation conducted in the vicinity, the release is suspected to have originated from an AST previously located immediately southeast of Building LCH-4023. Therefore, this document was prepared in general accordance with requirements denoted in the document entitled *"UST Section Guidelines for the Investigation and Remediation of Contamination from Non-UST Petroleum Releases"* as released by the North Carolina Department of Environment and Natural Resources (NCDENR) Division of Waste Management, UST Section, effective July 1, 2007 (AST Guidelines).

Due to circumstances associated with construction at the project site, remedial actions were expedited in order to excavate petroleum impacted soil prior to installation of a paved parking lot over a portion of the impacted area.

CATLIN was authorized to perform the CSA at the subject site by Naval Facilities (NAVFAC) Mid-Atlantic and MCB, Camp Lejeune under Contract Number N62470-05-D-6200, Delivery Order Number 0054. Preparation of

the Corrective Actions including soil excavation, soil disposal, and documentation was authorized under Contract Number N62470-05-D-6200, Delivery Order Number 0070.

2. Scope of Work

The initial phase of this investigation was a soil sampling event conducted by CATLIN personnel which consisted of the advancement of twelve (12) direct push technology (DPT) soil borings around the suspected area of petroleum impact. One soil sample was collected from each DPT boring for laboratory analysis per Environmental Protection Agency (EPA) Method 5030/8015 for Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) and EPA Method 3550/8015 for Diesel Range Organics (DRO).

Following a review of laboratory soil data, five “shallow” Type II and one “deep” Type III groundwater monitoring wells were installed in and around the area of petroleum impact. Groundwater samples were collected from each newly installed groundwater monitoring well and analyzed per EPA Method 602 for Purgeable Aromatics and Xylenes in addition to EPA Method 625 for Base/Neutral/Acid (B/N/A) Extractables plus Tentatively Identified Compounds (TICs).

Each soil boring, groundwater monitoring well, and pertinent site features were horizontally and vertically located by CATLIN personnel using a Survey Grade (precision of less than one centimeter) Geographic Positioning System (GPS). A site plan presenting DPT and groundwater monitoring well locations is presented on Figure 4.

Additional assessment activities conducted by CATLIN personnel during this investigation included a utility survey, water supply well survey, potential receptor survey, falling head slug test, and a potential source survey.

Corrective actions conducted under the direction of CATLIN included the excavation and disposal of 520 tons of petroleum impacted soil from the project site.

3. Area of Interest

Site LCH-4023 is adjacent to former Building LCH-4023 that was located at the corner of Butler Drive North and 3rd Street in the Midway Park Military Housing Area (Midway Park) in Jacksonville, North Carolina (See Figure 1).

C. SITE HISTORY AND SOURCE CHARACTERIZATION

1. Site Operations and History

According to information presented in a May 1996 CSA completed by Law Engineering and Environmental Services (LAW) on Building SLCH-4019

(LAW, 1996), formerly located next to the LCH-4023 project site, building LCH-4023 was previously used as a MCB, Camp Lejeune driver's license office. Modular office buildings were being installed at the project site during the field investigation. These modular office buildings (LCH-4012, LCH-4012A, and LCH-4012B) will reportedly serve as temporary office spaces for the MCB Family Support Service. Refer to Table 1 for storage tank system information and Table 2 for owner/operator information.

2. Contaminant Source Inventory

According to the OSAGE Initial Assessment Report the suspected contaminant source from which the petroleum impact originated was an AST (AST LCH-4023) containing "heating oil" used for heating Building LCH-4023. The AST was reportedly removed during the demolition of Building LCH-4023 in 2006.

Based on a review of documents in the Document Library of the MCB, Camp Lejeune Underground Storage Tank (UST) Management Web Portal (Web Portal) and field reconnaissance, additional contaminant sources exist in the vicinity. Specific sources identified within a 200 feet radius of the former AST include the following:

- Suspected UST LCH-4027 - 200ft. South - Unknown Status
- Unnamed UST - 80ft. South-southeast - Gasoline - Removed
- UST SLCH-4019 - 100ft. Southeast - Used Oil - Removed
- UST LCH-4025 - 130ft. South - Diesel - Removed

Potential contaminant sources are included in Table 3.

3. Release Incident History

No evidence of a reported release occurring at Building LCH-4023 was identified during records research. However, numerous releases have been confirmed in the immediate vicinity at Buildings SLCH-4019, LCH-4015, LCH-4022, and LCH-4034.

4. Previous Investigations

Potential contamination was detected at the LCH-4023 project site on October 28, 2008 when petroleum odor was noticed in soils removed from a trench being excavated to facilitate the installation of a new wastewater line across the site. Camp Lejeune Environmental Management Division (EMD) personnel were notified and tasked OSAGE with conducting initial assessment activities. As part of the assessment activities, OSAGE collected ten soil samples from the sidewalls and bottom of the excavation for laboratory analysis. Approximately 40 tons of petroleum impacted soil excavated during the initial actions were temporarily stockpiled on site and subsequently disposed at an approved facility. Field activities were presented by OSAGE in

an Initial Assessment Report and laboratory analytical results were provided to NCDENR in a letter dated November 5, 2008. The initial actions documentation is provided in Appendix A.

Based on information presented in the LAW CSA (LAW, 1996) and a review of the report archives in the Document Library of the Web Portal, a number of studies have been performed in the vicinity of Site LCH-4023. The project sites in the area include SLCH-4019, LCH-4015, LCH-4022, and LCH-4034. The reports and documents associated with these projects are on file with the Wilmington Regional Office of the NCDENR.

5. History of Corrective Actions

As part of the Initial Assessment activities conducted by OSAGE, petroleum impacted soils removed from the excavation were stockpiled and subsequently disposed and the excavation backfilled with clean borrow material.

The removal of the AST previously associated with Building LCH-4023 was reportedly removed during the demolition of Building LCH-4023 in 2006.

D. RECEPTOR INFORMATION

As defined by the NCDENR in Section .0102 of North Carolina Administrative Code (NCAC) T15A:02L, potential receptors include any human, plant, animal, or structure with the potential to be adversely affected by the release or migration of contaminants. Guidance documents issued by the regulatory agency indicate that structures may include items such as utility lines, basements, and elevator shafts. Although not specifically included in the rule definition (NCAC T15A:02L .0102), regulatory officials also consider potential receptors to include environmental resources such as water supply wells, surface waters, drinking water supplies, and "regions of groundwater that have been identified for planned resource development".

Performance of the potential receptors survey involved not only an evaluation of the presence of potential receptors but also an evaluation of transport mechanisms by which the contaminants are transported from the source to the receptor. The survey also involved a cursory evaluation of exposure pathways including ingestion, inhalation, and adsorption. As petroleum fuel seeps through the subsurface, adsorption onto soil particles and volatilization into pore spaces occurs. The remaining petroleum fuel moves vertically downward (in the absence of preferred lateral routes of migration) until it reaches the capillary fringe (in the absence of a permeable barrier above the capillary fringe). Petroleum fuel, now in the liquid phase, spreads throughout the capillary fringe and dissolves into the groundwater.

Exposure to contaminated soils is contingent upon site disturbance through construction or remediation activities. Potential receptors can be exposed to petroleum hydrocarbons found in the soil through inhalation of volatilized compounds and dermal contact with contaminated soil.

1. Water Supply Wells

As illustrated on Figure 1 and listed on Table 4, no potable water supply wells are located within 1,500 feet of the subject site. The nearest water supply well is PSWLCH4009 located approximately 1,800 feet southeast of the release. Well PSWLCH4009 is reportedly inactive and scheduled for abandonment.

2. Public Water Supplies

Public water is provided to buildings within 1,500 feet of the subject site by water mains which carry treated potable water. Potable water is supplied to the site and surrounding areas by the MCB water supply system. Typically, groundwater obtained from the Castle Hayne aquifer is the raw water source for the treatment facilities.

3. Surface Water

According to the Camp Lejeune, USGS Topographic Quadrangle, the nearest surface water bodies are Mott Creek and an unnamed tributary to Northeast Creek located approximately 2,200 feet north-northwest and southwest, respectively. The surface water bodies are shown on Figures 1 and 2.

4. Wellhead Protection Areas

At the MCB Camp Lejeune, wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB Camp Lejeune has identified wellhead protection areas on the base. Based on the most recent Wellhead Protection Plan – 2002 Update (AH Environmental Consultants, 2002), the potential source area is located within a proposed wellhead protection area. However, numerous water supply wells in the area have been deactivated and/or abandoned since the Wellhead Protection Plan was updated. Therefore, the designated extent of the Wellhead Protection Area may change when reevaluated.

5. Deep Aquifers in the Coastal Plain Physiographic Region

As identified in the Geologic Map of North Carolina (North Carolina Department of Natural Resources and Community Development, 1985), the subject site lies within the Coastal Plain physiographic province.

The potential source area is located just above an apparent semi-confined surficial groundwater aquifer. While there is the potential for recharge by rainfall to the surficial aquifer at the Base, the surficial aquifer is not used for water supply aboard MCB, Camp Lejeune. Groundwater obtained from the Castle Hayne aquifer is the raw water source for the MCB, Camp Lejeune potable water treatment facilities.

To determine deep aquifers underlying the subject site, the area was profiled in the “Visual Hydrogeologic Framework” database provided in the NCDENR Division of Water Resources website (VHF website). This is a database of well and soil boring log data from numerous locations across the North Carolina Coastal Plain.

Including the surficial aquifer there are eleven identified aquifers (seven principal aquifers and four minor aquifers) within the North Carolina Coastal Plain physiographic region. Data from the Onwasa Hubert 15M test boring, advanced west of the subject site to a depth of 273 feet, indicated that the surficial aquifer extended to a depth of approximately 26 feet below land surface (BLS), the Castle Hayne Confining Unit was encountered from 26 feet BLS to a depth of approximately 46 feet where the Castle Hayne Aquifer was encountered. Although not encountered in the boring due to the limited depth, the Beaufort, Peedee, Black Creek, Upper Cape Fear, and Lower Cape Fear aquifers likely exist beneath the project site.

6. Subsurface Structures

With the exception of underground utilities, no subsurface structures were identified at the subject site. Permanent buildings in the vicinity are of slab-on-grade construction. The temporary offices being installed at the site are prefabricated mobile structures with open undercarriages. See Figure 3 for locations of utilities at the project site.

7. Property Owners and Occupants

The MCB, Camp Lejeune has historically and continues to be the property owner and occupant. Refer to Table 2 for property owner and occupant details. Surrounding properties with places of public assembly are presented on Figure 2.

E. REGIONAL GEOLOGY AND HYDROGEOLOGY

1. Regional Geology

The project site lies within the southeastern portion of the Outer Coastal Plain physiographic province of North Carolina. The Outer Coastal Plain, as described by David R. Soller and Hugh H. Mills in *The Geology of the Carolinas* (1991), is the eastern portion of the Coastal Plain where constructional topography is evident or dominant. The Inner Coastal Plain begins at the Fall Line, narrows northerly, and is considered an area of erosional topography. According to Horton and Zullo in *The Geology of the Carolinas* (1991), the Coastal Plain is comprised of a seaward thickening wedge of post-Triassic, primarily unconsolidated, siliclastic sediments and carbonate rocks that extend from the Fall Line to the continental shelf break. Coastal Plain sediments were deposited in a number of different

environments including, but not limited to, offshore marine, near-shore marine, lagoonal, and deltaic. The eustatic rise and fall of sea level has resulted in numerous sedimentary packages of transgressive and regressive sequences deposited throughout the Coastal Plain. In Onslow County, the pre-Mesozoic crystalline basement rock, onto which the Coastal Plain was deposited, lies approximately 1,300 feet below mean sea level (MSL). The dominant structural features within the surrounding area of the subject site are the Cape Fear arch, a seaward (southeasterly) plunging anticline and the Albemarle Embayment. The axis of the Cape Fear arch is located roughly 100 miles southwest of the subject site. The Albemarle Embayment lies along the northeastern border of the Cape Fear arch (Horton and Zullo, 1991).

As detailed in the Wellhead Management Program report (Geophex, 1991), geologic units identified beneath the nearby MCB, Camp Lejeune include the Cretaceous Peedee Formation that is composed of sands, clayey sands, and clay. The Peedee Formation does not outcrop anywhere on base and has only been identified from drill-hole data. The Upper Eocene Castle Hayne Formation lies unconformably on the Peedee Formation. The Castle Hayne Formation consists of widespread limestone units that are intermixed with substantial beds of calcareous sands and silty sands. Overlying the Castle Hayne Formation is moldic limestone of the upper Oligocene River Bend Formation. The uppermost limestone unit in much of the nearby area is the lower Miocene Belgrade Formation. The Belgrade rests unconformably on the River Bend or directly on the Castle Hayne Formation where the River Bend is absent. Undifferentiated surficial sediments throughout most of the surrounding area typically overlie the Belgrade.

2. Regional Hydrogeology

As detailed by Cardinell, et al (1993), the area is located in the Coastal Plain physiographic province that contains numerous varieties of coastal environments of deposition. The majority of the underlying sediments were deposited in marine or near-shore environments. The thickness of the sedimentary beds in the area is roughly 1,500 feet. Aquifers underlying MCB, Camp Lejeune includes the surficial, Castle Hayne, Beaufort, and Peedee. These aquifers are typically separated by confining units of less permeable materials consisting of beds or groups of clay and silt containing varying amounts of sand (Winner and Coble, 1989). Recharge to Coastal Plain aquifers occurs predominantly through direct surface recharge by rainfall in interstream areas (Cardinell, et al, 1993).

The surficial aquifer consists of sand, clay, sandy clay, and silts. The aquifer ranges in thickness from zero to 73 feet (Cardinell, et al, 1993). The average hydraulic conductivity of the surficial aquifer was estimated by Cardinell, et al (1993) to be about 50 feet per day (ft/d).

The Castle Hayne aquifer includes the Eocene Castle Hayne Formation and Oligocene River Bend Formation. The Castle Hayne aquifer consists of beds of sand, limestone, and cemented/calcareous sand with discontinuous lenses of clay, silt, and clay/silt sand mixtures. According to Cardinell, et al (1993), the upper portion of the Castle Hayne aquifer is composed of calcareous sand with interbedded clay and silt beds. The top of the Castle Hayne aquifer was interpreted by Cardinell, et al (1993) to range from 10 to 68 feet below sea level aboard nearby Camp Lejeune and range in thickness from 156 to 400 feet. Numerous studies have been conducted to estimate the hydraulic properties of the Castle Hayne aquifer. A summary of the results as presented by Cardinell, et al (1993) include:

Transmissivity (T) 820 – 24500 [(ft³/d)/ft²] ft
Hydraulic conductivity (K) 14 – 91 ft/d (65 ft/day average)
Storage coefficients (S) 0.0002 – 0.001

The Castle Hayne aquifer is the primary source of potable water aboard MCB, Camp Lejeune.

The Castle Hayne confining unit, where present, is composed primarily of beds of clay, silt, sandy clay/silt, and clayey/silty sand. According to Winner and Coble (1989), the beds belong chiefly to the Belgrade, Pungo River, and Yorktown Formations. The confining unit has an overall average thickness of roughly 14 feet. Winner and Coble (1989) stated that throughout much of the unit, enough sand was contained to allow for significant leakage between the Castle Hayne aquifer and the overlying aquifers. Additionally, Cardinell, et al (1993) concluded through seismic profiling, that paleochannels as well as the New River and its major tributaries incised the unit. No spatially continuous clay beds were noted from the seismic records above the Castle Hayne aquifer by Cardinell, et al (1993).

F. SITE GEOLOGY AND HYDROGEOLOGY

1. Site Topography

During the initial phases of the investigation, the project site was generally flat and covered with approximately 1.5 feet of fill. After commencement of the assessment activities, construction began at the project site including the installation of three modular office buildings in addition to the construction of a paved parking area, sidewalk, and a grass area over the impacted area. The current site layout is presented on Figure 3. The average elevation of the project site is approximately 30 feet MSL.

2. Site Soils and Geology

Representative soil samples were collected from each boring advanced during this investigation to facilitate the soil analysis and installation of

groundwater monitoring wells. Soil samples were described in the field utilizing visual/manual techniques as described in ASTM International (ASTM) D-2488. The soils were classified in accordance with the Unified Soils Classification System (USCS) and a boring log for each boring was produced. Boring logs are included in Appendix C.

Two geologic cross sections were generated based on the information obtained from soil boring and monitoring well installation during this investigation. Figure 5 illustrates the plan view of the cross section layouts, and Figures 5A and 5B depict cross sections A-A' and B-B', respectively.

As depicted on the cross sections and within the boring logs, the majority of the land surface is covered by approximately one foot of fill material. A large portion of this material will be covered with asphalt. The fill material is underlain by clay and sandy silts with sand content increasing with depth. Interbedded high plasticity clay and silty sand was encountered beneath the sand and clay mixtures to depth of approximately 14 feet BLS where high plasticity clay with apparently low permeability was identified. The clay continued to a depth of 21.5 feet BLS where the material was in sharp contact with silty, fine grained sand. A 0.5 feet thick layer of friable, weathered limestone exhibiting the consistency of sandy gravel was encountered beneath the silty sand at a depth of 30 feet BLS. A solution cavity or void was noted at a depth of 30.5 feet BLS due to loss of circulation and a "rod drop" during drilling activities. The "cavity" extended from 30.5 feet to 32 feet BLS. Highly weathered limestone was encountered beneath the "cavity" to a depth of 35 feet BLS where an additional "cavity" was identified extending to a depth of 36 feet where the boring was terminated.

3. Site Groundwater

As part of this investigation, a comprehensive groundwater gauging event was conducted on April 8, 2009 by CATLIN personnel. Groundwater gauging was accomplished by using an engineer's tape marked with water and petroleum gauging paste to measure the distance from the top of casing of each monitoring well to the groundwater and/or petroleum/water interface.

Groundwater table elevations were then calculated and groundwater table contours were generated. Groundwater elevations in the Type II monitoring wells across the site ranged from 24.63 feet (USTLCH4023-MW01) to 27.90 feet (USTLCH4023-MW04) with an approximate average depth to groundwater of six feet BLS. Monitoring well gauging data is included in Table 5. Figure 7 illustrates the water table elevation contours as of April 8, 2009. As depicted on Figure 7, the generalized groundwater flow trend in the shallow aquifer is towards the northwest across the subject site at an approximate horizontal hydraulic gradient of 0.023 feet per foot. Horizontal hydraulic gradient calculations are provided in Appendix H. Site hydrogeologic characteristics are further discussed in Section J of this report.

G. SOIL SAMPLING RESULTS

Soil samples collected during this investigation were split in two and placed in plastic zip top bags. One sample was immediately placed on ice and the second was allowed to equilibrate then screened with a organic vapor analyzer (OVA) equipped with a photo ionization detector (PID). One representative soil sample was selected from each boring location installed during the two phases of drilling for laboratory analysis. Samples were selected based on physical evidence of impact, highest PID reading, or from the first sampled interval above the capillary fringe. Soil samples selected for laboratory analysis were analyzed per EPA Method 8015 for DRO and GRO. Boring logs summarizing field data from the monitoring well and DPT boring advancement are included in Appendix C.

Soil samples selected for laboratory analysis were placed in laboratory glassware, labeled, placed immediately into a cooler, and transported under proper Chain-of-Custody protocol to SGS Environmental Services, Inc. of Wilmington, North Carolina (SGS). All samples were collected in general accordance with CATLIN's Standard Methods of Investigation included in Appendix B. Laboratory analytical reports for the selected soil samples are included in Appendix E and are summarized as follows:

EPA METHODS 8015DRO and 8015GRO

As presented of Table 6, DRO were identified at concentrations above the method detection limit (MDL) in eight of the 18 samples (includes one duplicate sample) submitted for laboratory analysis. Samples collected from four of the 17 sampling locations were identified above the NCDENR Action Level of 40 mg/kg. Concentrations of GRO were identified above the NCDENR Action Level of 10 mg/kg in three of the eighteen samples submitted for laboratory analysis. Concentrations above the NCDENR Action Level are summarized as follows:

SAMPLE LOCATION*	DEPTH	DRO Result (mg/kg)	GRO Result (mg/kg)
DPT03	1-3	547	12.6
DPT07	1-3	84.1	<5.56
DPT08	1-3	432	32.1
MW05	0-2	120	18.0
NCDENR ACTION LEVEL (mg/kg)		40	10

* All sample locations are preceded with "LCH4023-" nomenclature.

An estimated extent of DRO/GRO above the NCDENR Action Levels in addition to summarized laboratory results are presented on Figure 6.

H. GROUNDWATER SAMPLING RESULTS

On February 9, 2009, each newly installed groundwater monitoring well was gauged for depth to groundwater and potential free-phase product. Subsequent to obtaining groundwater measurements, each groundwater monitoring well, with the exception

of USTLCH4023-MW06 which was bailed dry, was purged a minimum of three well volumes as per CATLIN's Standard Methods of Investigation included in Appendix B. After collection, the groundwater samples were placed in laboratory glassware, labeled, placed immediately on ice in a cooler, and transported under proper Chain-of-Custody protocol to SGS and analyzed per EPA Methods 602 and 625 plus TICs. Analytical reports for the groundwater samples analyzed are included in Appendix E and are summarized as follows:

EPA METHOD 602

No EPA Method 602 constituents were identified at concentrations above current 2L GWQS. The following were identified in the groundwater sample and duplicate sample collected from USTLCH4023-MW05: Benzene (estimated 0.689), Ethylbenzene (29), and Total Xylenes (estimated 6.213). All presented results are from the primary groundwater sample and are reported in µg/L. Laboratory results are summarized on Table 7 and illustrated on Figure 8.

EPA METHOD 625

As indicated in Table 7A and illustrated on Figure 8, the only EPA 625 compound identified above the applicable 2L GWQS was Naphthalene detected at a concentration of 76.6 µg/L in the groundwater sample collected from USTLCH4023-MW05. The current 2L GWQS for Naphthalene is 21 µg/L. Naphthalene was additionally identified at a concentration of 6.62 µg/L in the groundwater sample USTLCH4023-MW02. All other EPA Method 625 target compounds were below the applicable 2L GWQS or reported as below laboratory quantitation limits (BQL).

I. FREE-PHASE PRODUCT INVESTIGATION

No free-phase product was identified in any of the groundwater monitoring wells installed during this investigation.

J. HYDROGEOLOGIC INVESTIGATION

1. Vertical Gradient Determination

Vertical hydraulic gradient was calculated on Type II/Type III well pair USTLCH4023-MW05/USTLCH4023-MW06 with a resultant vertical hydraulic gradient of 1.0053. The positive (+) gradient indicates the potential for "downward" groundwater movement. Vertical gradient calculations are provided in Appendix F.

2. Hydraulic Conductivity

Two falling head slug tests were performed at the subject site during this investigation. Slug tests were performed on Type II groundwater monitoring wells USTLCH4023-MW01 and USTLCH4023-MW05 on February 9, 2009. The calculated hydraulic conductivity values were calculated using the

Bouwer-Rice Solution Method. A hydraulic conductivity value of 0.00001462 feet per second, or 1.263 feet per day (ft/day), was calculated for the shallow Type II monitoring well USTLCH4023-MW01. A hydraulic conductivity value of 0.00001719 feet per second, or 1.485 ft/day was calculated for the shallow Type II monitoring well USTLCH4023-MW05. The resultant average hydraulic conductivity value determined from the two tests is 1.374 ft/day. Slug test data is included in Appendix G.

3. Rate of Groundwater Linear Flow Velocity

Groundwater travel time or average groundwater linear flow velocity serves as the basis for estimating the rate of contaminant migration at the site. Groundwater flow rates should represent the maximum rate of contaminant migration with variations among contaminants due to geohydrochemical processes including molecular diffusion, mechanical mixing, sorption-desorption, ion-exchange, hydrolysis, and biodegradation.

However, due to the difficulties in estimating the effects of many of the processes on contaminant migration rates and the desire to produce relatively conservative (higher) estimates, only adsorption processes are incorporated into rate calculations.

The average groundwater linear flow velocity was calculated using a modification of Darcy's Law (Todd, 1980) and is presented in Appendix H. The hydraulic gradient was extrapolated from the calculated groundwater elevations in monitoring wells USTLCH4023-MW04 and USTLCH4023-MW01. The hydraulic gradient was determined to be 0.022915 feet per foot towards the northwest. The average hydraulic conductivity value of 1.374 ft/day was used in the calculations. An average effective porosity value of 0.437 was estimated from the values for fine-grained sand, silt, and clay. The average groundwater linear flow velocity was determined to be 0.072 ft/day to the northwest.

K. GROUNDWATER MODELING

No detailed groundwater modeling was conducted during this investigation. However, the estimated velocity of the petroleum contaminant Naphthalene was calculated in accordance with the USEPA (1985). As shown in the calculations in Appendix I, the contaminant velocity (V_c) for Naphthalene was determined to be 0.002087 ft/day.

L. DISCUSSION

This CSA has been completed in accordance with the NCDENR – *UST Section Guidelines for the Investigation and Remediation of Contamination from Non-UST petroleum Releases* effective July 1, 2007.

The investigation included the installation of 12 DPT soil borings, five Type II groundwater monitoring wells, and one Type III groundwater monitoring well. Soil samples were collected and submitted for laboratory analysis from all soil borings and Type II groundwater monitoring well borings advanced on the project site. Based on laboratory analytical results, four soil samples were identified with concentrations of target compounds above the current NCDENR Action Levels. The extent of soils with petroleum impact in excess of current NCDENR Action Levels has been delineated horizontally to an area of approximately 1,000 square feet and based on groundwater gauging data in addition to field data generated during the excavation activities, vertically to an estimated depth of approximately four feet BLS.

A comprehensive groundwater gauging event was conducted on April 8, 2009. Groundwater elevations in the Type II monitoring wells across the site ranged from 24.63 feet to 27.90 feet (NAVD 88). The generalized groundwater flow trend in the shallow aquifer was determined to be towards the northwest across the subject site at an approximate average linear flow velocity of 0.072 ft/day. No free-phase product was identified in any of the groundwater monitoring wells installed and gauged as part of this investigation.

Naphthalene, identified at a concentration of 76.6 µg/L in groundwater sample USTLCH4023-MW05, was the only dissolved petroleum constituent identified in groundwater samples collected during this investigation at a concentration above current applicable 2L GWQS. Review of data compiled during this investigation indicates that the dissolved contaminant plume has been delineated horizontally and vertically to a depth of less than approximately 14 feet BLS.

As previously stated, ten soil samples were collected by OSAGE for laboratory analysis from the sidewalls and bottom of an excavation associated with the installation of a sewer pipeline. Approximately 40 tons of petroleum impacted soil excavated during the initial actions were temporarily stockpiled on site and subsequently disposed at an approved facility.

M. CORRECTIVE ACTION RECOMMENDATIONS

As presented in the findings of the initial actions and data presented in this document, soil impacted with petroleum at concentrations in excess of current NCDENR Action Levels was identified at the site. Groundwater contamination exists at the subject site above current 2L GWQS. The extent of impacted groundwater has been delineated to a small area in the immediate vicinity of groundwater monitoring well USTLCH4023-MW05 and to a depth of less than approximately 14 feet BLS. The source and quantity of the release which caused the contamination is unknown but suspected to have originated from an AST formerly located immediately southeast of former building LCH-4023. The contents of the former AST are reported to have been heating oil.

1. OBJECTIVES

The goals of the Corrective Actions are as follows:

- Remediate soil contaminant levels to less than the NCDENR Action Levels of 10 mg/kg for TPH GRO and 40 mg/kg for TPH DRO,
- Reduce dissolved groundwater contamination to less than the applicable 2L GWQSSs,
- Provide a schedule for the implementation and operation of the proposed corrective actions, and
- Outline a monitoring plan with the capacity to evaluate the effectiveness of the proposed corrective.

Soil sampling results are summarized on Table 6 and Figure 6. Groundwater sampling results are summarized on Tables 7 and 7A and Figure 8. Site rehabilitation goals are summarized on Table 8.

2. REMEDIATION ALTERNATIVES

Numerous technologies that address the remediation of soil and groundwater from the subsurface are available. Specific remedial alternatives that were reviewed include the following: Natural Attenuation, Soil Vapor Extraction (SVE), Excavation and disposal, Chemical Oxidation, Enhanced Bioremediation, and/or a pump and treat system. Some of these technologies have demonstrated an acceptable level of success when implemented in the field, while others appear to have been ineffective. In certain instances, implementation of any available remediation technology by itself will not suffice. Hence, a combination of treatment technologies is at times more effective. Site specific conditions, nature, and extent of contamination together with an analysis of a particular remediation technology's record of success with similar sites will allow the screening of technically feasible alternative technologies. The "best" remedial strategy is the one that can fulfill the established remediation objectives at the least cost.

3. REMEDIATION TECHNOLOGY SELECTION

CATLIN recommends the following remediation technologies to be implemented at the subject site:

- No free-phase product has been identified during the CSA investigation. Therefore, no remediation is required.
- Due to the shallow groundwater table which creates the potential for continued soil to groundwater contaminant transfer and the existence of

residential buildings, daycare facilities, places of public assembly in the vicinity, and the need to expedite remedial activities due to ongoing construction in the area, excavation and disposal is the most practical alternative for soil remediation.

- Based on the low levels of dissolved groundwater impact in excess of 2L GWQS in addition to the proposed soil remedial actions, Natural Attenuation will be an effective remedial alternative to address dissolved phase petroleum contamination.

4. PROPOSED REMEDIATION

1. FREE-PHASE PRODUCT RECOVERY

Free-phase product has not been detected at the subject site during the environmental investigations; therefore, no free-phase product remediation is required at this time.

2. SOIL

To remediate vadose zone soil with petroleum contamination in excess of NCDENR Action Levels, CATLIN recommended excavation and disposal. The proposed excavation boundaries, based on the estimated areal extent of TPH DRO and/or GRO concentrations in excess of NCDENR Action Levels, are presented on Figure 9. The area covered approximately 1,000 square feet. Based on an approximate six feet depth to groundwater, the estimated excavation depth to remove vadose zone soil in addition to petroleum impacted groundwater was six feet resulting in an estimated excavation quantity of 220 cubic yards or approximately 330 tons assuming 1.5 tons per cubic yard.

3. GROUNDWATER

Due to the limited magnitude of groundwater contamination and the proposed removal of the potential source CATLIN recommends remediation of groundwater contamination by natural attenuation.

As discussed previously, the average groundwater linear flow velocity was calculated using a modification of Darcy's Law (Todd, 1980) and is presented in Appendix H. The average hydraulic conductivity value of 1.374 ft/day was used in the calculations. An average effective porosity value of 0.437 was estimated from the values for fine-grained sand, silt, and clay. The average groundwater linear flow velocity was determined to be 0.072 ft/day to the northwest.

The estimated velocities of the petroleum contaminant Naphthalene and was calculated in accordance with the USEPA (1985). As shown in the calculations in Appendix I, the contaminant velocity (V_c) for Naphthalene was determined to be 0.002087 ft/day.

The previously discussed recommendations are based on the following observations:

- Soil excavation and disposal is a cost-effective option for remediation of the relatively small volume of contaminated soil.
- Excavation of contaminated soil will eliminate the source of additional groundwater contamination.
- Excavation is a rapid remedial technique that would create minimal disturbances to the construction activities and schedule.
- No active water supply wells have been identified within a 1,500 feet radius of the site.
- The project site is located aboard MCB, Camp Lejeune and migration of the petroleum hydrocarbon plume onto adjacent properties is not anticipated.
- Migration of the dissolved-phase is not expected to impact nearby surface waters.

Soil excavation activities and groundwater monitoring well replacement, if necessary, were expedited in an effort to conclude the activities prior to completion of the final paving associated with the proposed parking area. A list of proposed target dates is included in Table 10.

5. MONITORING PLAN

1. MONITORING PLAN GOALS

The goals of the monitoring plan are to track any contaminant plume migration and assess the attenuation of groundwater contaminant levels to provide data necessary for recommendations regarding the remedial endpoints.

2. PROPOSED MONITORING ACTIVITIES

The following monitoring activities are proposed upon completion of excavation activities and groundwater monitoring well replacement, if necessary:

- Gauging of all groundwater monitoring wells will be performed in order to confirm the direction and rate of groundwater flow.
- Sampling of monitoring wells USTLCH4023-MW05, (source area), USTLCH4023-MW01 (down gradient), and USTLCH4023-MW06 (Type III) for groundwater analysis per EPA Methods 602 and 625 parameters.

3. PROPOSED MONITORING SCHEDULE

The monitoring activities are proposed after completion of the soil activities then annually thereafter until the remediation objectives are met.

Termination of monitoring and site closeout will be requested when petroleum contaminated soil has been removed and petroleum-related constituents dissolved in groundwater are below 2L GWQS and have remained so for at least one year (four consecutive quarterly groundwater sampling events).

4. REPORTING

The post remediation groundwater gauging and sampling event should be submitted to the NCDENR following completion of said activities. Monitoring Reports should be prepared and submitted to the NCDENR annually to summarize monitoring activities and findings. The results of each sampling event should be reviewed to determine if groundwater restoration goals have been achieved thereby qualifying the site for closure.

6. PERMITS

No permits are required. Appropriate documentation and laboratory analytical data were collected to facilitate soil disposal at an appropriate State approved facility. The excavation and disposal activities are discussed further in Section N of this document.

N. CORRECTIVE ACTIONS

As previously mentioned, corrective actions were expedited due to construction activities. To remediate vadose soil contamination identified in excess of NCDENR Action Levels it was concluded that soil excavation as recommended in previously in this document would be conducted. The excavation boundaries were developed based on soil sampling results from the assessment portion of this investigation in addition to the Osage investigation. Proposed excavation boundaries in addition to proposed methods were presented by CATLIN in a Workplan/Health and Safety Plan dated May 22, 2009.

On May 26, 2009 CATLIN personnel met on-site with a private utility locator to layout the proposed excavation limits and mark underground utilities in the vicinity of the excavation. Also on May 26, 2009, CATLIN personnel removed sod from the proposed excavation area and in addition to approximately 42 linear feet of sidewalk which crossed the proposed excavation area. The sod was stored onsite for replacement subsequent to soil excavation and backfill. The proposed excavation boundaries are presented on Figure 9.

CATLIN personnel along with personnel from P&F Environmental, Incorporated (P&F) met on-site May 27, 2009 to commence soil excavation at the subject site. On the morning of May 27, 2009 before beginning soil removal CATLIN personnel discussed site safety issues with P&F personnel. Removed soil was loaded directly onto trucks from the excavation. Trucks loaded with soil from the excavation were weighed at the MCB Camp Lejeune Landfill truck scales. CATLIN personnel were on-site to conduct excavation oversight, screen soils both physically and with an OVA, and to collect confirmation soil samples. CATLIN personnel documented the number of trucks loaded with excavated soil and the number of trucks arriving with clean fill material each day. Clean fill material was stockpiled on-site to accelerate backfilling the excavation. The fill material was not placed into the excavation area until the confirmation soil sample for that area was collected. Fill within the excavation from the former sidewalk extending southeast was tamped and compacted with the track-hoe bucket. Fill emplaced in the excavation from the former sidewalk extending northwest, under the proposed parking area, was placed in lifts of approximately one foot thick and rolled with a vibratory roller to assure adequate compaction of the fill material. Removal of soil from the excavation was completed on the evening of May 28, 2009 and backfilling and compaction activities were completed on the morning of May 29, 2009. A final inspection of the excavation and backfill was completed by CATLIN personnel on the afternoon of May 29, 2009. After completion of excavation, backfilling, and compaction, CATLIN personnel replaced the sod and sidewalk which had been removed to facilitate excavation activities.

As depicted on Figure 10, the excavation encompassed an area of approximately 1,450 square feet. Excavation limits were established by CATLIN personnel based on physical observations in addition to PID measurements. As excavation activities progressed, it was determined by CATLIN personnel that groundwater encountered

at approximately four feet BLS was perched on a clay layer identified across the area of investigation. Based on the previously discussed criteria, the excavation was dug to a depth of approximately eight feet below grade in the southeastern portion of the excavation, through the clay layer, into the underlying sand to ensure removal of petroleum impacted soil. Based on these same criteria, the excavation depth in the northwestern portion of the excavation was dug to a depth of approximately six feet below grade. A total of 520.15 tons (approximately 350 cubic yards) of soil was removed during excavation activities and replaced with clean backfill.

A soil manifest was completed for each truck loaded with excavated soil. The manifest was signed by the driver and MCB, Camp Lejeune personnel. Subsequently, the manifests were signed by the disposal facility upon arrival and disposal of the soil. A copy of each of the final soil manifests is included in Appendix J. All excavated soils were weighed on the truck scales at the MCB, Camp Lejeune Landfill weigh station before transportation by truck to the disposal facility. All excavated soils were disposed at the dedicated land application facility, Pridgen Farms, Inc. (NCDENR Permit No. SR0500106) located in Edgecombe County, North Carolina.

O. POST-REMEDATION SAMPLING

CATLIN personnel collected sidewall soil samples LCH4023-EX-1(N5') and LCH4023-EX-2(E5') on May 27, 2009 and sidewall soil samples LCH4023-EX-3(S5') and LCH4023-EX-4(W5') on May 28, 2009. Each of the soil samples were collected from an undisturbed portion of soil directly from the track-hoe bucket after retrieval from the excavation. Soil samples LCH4023-EX-5(Floor 6-7') and LCH4023-EX-6(Floor 6') were collected from the bottom of the excavation on May 29, 2009 and May 28, 2009, respectively. Each soil sample was noted for any hydrocarbon odor and then a portion was placed into a plastic zip-top bag and then the sample headspace was screened with a MiniRAE® 2000 PID.

The soil samples collected by CATLIN were obtained in accordance with the methods specified in the Workplan. The soil samples were placed in laboratory glassware, labeled, placed immediately on ice in a cooler, and transported under proper Chain-of-Custody protocol to SGS Environmental Services, Inc. in Wilmington, North Carolina. At the laboratory, soil samples were analyzed as specified in the ASTM Guidelines for TPH DRO/GRO. Analytical results are included in Appendix E and are summarized as follows:

As indicated in Table 11 and illustrated on Figure 10, only one sample collected from the excavation limits were identified with concentrations above the method detection limit. Soil sample LCH4023-EX-5 (Floor 6-7') was reported with a concentration of 9.79 mg/kg of DRO. This concentration is well below the NCDENR Action Level of 40 mg/kg for DRO.

P. CONCLUSIONS AND RECOMMENDATIONS

Based on the data presented herein, the soil excavation activities appear to have been successful in removing petroleum impacted soil from beneath the subject site. Therefore, no additional soil assessment or remedial actions are recommended. Based on the groundwater sampling events conducted during the assessment portion of this investigation, groundwater with dissolved petroleum constituents at concentrations in excess of NCDENR Action Levels remain at the site. Therefore, the proposed Natural Attenuation is considered the recommended remedial alternative. The proposed monitoring plan and schedule presented in this document are recommended as well.

Q. LIMITATIONS

The soil and groundwater samples analyzed as part of this investigation only provide isolated data points and may not represent conditions at every location in the project area. Analyses and conclusions of this report, being based on interpolation between data points at the project area, may not be completely representative of all site conditions. Conclusions and recommendations of this investigation and report are based on the best available data in an effort to comply with current regulatory requirements.

R. REFERENCES

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TABLES

**TABLE 1
SITE HISTORY
STORAGE TANK SYSTEM INFORMATION**

Incident Name / No.: LCH-4023 / Pending

AST ID Number	Product (gasoline, diesel, jet fuel, etc.)	Capacity (gallons)	Date Installed	Date Permanently Closed (P), or Still in Use* (C) (m/dd/yy)	Was Release Associated With AST System? (Yes / No)
AST LCH-4023	Unknown (Est. #2 Fuel Oil)	Unknown (Est. 550)	Unknown	P (Est. 2006)	Unknown

* Still in use means not permanently closed.

Est = Estimate

TABLE 2
SITE HISTORY
STORAGE TANK OWNER/OPERATOR INFORMATION

Incident Name / No.: LCH-4023 / Pending

Dates of Ownership/ Operation	Tank Number	Name of Owner or Operator	Site Use
Unknown - ~2006	AST LCH-4023	MCB, Camp Lejeune Owner and Operator	Currently under construction - Will be used as MCB Family Support Service offices - Formerly MCB Drivers License Office
Contact Address		Telephone Number	
Commanding Officer I&E/EMD/EQB Marine Corps Base McHugh Blvd, Building 12, Room 235 Camp Lejeune, North Carolina 28542		(910) 451-9017	

**TABLE 3
SITE HISTORY
CONTAMINANT SOURCES**

Incident Name / No.: LCH-4023 / Pending

Contaminant Source	Product (gasoline, diesel, jet fuel, etc.)	Capacity (gallons)	Date of Spill	Date Permanently Closed (P), or Still in Use (C)	Was a Release Associated with System? (Yes/No)
AST LCH-4023	Unknown (Est. #2 Fuel Oil)	Est. 550	Not Applicable	(P) ~2006	No
Unnamed UST	Gasoline	Unknown	Unknown	(*) 1958	Unknown
UST SLCH-4019	Used Oil	550	Unknown	(P) 1993	Yes
Suspected UST @ LCH-4027	Unknown	Unknown	Unknown	Unknown	Unknown
UST LCH-4025	Diesel Fuel	1,000	Not Applicable	(P) 1993	No

* = LAW CSA for SLCH-4019 dated May 1996 lists "In 1958, the Government reportedly was to remove tank. Above-grade evidence of UST not observed. Asphalt covers location."

Est. = Estimate

TABLE 4
WATER SUPPLY WELL INFORMATION

Incident Name / No.: LCH-4023 / Pending

Well ID#	Well Owner/User (indicate which)	Address	Phone Number	Well Use	Well Depth (ft. BLS)	Type of Well	Well Casing Depth (ft. BLS)	Well Screen Interval (x to y ft. BLS)	Distance from source area of release (ft.)
LCH4009	Owner & User MCB, Camp Lejeune	PSC Box 2004, MCB, Camp Lejeune, NC	910-451-5068	Public Water Supply (Inactive)	Unknown	Public Water	Unknown	Unknown	Southeast 1,800 ft.

ft. BLS = Feet Below Land Surface

**TABLE 5
MONITORING WELL CONSTRUCTION INFORMATION**

Incident Name / No.: LCH-4023 / Pending

WELL IDENTIFICATION	DATE INSTALLED (m/dd/yy)	DATE WATER LEVEL MEASURED (m/dd/yy)	WELL CASING DEPTH (ft. BLS)	SCREENED INTERVAL (x to y ft. BLS)	BOTTOM OF WELL (ft. BLS)	TOP OF CASING ELEV.* (ft.)	DEPTH TO WATER From Top of Casing (ft.)	GROUND-WATER ELEV. *(ft.)	FREE-PHASE PRODUCT THICKNESS (ft.)	COMMENTS
USTLCH4023-MW01	1/30/09	4/08/09	2.0	2.0 - 11.5	12.0	32.92	8.29	24.63	NMT	Permanent Flush Type II Monitoring Well
USTLCH4023-MW02	1/30/09	4/08/09	2.0	2.0 - 11.5	12.0	33.03	5.72	27.31	NMT	Permanent Flush Type II Monitoring Well
USTLCH4023-MW03	2/02/09	4/08/09	2.0	2.0 - 11.5	12.0	33.88	6.07	27.81	NMT	Permanent Flush Type II Monitoring Well
USTLCH4023-MW04	2/02/09	4/08/09	2.0	2.0 - 11.5	12.0	30.64	2.74	27.90	NMT	Permanent Flush Type II Monitoring Well
USTLCH4023-MW05	2/02/09	4/08/09	2.0	2.0 - 11.5	12.0	34.13	7.43	26.70	NMT	Permanent Flush Type II Monitoring Well
USTLCH4023-MW06	2/06/09	4/08/09	22.0 Inner 19.5 Outer	22.0 - 26.5	27.0	32.93	25.03	7.90	NMT	Permanent Flush Type III Monitoring Well

* Reference Point for Elevation Measurements (NGVD 88)

** If free-phase product present, groundwater elevation calculated by: [Top of Casing Elevation - Depth to Water] + [Free-Phase Product Thickness x 0.82]

ft. BLS = Feet Below Land Surface

NMT = No Measurable Thickness

ND = No Data

TABLE 6
SUMMARY OF SOIL LABORATORY RESULTS
Analytical Methods: EPA Methods 8015DRO and 8015GRO

Incident Name / No.: LCH-4023 / Pending

Sample ID	Contaminant of Concern →		Diesel Range Organics	Gasoline Range Organics
	Date Collected	Sample Depth (ft. BLS)		
NCDENR ACTION LEVEL (mg/kg)			40	10
LCH4023-DPT01 (1-3)	1/8/2009	1-3	<7.32	<5.57
LCH4023-DPT02 (1-3)	1/8/2009	1-3	<6.51	<4.67
LCH4023-DPT03 (1-3)	1/8/2009	1-3	547	12.6
LCH4023-DPT04 (1-3)	1/8/2009	1-3	<6.87	<5.14
LCH4023-DPT05 (0-2)	1/8/2009	0-2	19.3	<6.16
LCH4023-DPT06 (2-4)	1/8/2009	2-4	<7.06	<5.35
LCH4023-DPT07 (1-3)	1/9/2009	1-3	84.1	<5.56
LCH4023-DPT08 (1-3)	1/9/2009	1-3	432	32.1
LCH4023-DPT09 (1-3)	1/9/2009	1-3	<7.91	<5.9
LCH4023-DPT10 (1-2)	1/9/2009	1-2	8.69	<5.27
LCH4023-DPT11 (1-3)	1/9/2009	1-3	<7.34	<5.25
LCH4023-DPT12 (0-2)	1/9/2009	0-2	<7.3	<5.24
USTLCH4023-MW01 (0-2)	1/30/2009	0-2	15.6	<5.53
USTLCH4023-MW02 (0-2)	1/30/2009	0-2	<7.01	<5.32
USTLCH4023-MW03 (0-2)	2/2/2009	0-2	<6.77	<5.78
USTLCH4023-MW03 (0-2) DUP	2/2/2009	0-2	<7.21	<5.85
USTLCH4023-MW04 (0-2)	2/2/2009	0-2	11.0	<5.79
USTLCH4023-MW05 (0-2)	2/2/2009	0-2	120	18.0

All results in milligrams per kilogram (mg/kg).

Bold results indicate concentrations above NCDENR Action Levels.

ft. BLS = Feet Below Land Surface

< = Less than method detection limit

TABLE 7
SUMMARY OF GROUNDWATER LABORATORY RESULTS
Analytical Method: EPA Method 602

Incident Name / No.: LCH-4023 / Pending

Well ID	Contaminant of Concern →		Benzene	Diisopropyl ether (DIPE)	Ethylbenzene	Methyl-tert butyl ether (MTBE)	Toluene	Total Xylenes
	Sample ID	Date Collected						
2L GWQS (µg/L)			1	70	550	200	1,000	530
USTLCH4023-MW01	USTLCH4023-MW01	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW02	USTLCH4023-MW02	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW03	USTLCH4023-MW03	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW04	USTLCH4023-MW04	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW05	USTLCH4023-MW05	2/9/2009	0.689 J	<0.391	29	<0.778	<0.404	6.213 J
USTLCH4023-MW05	USTLCH4023-MW05 DUP	2/9/2009	0.638 J	<0.391	29.7	<0.778	<0.404	5.758 J
USTLCH4023-MW06	USTLCH4023-MW06	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<1.063 J

All results in micrograms per liter (µg/L).

J = Estimated concentration, below calibration range and above method detection limit

2L GWQS = NCAC T15A:02L Groundwater Quality Standards

< = Less than method detection limit

TABLE 7A
SUMMARY OF GROUNDWATER LABORATORY RESULTS
Analytical Method: EPA Method 625

Incident Name / No.: LCH-4023 / Pending

Well ID	Contaminant of Concern →		Acenaphthene	Bis(2-ethylhexyl)phthalate	Fluorene	Naphthalene	Phenanthrene	All Other EPA Method 625 Analytes
	Sample ID	Date Collected						
2L GWQS (µg/L)			80	2.5	280	21	210	Varies
USTLCH4023-MW01	USTLCH4023-MW01	2/9/2009	<0.768	<0.423	<0.747	<0.938	<0.459	BMDL
USTLCH4023-MW02	USTLCH4023-MW02	2/9/2009	<0.783	<0.431	<0.762	6.62	<0.467	BMDL
USTLCH4023-MW03	USTLCH4023-MW03	2/9/2009	<0.776	<0.427	<0.755	<0.948	<0.464	BMDL
USTLCH4023-MW04	USTLCH4023-MW04	2/9/2009	<0.791	<0.435	<0.770	<0.966	<0.472	BMDL
USTLCH4023-MW05	USTLCH4023-MW05	2/9/2009	3.23 J	0.468 J	3.49 J	76.6	3.12 J	BMDL
USTLCH4023-MW06	USTLCH4023-MW06	2/9/2009	<0.970	1.56 J	<0.944	<1.18	<0.579	BMDL

All results in micrograms per liter (µg/L).

BMDL = Below Method Detection Limit

Bold results indicate concentrations above 2L GWQS

J = Estimated concentration, below calibration range and above method detection limit

2L GWQS = NCAC T15A:02L Groundwater Quality Standards

< = Less than method detection limit

TABLE 8
SITE REHABILITATION GOALS

Incident Name / No.: LCH-4023 / Pending

MEDIUM	CONTAMINANT OF CONCERN	MAXIMUM CONCENTRATION	TARGET CLEANUP
Soil and Groundwater	Free-Phase Product	Not Applicable	Not Applicable
Soil	Diesel Range Organics	547	<40
	Gasoline Range Organics	32.1	<10
Groundwater	Naphthalene	76.6	<21

Soil contaminant concentrations are represented in mg/kg.

Groundwater contaminant concentrations are represented in µg/L.

TABLE 9
TARGET DATES OF CORRECTIVE ACTIONS

Incident Name / No.: LCH-4023 / Pending

ITEM	DATE*
Commencement of Excavation Activities and Groundwater Monitoring Well Replacement (if necessary)	2009
Commencement of Monitoring Activities	2009
Achievement of Cleanup Goals	2011
Project Completion Date	2012

* All dates are estimated

TABLE 10
SUMMARY OF POST REMEDIATION SOIL LABORATORY RESULTS
Analytical Methods: EPA Methods 8015DRO and 8015GRO

Incident Name / No.: LCH-4023 / Pending

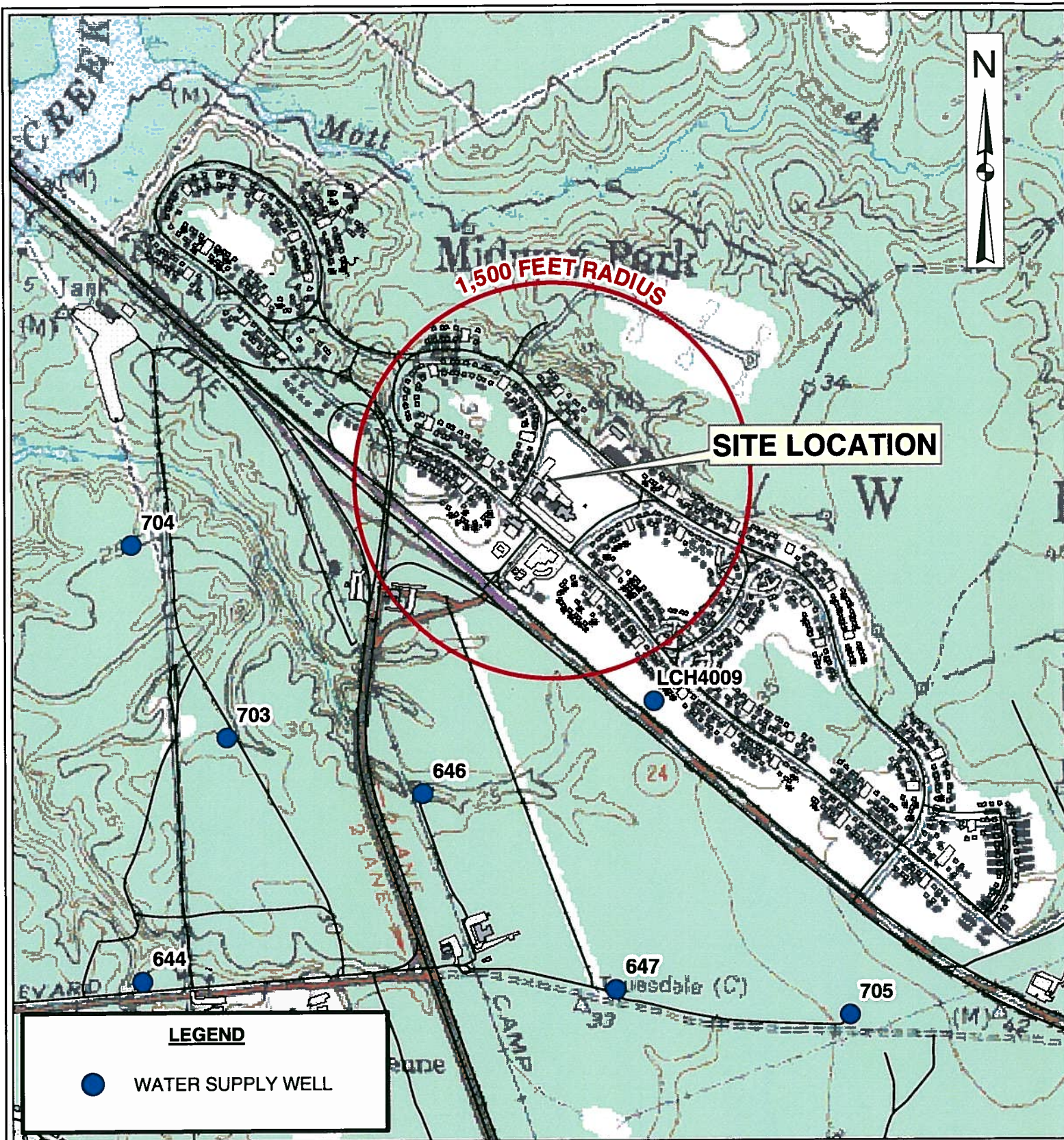
Sample ID	Contaminant of Concern →		Diesel Range Organics	Gasoline Range Organics
	Date Collected	Sample Depth (ft. BLS)		
NCDENR ACTION LEVEL (mg/kg)			40	10
LCH4023-EX-1 (N5')	5/27/2009	5	<7.96	<6.12
LCH4023-EX-2 (E5')	5/27/2009	5	<7.31	<5.67
LCH4023-EX-3 (S5')	5/28/2009	5	<7.38	<6.06
LCH4023-EX-4 (W5')	5/28/2009	5	<7.57	<7.00
LCH4023-EX-5 (Floor 6-7')	5/29/2009	6-7	9.79	<6.18
LCH4023-EX-6 (Floor 6')	5/28/2009	6	<8.10	<6.61

All results in milligrams per kilogram (mg/kg).

ft. BLS = Feet Below Land Surface

< = Less than method detection limit

FIGURES



Data Sources: USGS Topographic Quadrangle
Camp Lejeune (1952, Photorevised 1971). GIS
data provided by Camp Lejeune GIS Department.



PROJECT

COMPREHENSIVE SITE
ASSESSMENT AND CORRECTIVE
ACTIONS - LCH-4023
MARINE CORPS BASE
CAMP LEJEUNE, NC

TITLE

**SITE VICINITY AND WATER
SUPPLY WELLS**

FIGURE

1

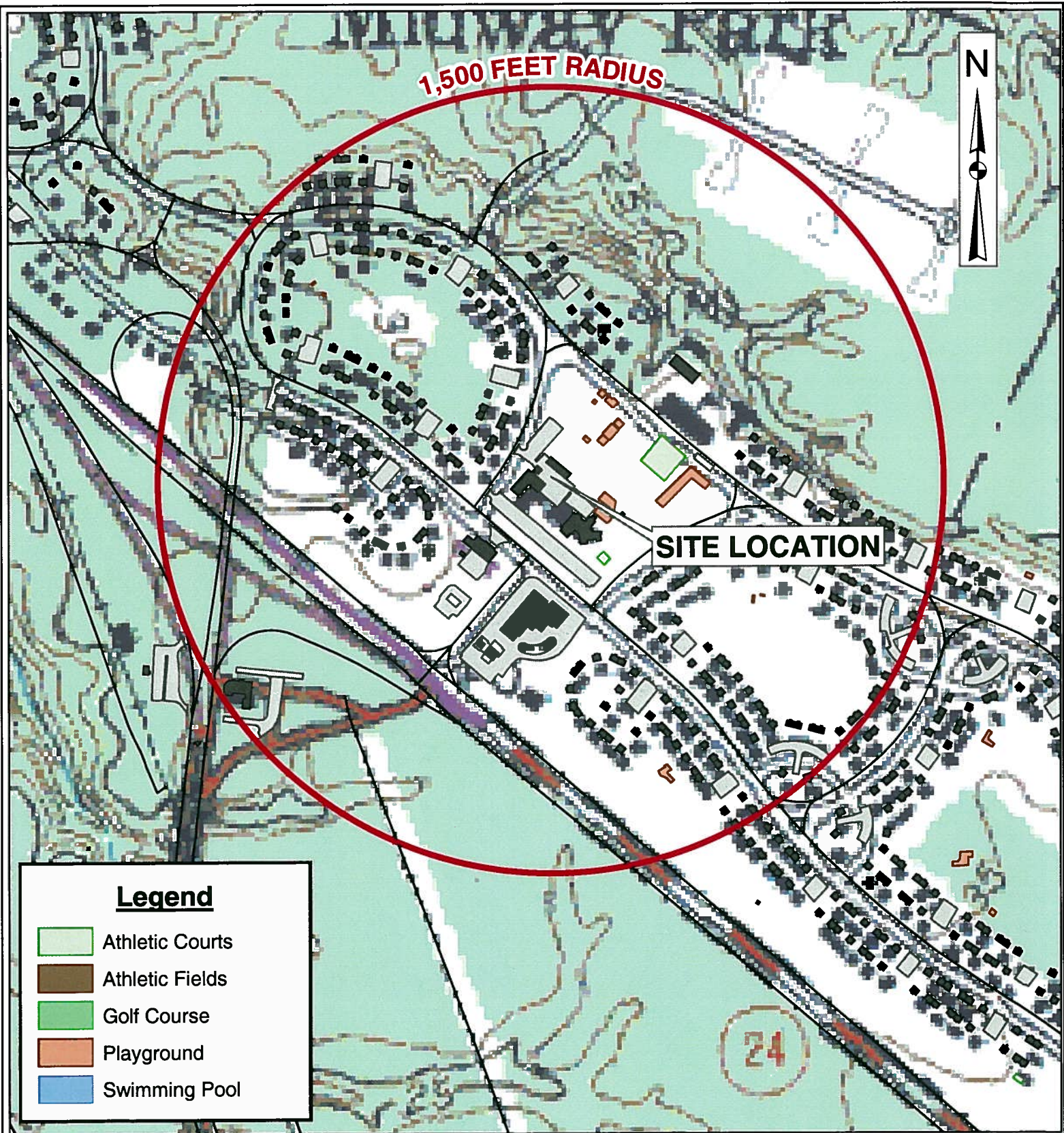
JOB NO.
208-018

DATE
JULY 2009

SCALE
AS SHOWN

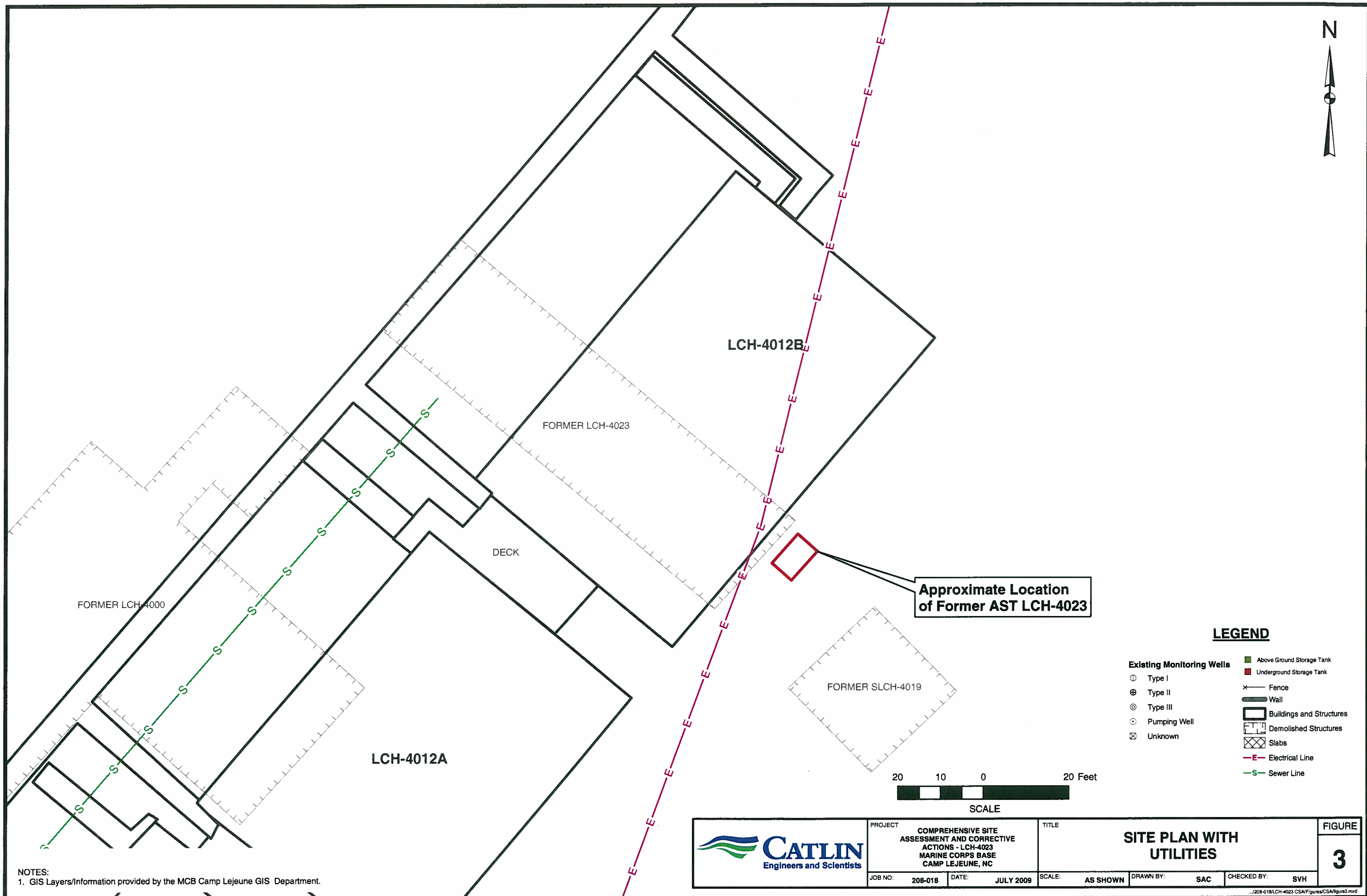
DRAWN BY
THW

CHECKED BY
SVH



Data Sources: USGS Topographic Quadrangle
Camp Lejeune (1952, Photorevised 1971). GIS
data provided by Camp Lejeune GIS Department.

	PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE SITE VICINITY WITH PLACES OF PUBLIC ASSEMBLY			FIGURE
	JOB NO. 208-018	DATE JULY 2009	SCALE AS SHOWN	DRAWN BY THW	CHECKED BY SVH	2

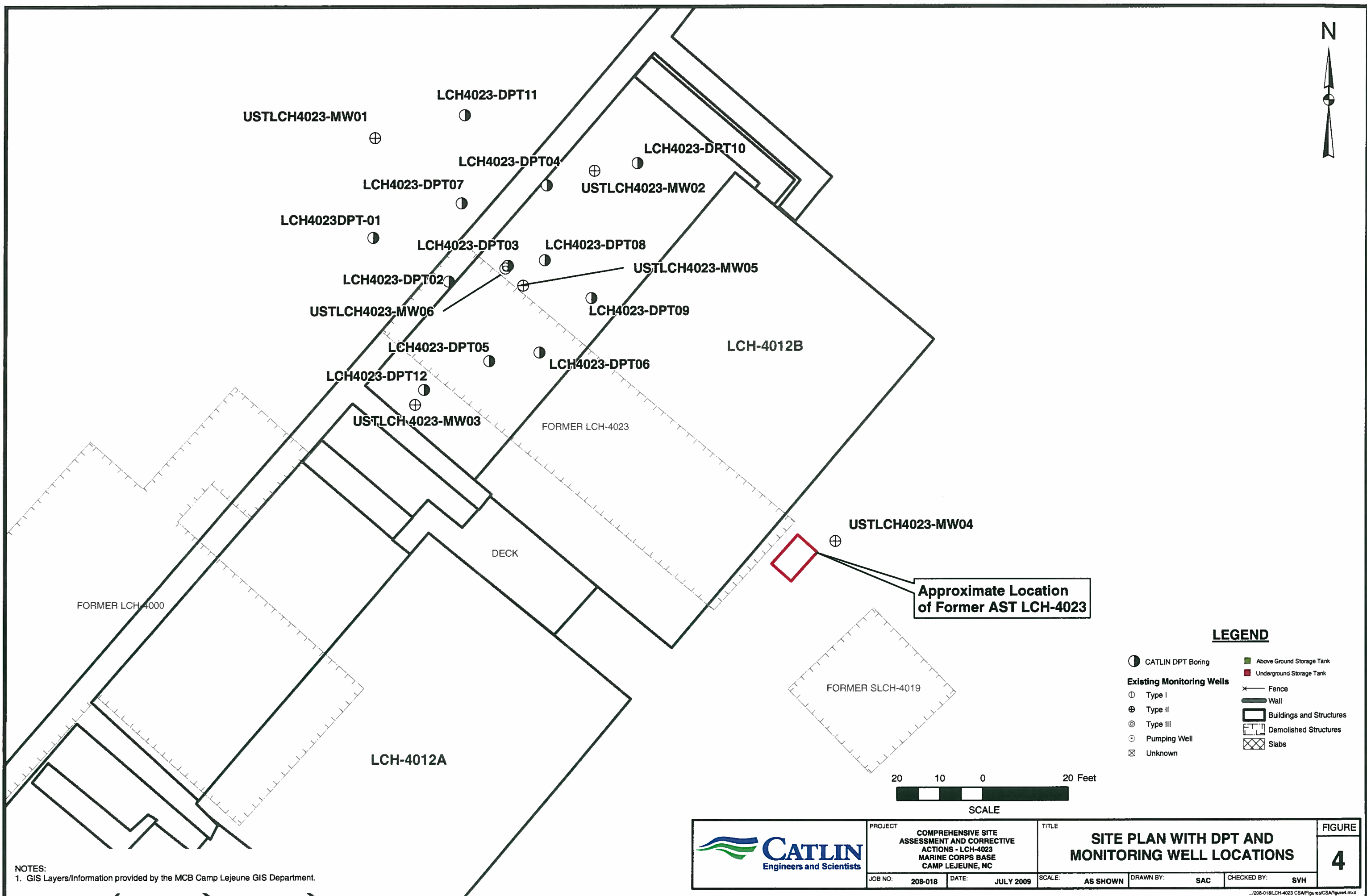


NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department.



PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE SITE PLAN WITH UTILITIES		FIGURE 3
JOB NO:	208-018	DATE:	JULY 2009	SCALE: AS SHOWN
DRAWN BY: SAC		CHECKED BY: SVH		

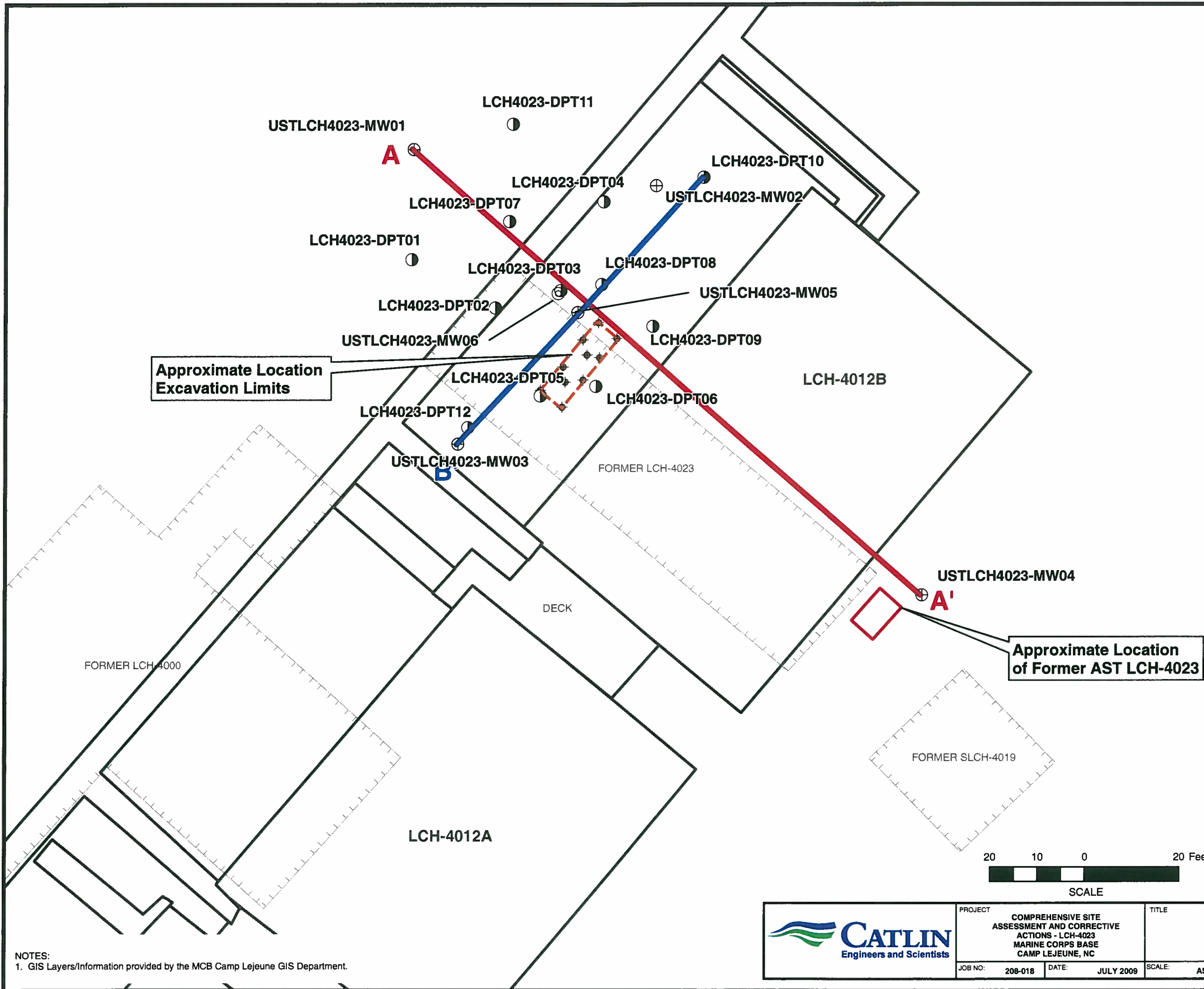
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NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department.

 CATLIN Engineers and Scientists	PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE SITE PLAN WITH DPT AND MONITORING WELL LOCATIONS		FIGURE 4
	JOB NO: 208-018	DATE: JULY 2009	SCALE: AS SHOWN	DRAWN BY: SAC CHECKED BY: SVH

.../208-018/LCH-4023 CSA/Figures/CSA/figure4.mxd

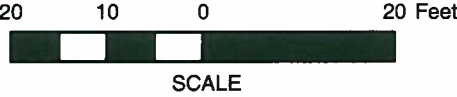


Approximate Location
Excavation Limits

Approximate Location
of Former AST LCH-4023

LEGEND

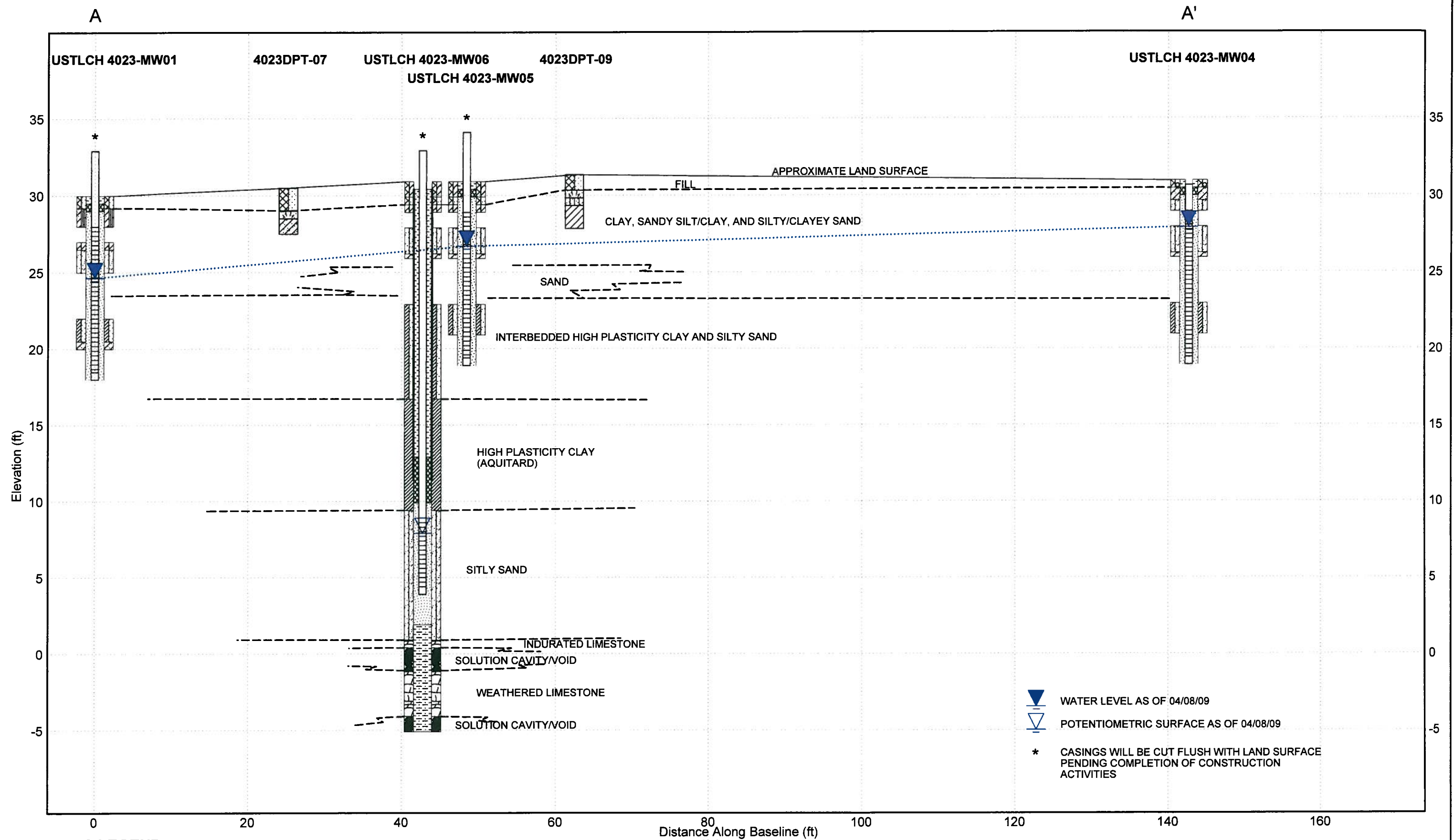
- CATLIN DPT Boring
- OSAGE Soil Sample Location
- Existing Monitoring Wells
 - Type I
 - Type II
 - Type III
 - Pumping Well
 - Unknown
- Above Ground Storage Tank
- Underground Storage Tank
- Fence
- Wall
- Buildings and Structures
- Demolished Structures
- Slabs
- Excavation Limits



NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department.

 CATLIN Engineers and Scientists	PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE CROSS SECTION - PLAN VIEW	FIGURE 5
	JOB NO: 208-018 DATE: JULY 2009	SCALE: AS SHOWN DRAWN BY: SAC CHECKED BY: SVH	

...208-018/LCH-4023 CSA/Figures/CSAfigure5.mxd



SOILS LEGEND

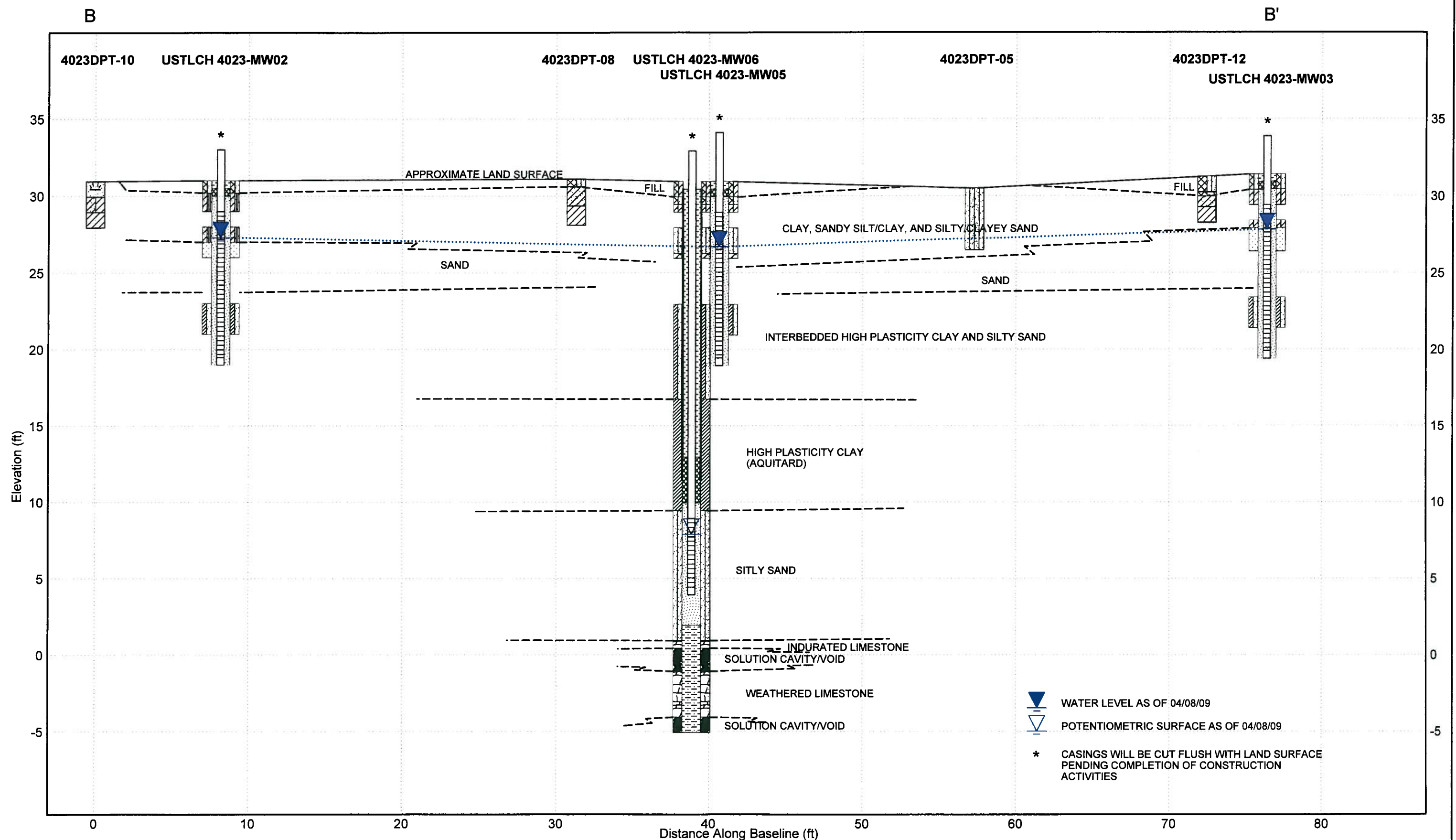
	(SM) Silty Sand		Topsoil		(SC) Clayey Sand		(CL) Low to Med. Plast. Clay
	(SC-CL) Clayey Sand to Sandy Clay		(SC-SM) Clayey/Silty Sand		(CH) High plast. CLAY		SILTY SAND FILL
	(SP) Poorly-graded Sand		Interbedded CH and SM.		CLAYEY SAND FILL		WELL GRADED SAND FILL

WELL BACKFILL

	Portland Cement		Bentonite Pellets
	#2 Medium Sand		



PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE CROSS SECTION A - A'		FIGURE 5A
JOB NO.: 208-018	DATE: JULY 2009	SCALE: HORZ. 1"=12' VERT. 1"=6'	DRAWN BY: SVH	CHECKED BY: MDM



SOILS LEGEND

(SM) Silty Sand	Topsoil	(SC) Clayey Sand	(CL) Low to Med. Plast. Clay
(SC-CL) Clayey Sand to Sandy Clay	(SC-SM) Clayey/Silty Sand	(CH) High plast. CLAY	SILTY SAND FILL
(SP) Poorly-graded Sand	Interbedded CH and SM.	CLAYEY SAND FILL	WELL GRADED SAND FILL

WELL BACKFILL

Portland Cement
Bentonite Pellets
#2 Medium Sand



PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE CROSS SECTION B - B'		FIGURE 5B
JOB NO.: 208-018	DATE: JULY 2009	SCALE: HORZ: 1"=6' VERT: 1"=6'	DRAWN BY: SVH	CHECKED BY: MDM

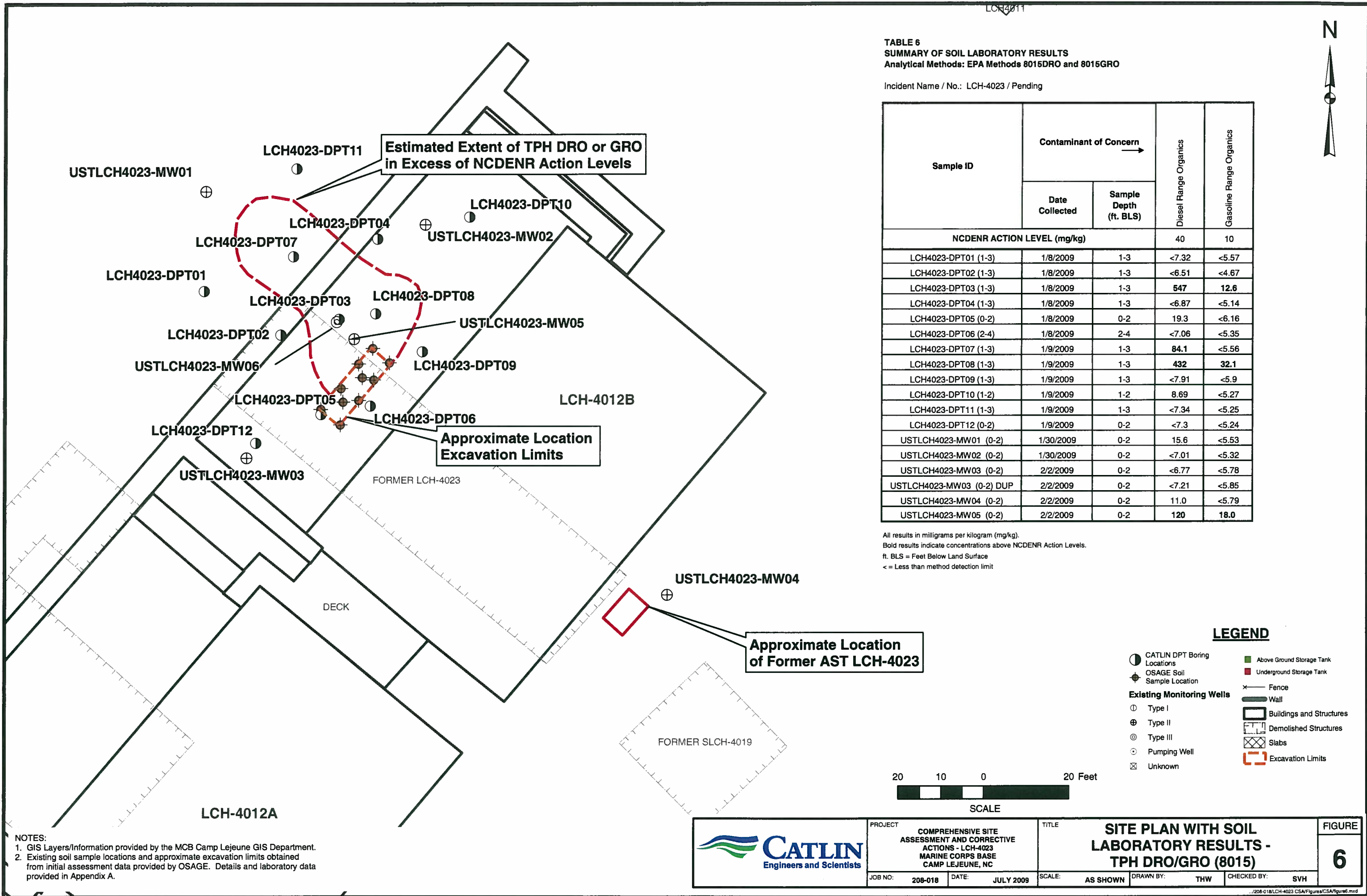


TABLE 6
SUMMARY OF SOIL LABORATORY RESULTS
Analytical Methods: EPA Methods 8015DRO and 8015GRO

Incident Name / No.: LCH-4023 / Pending

Sample ID	Contaminant of Concern		Diesel Range Organics	Gasoline Range Organics
	Date Collected	Sample Depth (ft. BLS)		
NCDENR ACTION LEVEL (mg/kg)			40	10
LCH4023-DPT01 (1-3)	1/8/2009	1-3	<7.32	<5.57
LCH4023-DPT02 (1-3)	1/8/2009	1-3	<6.51	<4.67
LCH4023-DPT03 (1-3)	1/8/2009	1-3	547	12.6
LCH4023-DPT04 (1-3)	1/8/2009	1-3	<6.87	<5.14
LCH4023-DPT05 (0-2)	1/8/2009	0-2	19.3	<6.16
LCH4023-DPT06 (2-4)	1/8/2009	2-4	<7.06	<5.35
LCH4023-DPT07 (1-3)	1/9/2009	1-3	84.1	<5.56
LCH4023-DPT08 (1-3)	1/9/2009	1-3	432	32.1
LCH4023-DPT09 (1-3)	1/9/2009	1-3	<7.91	<5.9
LCH4023-DPT10 (1-2)	1/9/2009	1-2	8.69	<5.27
LCH4023-DPT11 (1-3)	1/9/2009	1-3	<7.34	<5.25
LCH4023-DPT12 (0-2)	1/9/2009	0-2	<7.3	<5.24
USTLCH4023-MW01 (0-2)	1/30/2009	0-2	15.6	<5.53
USTLCH4023-MW02 (0-2)	1/30/2009	0-2	<7.01	<5.32
USTLCH4023-MW03 (0-2)	2/2/2009	0-2	<6.77	<5.78
USTLCH4023-MW03 (0-2) DUP	2/2/2009	0-2	<7.21	<5.85
USTLCH4023-MW04 (0-2)	2/2/2009	0-2	11.0	<5.79
USTLCH4023-MW05 (0-2)	2/2/2009	0-2	120	18.0

All results in milligrams per kilogram (mg/kg).
Bold results indicate concentrations above NCDENR Action Levels.
ft. BLS = Feet Below Land Surface
< = Less than method detection limit

NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department.
2. Existing soil sample locations and approximate excavation limits obtained from initial assessment data provided by OSAGE. Details and laboratory data provided in Appendix A.

LEGEND

CATLIN DPT Boring Locations

OSAGE Soil Sample Location

Existing Monitoring Wells

Type I

Type II

Type III

Pumping Well

Unknown

Above Ground Storage Tank

Underground Storage Tank

Fence

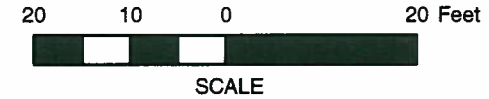
Wall

Buildings and Structures

Demolished Structures

Slabs

Excavation Limits





CATLIN
Engineers and Scientists

PROJECT

COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC

TITLE

SITE PLAN WITH SOIL LABORATORY RESULTS - TPH DRO/GRO (8015)

FIGURE

6

JOB NO:

208-018

DATE:

JULY 2009

SCALE:

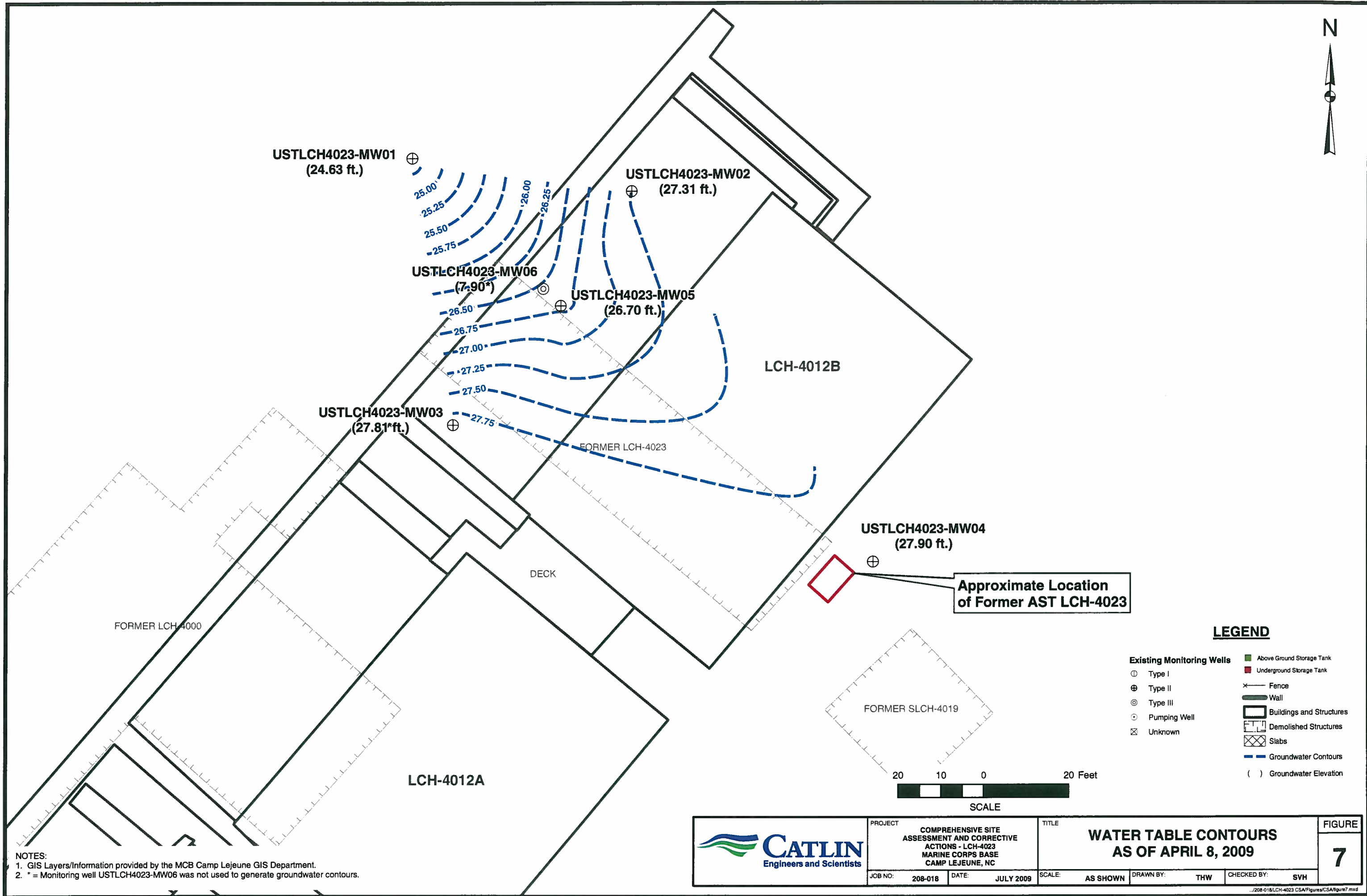
AS SHOWN

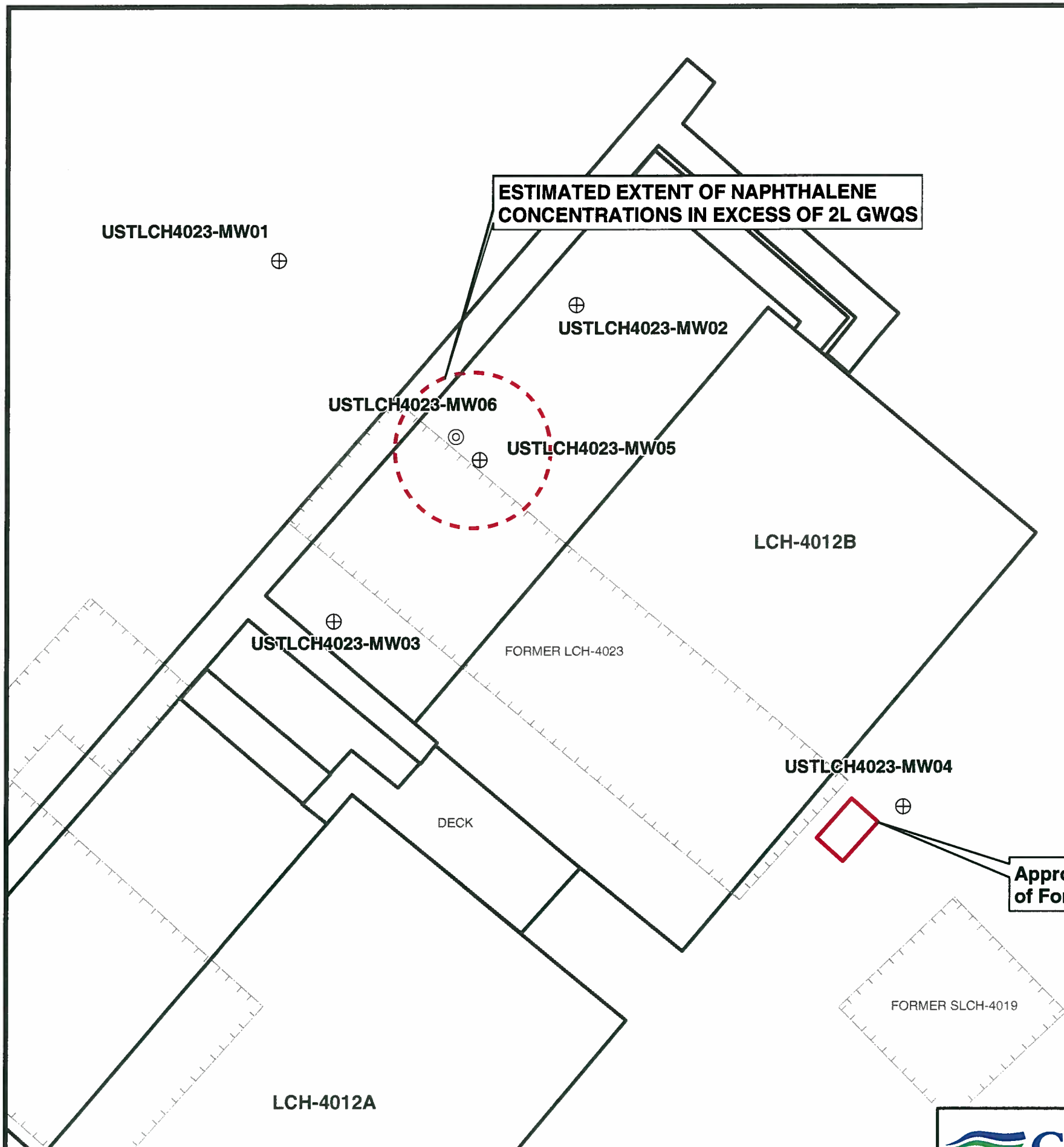
DRAWN BY:

THW

CHECKED BY:

SVH





NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department.

TABLE 7
SUMMARY OF GROUNDWATER LABORATORY RESULTS
Analytical Method: EPA Method 602

Incident Name / No.: LCH-4023 / Pending

Well ID	Contaminant of Concern		Benzene	Diisopropyl ether (DIPE)	Ethylbenzene	Methyl-tert butyl ether (MTBE)	Toluene	Total Xylenes
	Sample ID	Date Collected						
2L GWQS (µg/L)			1	70	550	200	1,000	530
USTLCH4023-MW01	USTLCH4023-MW01	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW02	USTLCH4023-MW02	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW03	USTLCH4023-MW03	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW04	USTLCH4023-MW04	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<0.973
USTLCH4023-MW05	USTLCH4023-MW05	2/9/2009	0.689 J	<0.391	29	<0.778	<0.404	6.213 J
USTLCH4023-MW05	USTLCH4023-MW05 DUP	2/9/2009	0.638 J	<0.391	29.7	<0.778	<0.404	5.758 J
USTLCH4023-MW06	USTLCH4023-MW06	2/9/2009	<0.428	<0.391	<0.341	<0.778	<0.404	<1.063 J

All results in micrograms per liter (µg/L).
J = Estimated concentration, below calibration range and above method detection limit
2L GWQS = NCAC T15A-02L Groundwater Quality Standards
< = Less than method detection limit

TABLE 7A
SUMMARY OF GROUNDWATER LABORATORY RESULTS
Analytical Method: EPA Method 625

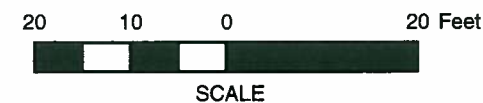
Incident Name / No.: LCH-4023 / Pending

Well ID	Contaminant of Concern		Acenaphthene	Bis(2-ethylhexyl)phthalate	Fluorene	Naphthalene	Phenanthrene	All Other EPA Method 625 Analytes
	Sample ID	Date Collected						
2L GWQS (µg/L)			80	2.5	280	21	210	Varies
USTLCH4023-MW01	USTLCH4023-MW01	2/9/2009	<0.768	<0.423	<0.747	<0.938	<0.459	BMDL
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All results in micrograms per liter (µg/L).
BMDL = Below Method Detection Limit
Bold results indicate concentrations above 2L GWQS
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LEGEND

- Existing Monitoring Wells
- Type I
 - Type II
 - Type III
 - Pumping Well
 - Unknown
- Storage Tanks
- Above Ground Storage Tank
 - Underground Storage Tank
- Other Features
- Fence
 - Wall
 - Buildings and Structures
 - Demolished Structures
 - Slabs



CATLIN
Engineers and Scientists

PROJECT
COMPREHENSIVE SITE
ASSESSMENT AND CORRECTIVE
ACTIONS - LCH-4023
MARINE CORPS BASE
CAMP LEJEUNE, NC

JOB NO: 208-018 DATE: JULY 2009

TITLE
SITE PLAN WITH GROUNDWATER
LABORATORY RESULTS -
EPA METHODS 602 & 625

SCALE: AS SHOWN DRAWN BY: THW CHECKED BY: SVH

FIGURE
8

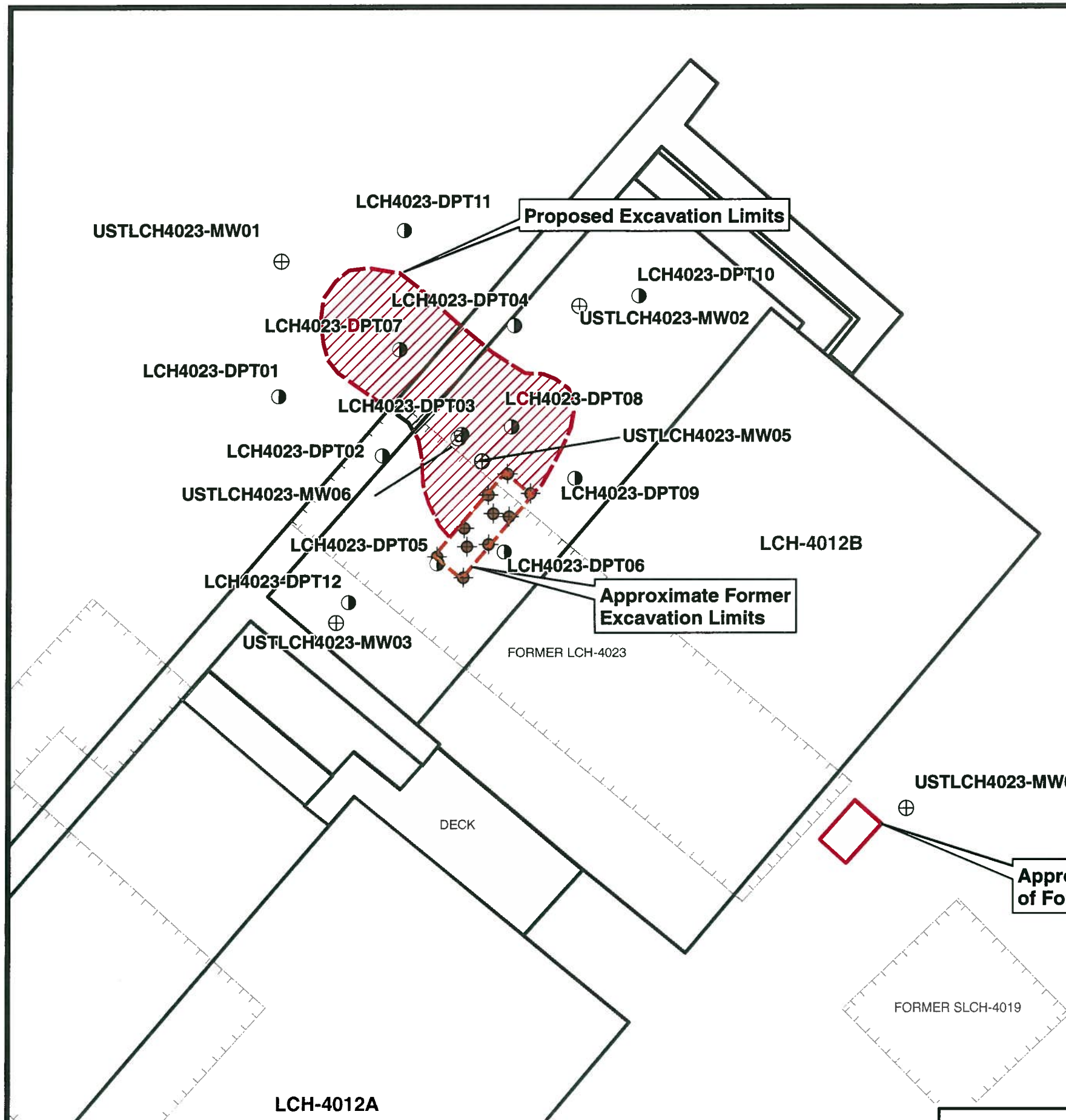


TABLE 6
SUMMARY OF SOIL LABORATORY RESULTS
Analytical Methods: EPA Methods 8015DRO and 8015GRO

Incident Name / No.: LCH-4023 / Pending

Sample ID	Contaminant of Concern		Diesel Range Organics	Gasoline Range Organics
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NOTES:
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2. Existing soil sample locations and approximate excavation limits obtained from initial assessment data provided by OSAGE. Details and laboratory data provided in Appendix A.



PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE SITE PLAN WITH PROPOSED EXCAVATION LIMITS		FIGURE 9
JOB NO:	208-018	DATE:	JULY 2009	SCALE: AS SHOWN
DRAWN BY:	THW	CHECKED BY:	SVH	

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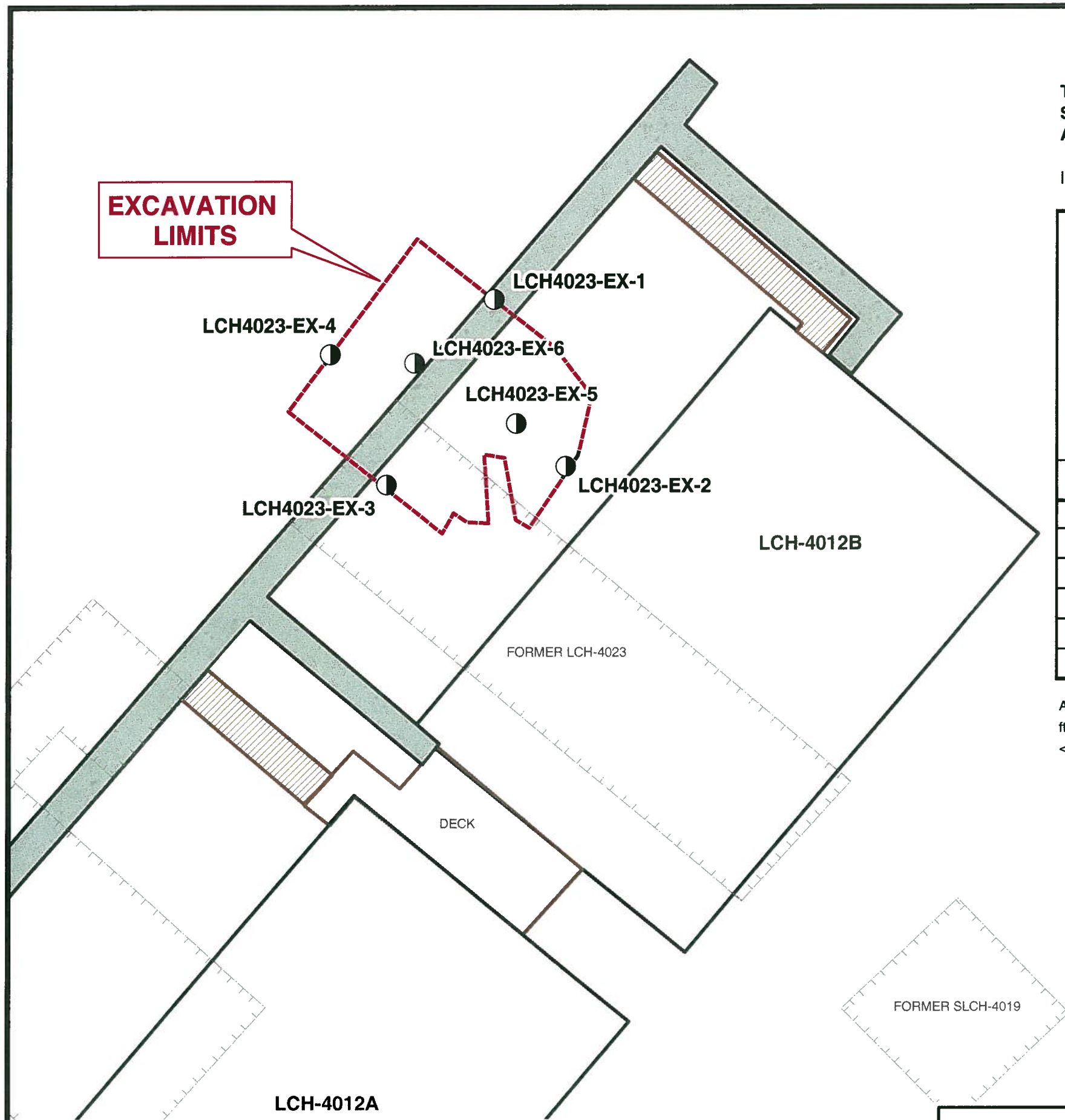


TABLE 10
SUMMARY OF POST REMEDIATION SOIL LABORATORY RESULTS
Analytical Methods: EPA Methods 8015DRO and 8015GRO

Incident Name / No.: LCH-4023 / Pending

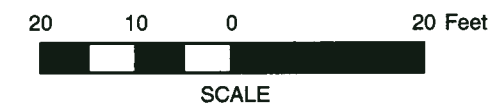
Sample ID	Contaminant of Concern →		Diesel Range Organics	Gasoline Range Organics
	Date Collected	Sample Depth (ft. BLS)		
NCDENR ACTION LEVEL (mg/kg)			40	10
LCH4023-EX-1 (N5')	5/27/2009	5	<7.96	<6.12
LCH4023-EX-2 (E5')	5/27/2009	5	<7.31	<5.67
LCH4023-EX-3 (S5')	5/28/2009	5	<7.38	<6.06
LCH4023-EX-4 (W5')	5/28/2009	5	<7.57	<7.00
LCH4023-EX-5 (Floor 6-7')	5/29/2009	6-7	9.79	<6.18
LCH4023-EX-6 (Floor 6')	5/28/2009	6	<8.10	<6.61

All results in milligrams per kilogram (mg/kg).
ft. BLS = Feet Below Land Surface
< = Less than method detection limit

NOTES:
1. GIS Layers/Information provided by the MCB Camp Lejeune GIS Department.
2. Existing soil sample locations and approximate excavation limits obtained from initial assessment data provided by OSAGE. Details and laboratory data provided in Appendix A.

LEGEND

- CATLIN DPT Boring Locations
- Existing Monitoring Wells
 - Type I
 - Type II
 - Type III
 - Pumping Well
 - Unknown
- Above Ground Storage Tank
- Underground Storage Tank
- Fence
- Wall
- Buildings and Structures
- Demolished Structures
- Slabs
- Excavation Limits
- New Sidewalk
- New Ramp



PROJECT COMPREHENSIVE SITE ASSESSMENT AND CORRECTIVE ACTIONS - LCH-4023 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE EXCAVATION LIMITS WITH POST REMEDIATION SOIL SAMPLING RESULTS - TPH DRO/GRO (8015)		FIGURE 10
JOB NO:	208-018	DATE:	JULY 2009	SCALE: AS SHOWN
DRAWN BY:	THW	CHECKED BY:	SVH	

APPENDIX A

INITIAL ACTIONS DOCUMENTATION



UNITED STATES MARINE CORPS
MARINE CORPS BASE
PSC BOX 20004
CAMP LEJEUNE, NC 28542-0004

PERMANENT FILE

IN REPLY REFER TO:
5090.10

BEMD

NOV 05 2008

Mr. Bruce Reed
North Carolina Department of Environment
and Natural Resources
Division of Waste Management
Underground Storage Tank Section
127 Cardinal Drive
Wilmington, North Carolina 28405-3845

Dear Mr. Reed:

Enclosed are the analytical results and supporting documents for the petroleum contamination detected near Building LCH-4023, Midway Park, aboard Marine Corps Base, Camp Lejeune. The contamination was detected on October 28, 2008 when a contractor conducted trench excavation work for a new wastewater line in the area.

The source of the contamination is believed to be from a previously removed aboveground storage tank (AST) containing heating oil. The AST was associated with former Building LCH-4023 which was demolished approximately two years ago.

Ten soil samples were collected at a depth of approximately four feet, just above the ground water table. Soil sample numbers LCH-S003 and LCH-S006 are bottom samples; all others are sidewall samples. The samples were analyzed for TPH-GRO and TPH-DRO and analytical results indicate contamination in excess of State action levels for several sample locations.

The proposed wastewater line was relocated to an uncontaminated area and the trench will be backfilled with clean soil when weather permits. Contaminated soil moved to drying beds on Base totaled 39.57 tons. The contaminated soil will be disposed when a sufficient amount has accumulated. A disposal manifest will be provided to the Division of Waste Management, as soon as it becomes available.

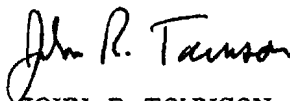
5090.10

BEMD

NOV 05 2008

If you have any questions or require further information, please contact Dr. Johanna Arnold, Environmental Quality Branch, Environmental Management Division, Installations and Environment Department, at (910) 451-9114.

Sincerely,



JOHN R. TOWNSON

Director, Environmental Management

By direction of

the Commanding Officer

Enclosure: Building LCH-4023 Analytical Results and supporting Documents

Copy to: (w/o encl)

NAVFACENGCOM (Mr. Mel Acree Code OPCEV4)

Osage (Mr. Mike Cree)



Shaun Whitworth
Osage of Virginia
2618 A Colley Ave
Norfolk, VA 23517

Report Number: G649-79

Client Project: CTO 002

Dear Shaun Whitworth,

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or services performed during this project, please call Ashley Nifong at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS Environmental Services for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS Environmental Services, Inc.

Ashley Nifong
2008.10.31 16:00:54 -04'00'

Project Manager
Ashley Nifong

Date

List of Reporting Abbreviations and Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantitation Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL/CL = Reporting Limit / Control Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.



Print Date: 10/31/2008

Client Sample ID: LCH4000-S001
Client Project ID: CTO 002
Lab Sample ID: G649-79-1D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 16:40
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 78.51
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DE</u>	<u>Date Analyzed</u>
Diesel Range Organics	BQL	7.69	MG/KG	1	30-Oct-08 11:04

Surrogates

OTP	60.4	40-140	%	1	30-Oct-08 11:04
-----	------	--------	---	---	-----------------

Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 33.14
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S002
Client Project ID: CTO 002
Lab Sample ID: G649-79-2D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 16:45
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 77.36
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DE</u>	<u>Date Analyzed</u>
Diesel Range Organics	BQL	7.77	MG/KG	1	30-Oct-08 11:33

Surrogates

OTP	55.4	40-140	%	1	30-Oct-08 11:33
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Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 33.29
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S003
Client Project ID: CTO 002
Lab Sample ID: G649-79-3D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 16:50
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 79.81
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	80.8	7.50	MG/KG	1	30-Oct-08 12:01

Surrogates

OTP	55.8	40-140	%	1	30-Oct-08 12:01
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Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 33.42
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S004
Client Project ID: CTO 002
Lab Sample ID: G649-79-4D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:04
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 78.16
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RI/CI</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	1730	76.0	MG/KG	10	30-Oct-08 15:49

Surrogates

OTP	81.1	40-140	%	10	30-Oct-08 15:49
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Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 33.69
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S005
Client Project ID: CTO 002
Lab Sample ID: G649-79-5E
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:09
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 77.73
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RI/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	881	31.7	MG/KG	4	31-Oct-08 14:08

Surrogates

OTP	65.6	40-140	%	4	31-Oct-08 14:08
-----	------	--------	---	---	-----------------

Batch Information

Analytical Batch: EP103108
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 32.48
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S008
Client Project ID: CTO 002
Lab Sample ID: G649-79-6D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:15
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 75.20
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	1610	77.1	MG/KG	10	30-Oct-08 16:17

Surrogates

OTP	80.7	40-140	%	10	30-Oct-08 16:17
-----	------	--------	---	----	-----------------

Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC6
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 34.48
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S007
Client Project ID: CTO 002
Lab Sample ID: G649-79-7D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:00
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 71.64
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	1310	88.8	MG/KG	10	30-Oct-08 16:46

Surrogates

OTP	76.8	40-140	%	10	30-Oct-08 16:46
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Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 32.16
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S008
Client Project ID: CTO 002
Lab Sample ID: G649-79-8D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:25
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 79.09
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	561	37.9	MG/KG	5	31-Oct-08 12:43

Surrogates

OTP	61.3	40-140	%	5	31-Oct-08 12:43
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Batch Information

Analytical Batch: EP103108
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 33.34
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S009
Client Project ID: CTO 002
Lab Sample ID: G649-79-9D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:40
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 82.61
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RI/CI</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	307	7.16	MG/KG	1	30-Oct-08 14:52

Surrogates

OTP	56.8	40-140	%	1	30-Oct-08 14:52
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Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 33.82
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S010
Client Project ID: CTO 002
Lab Sample ID: G649-79-10D
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:45
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 80.51
Basis: Dry

Results by 8015DRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Diesel Range Organics	49.5	7.62	MG/KG	1	30-Oct-08 15:20

Surrogates

OTP	53.1	40-140	%	1	30-Oct-08 15:20
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Batch Information

Analytical Batch: EP103008
Analytical Method: 8015DRO
Instrument: GC8
Analyst: EAW

Prep Batch:
Prep Method: 3541
Prep Date/Time:
Initial Prep Wt./Vol.: 32.58
Prep Extract Vol: 10



Print Date: 10/31/2008

Client Sample ID: LCH4000-S001
Client Project ID: CTO 002
Lab Sample ID: G649-79-1A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 16:40
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 78.51
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	BQL	5.92	MG/KG	1	29-Oct-08 17:04

Surrogates

BFB	96.3	70-130	%	1	29-Oct-08 17:04
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Batch Information

Analytical Batch: VP102908
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.45
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S002
Client Project ID: CTO 002
Lab Sample ID: G649-79-2A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 16:45
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 77.36
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	BQL	6.19	MG/KG	1	29-Oct-08 17:30

Surrogates

BFB	94.8	70-130	%	1	29-Oct-08 17:30
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Batch Information

Analytical Batch: VP102908
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.28
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S003
Client Project ID: CTO 002
Lab Sample ID: G649-79-3A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 16:50
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 79.81
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	BQL	5.20	MG/KG	1	29-Oct-08 17:57

Surrogates

BFB	96	70-130	%	1	29-Oct-08 17:57
-----	----	--------	---	---	-----------------

Batch Information

Analytical Batch: VP102908
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 7.23
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S004
Client Project ID: CTO 002
Lab Sample ID: G649-79-4A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:04
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 78.16
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	76.6	6.05	MG/KG	10	30-Oct-08 9:18

Surrogates

BFB	103	70-130	%	10	30-Oct-08 9:18
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Batch Information

Analytical Batch: VP103008
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.34
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S005
Client Project ID: CTO 002
Lab Sample ID: G649-79-5A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:09
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 77.73
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	50.4	5.94	MG/KG	2	30-Oct-08 8:25

Surrogates

BFB	105	70-130	%	2	30-Oct-08 8:25
-----	-----	--------	---	---	----------------

Batch Information

Analytical Batch: VP103008
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.5
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S008
Client Project ID: CTO 002
Lab Sample ID: G649-79-6A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:15
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 75.20
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	180	5.84	MG/KG	10	30-Oct-08 9:44

Surrogates

BFB	101	70-130	%	10	30-Oct-08 9:44
-----	-----	--------	---	----	----------------

Batch Information

Analytical Batch: VP103008
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.83
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S007
Client Project ID: CTO 002
Lab Sample ID: G649-79-7A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:00
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 71.64
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RI/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	40.8	6.53	MG/KG	2	30-Oct-08 7:32

Surrogates

BFB	99.9	70-130	%	2	30-Oct-08 7:32
-----	------	--------	---	---	----------------

Batch Information

Analytical Batch: VP103008
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.41
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S008
Client Project ID: CTO 002
Lab Sample ID: G649-79-8A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:25
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 79.09
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	35.6	5.54	MG/KG	1	29-Oct-08 20:10

Surrogates

BFB	117	70-130	%	1	29-Oct-08 20:10
-----	-----	--------	---	---	-----------------

Batch Information

Analytical Batch: VP102908
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.85
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S009
Client Project ID: CTO 002
Lab Sample ID: G649-79-9A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:40
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 82.61
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DE</u>	<u>Date Analyzed</u>
Gasoline Range Organics	14.9	5.33	MG/KG	1	30-Oct-08 6:12

Surrogates

BFB	104	70-130	%	1	30-Oct-08 6:12
-----	-----	--------	---	---	----------------

Batch Information

Analytical Batch: VP103008
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.81
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: LCH4000-S010
Client Project ID: CTO 002
Lab Sample ID: G649-79-10A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 17:45
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 80.51
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	BQL	5.72	MG/KG	1	29-Oct-08 21:02

Surrogates

BFB	99.4	70-130	%	1	29-Oct-08 21:02
-----	------	--------	---	---	-----------------

Batch Information

Analytical Batch: VP102908
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 6.51
Prep Extract Vol: 5



Print Date: 10/31/2008

Client Sample ID: Trip Blank
Client Project ID: CTO 002
Lab Sample ID: G649-79-11A
Lab Project ID: G649-79

Collection Date: 28-Oct-08 0:00
Received Date: 29-Oct-08
Matrix: SOIL
Solids: 100.0
Basis: Dry

Results by 8015GRO

<u>Parameter</u>	<u>Result</u>	<u>RL/CL</u>	<u>Units</u>	<u>DF</u>	<u>Date Analyzed</u>
Gasoline Range Organics	BQL	6.00	MG/KG	1	29-Oct-08 16:37

Surrogates

BFB	108	70-130	%	1	29-Oct-08 16:37
-----	-----	--------	---	---	-----------------

Batch Information

Analytical Batch: VP102908
Analytical Method: 8015GRO
Instrument: GC4
Analyst: DVG

Prep Batch:
Prep Method: 5035
Prep Date/Time:
Initial Prep Wt./Vol.: 5
Prep Extract Vol: 5

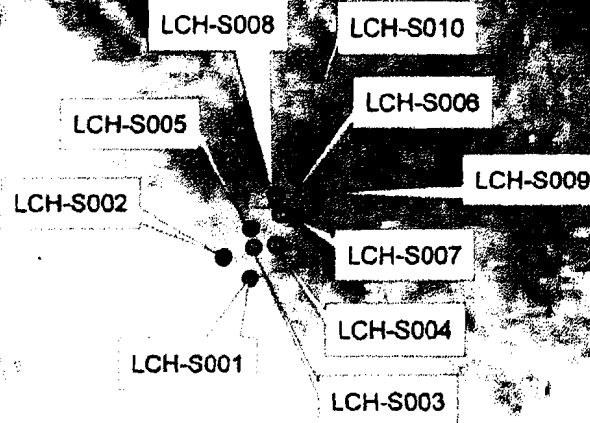
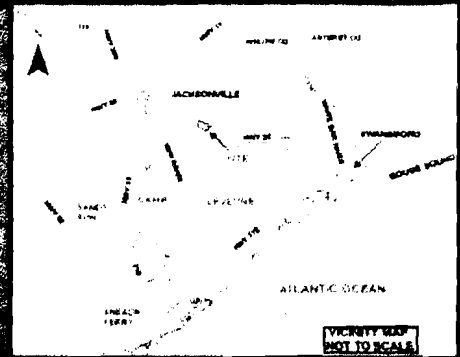


CHAIN OF CUSTODY RECORD
SGS Environmental Services Inc.

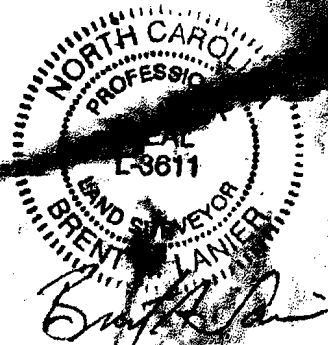
Locations Nationwide
• Alaska • Hawaii
• Ohio • Maryland
• New Jersey • North Carolina
• West Virginia
www.us.sgs.com

087842

1 CLIENT: OSAGE OF VIRGINIA					SGS Reference: 5649-79					PAGE 1 OF 1	
CONTACT: Theresa Eilerman PHONE NO: 757 274-4949					CONTAINERS No SAMPLE TYPE Preservatives Used Analysis Required C= COMP G= GRAB 3550 5050 3550 5050						
PROJECT: CTO 002 SITE/PWSID: Midway Park											
REPORTS TO: E-MAIL: Swhitworth@osageva.com											
FAX NO: 757 274-410-0411											
INVOICE TO: Mike Cree QUOTE # P.O. NUMBER CTO 002											
2											
LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX							REMARKS
	LCH4000-S001	10/29/08	1640	S	3			X	X		ADD Trip Blank
	LCH4000-S002	↑	1645	S	3			X	X		also.
	LCH4000-S003		1650	S	3			X	X		
	LCH4000-S004		1704	S	3			X	X		
	LCH4000-S005		1709	S	3			X	X		
	LCH4000-S006		1715	S	3			X	X		
	LCH4000-S007		1720	S	3			X	X		
	LCH4000-S008		1725	S	3			X	X		
	LCH4000-S009		1740	S	3			X	X		
	LCH4000-S010	10/29/08	1745	S	3			X	X		
3											
Collected/Relinquished By: (1) <i>Theresa Eilerman</i>		Date	Time	Received By: <i>Theresa Eilerman</i>		Date	Time	Shipping Carrier: <i>Courier</i>		Samples Received Cold? (Circle) <i>YES</i> NO	
Relinquished By: (2) <i>Theresa Eilerman</i>		Date	Time	Received By: <i>Theresa Eilerman</i>		Date	Time	Shipping Ticket No:		Temperature (C): <i>5.24</i>	
Relinquished By: (3) <i>Theresa Eilerman</i>		Date	Time	Received By: <i>Theresa Eilerman</i>		Date	Time	Special Deliverable Requirements: <i>EDD Format</i>		Chain of Custody Seal: (Circle) <i>INTACT</i> BROKEN ABSENT	
Relinquished By: (4)		Date	Time	Received By:		Date	Time	Special Instructions: <i>Email results to: Swhitworth@osageva.com</i> <i>teilerman@osageva.com</i>		Requested Turnaround Time: <i>ASAP</i> ☐ STD	



POINT ID	NORTHING	EASTING	ELEVATION
LCH-S010	3845402.332	285775.935	9.314
LCH-S008	3845401.223	285774.933	9.360
LCH-S005	3845399.477	285773.664	9.324
LCH-S002	3845397.983	285772.23	9.274
LCH-S009	3845401.302	285777.122	9.190
LCH-S007	3845400.081	285776.006	9.177
LCH-S004	3845398.633	285774.935	9.312
LCH-S001	3845396.883	285773.606	9.257
LCH-S003	3845398.505	285773.801	9.244
LCH-S006	3845400.251	285775.187	9.046



LCH4000

10/29/08

GPS MAKE TOPCON HYPER/ GLONASS
REF BM NORTH CAROLINA GEODETIC NETWORK
JACKSONVILLE CORS
MOREHEAD CITY CORS
CASTLE HAYNE CORS

BASE MAP SOURCE
CAMP LEJEUNE GIS

CAMP LEJEUNE NORTH CAROLINA
OCTOBER 29, 2008

UTM ZONE 18 NORTH NAD 83 METERS (NSRS2007)

LANIER
SURVEYING COMPANY
CEDAR POINT, NC

134 CEDAR POINT BLVD.
(252) 393-4505

Legend

● SOIL SAMPLES



30
Feet
1 inch equals 30 feet



LCH-4023 Trench; picture was taken facing south; Fire Station in background of photograph is Building LCH-4022; soil sample locations are identified with orange flags.

28 October 2008

MCBCL/MCASNR SPCC

State Notification of Discharge Report (POL's)

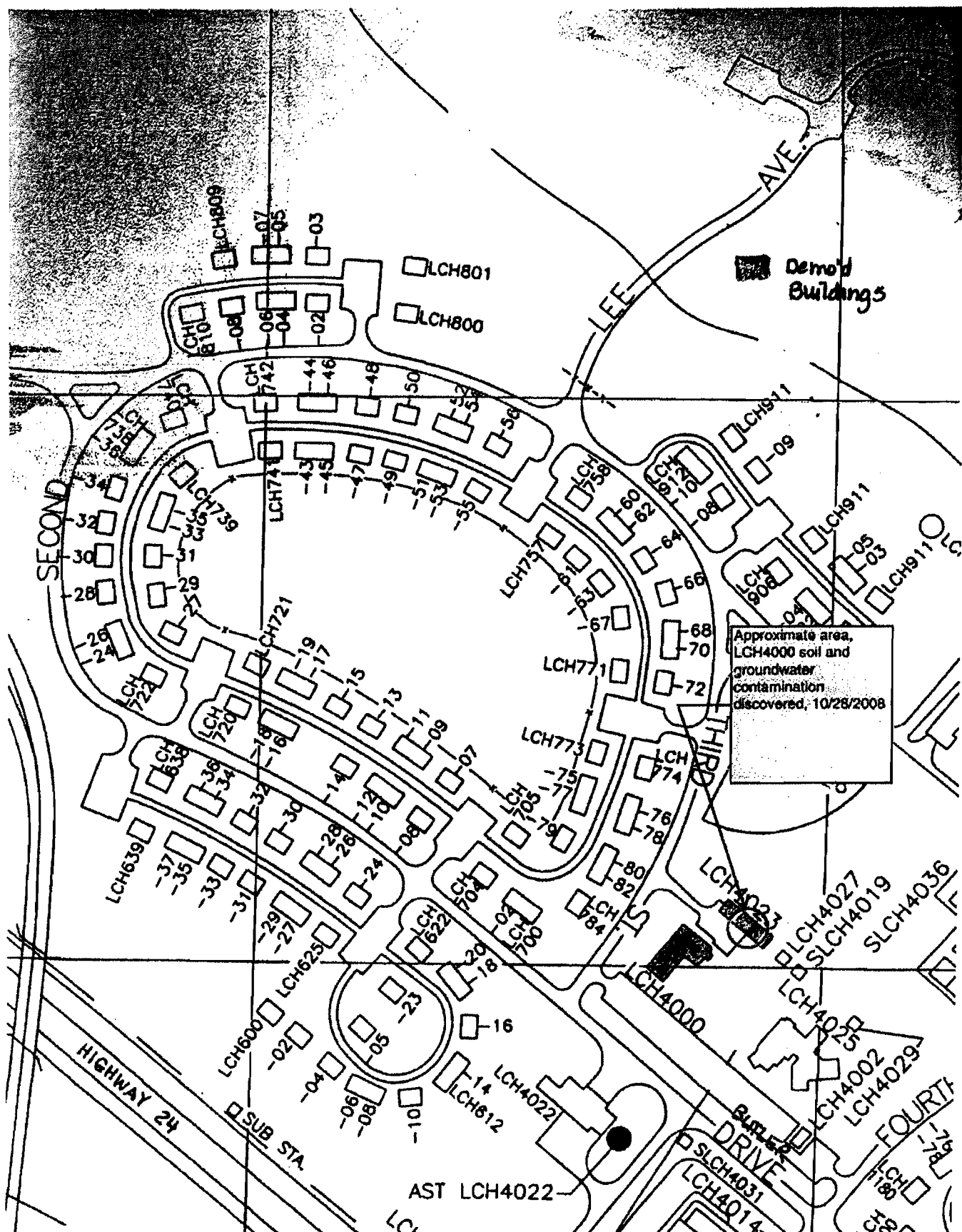
Subj:	Contaminated Soil Discovery from a Historical Heating Oil Release from Removed AST
Installation POC/Phone Number:	MCBCLNC 910-451-5306
1. Date and Time When Release Occurred/Discovered	Discovered 10/28/2008 1330 Responded 10/28/2008 1600
2. Activity/Responsible Party Originating Release	MCBCLNC 910-451-5306
2a. Address of Responsible Party	Bldg 977 Michael Street
3. Source of Release (Storage Area, Shop, Vehicle, etc)	Believed to be Heating Oil AST that had been removed in the past.
4. Location of Spill (Bldg, Highway, Range, etc)	Butler Drive North and 3rd St., Midway Park Military Housing Area - In vicinity of former Bldg LCH-4023
5. Quantity Released (Gallons/Liters, Pounds/Kilograms) - If Unknown, Indicate Size of Contaminated Area	Unknown
6. Type of Substance Released	#2 Heating Oil
7. Container Involved (Drum, Bag, Storage Tank, etc)	Believed to be a previously removed Heating Oil AST
8. Samples Taken (Yes/No; Specify Analyses Requested/Performed)	Samples have been taken by Osage Environmental Corp.
9. Cause of Release	Historical Releases from heating oil AST
10. Release Scene Description (Contaminated Area, Path of Release, etc)	The excavation was already in the groundwater table (which is only four feet deep). Therefore, we assume both soil and groundwater contamination. Samples were taken to confirm.
11. Document the Action Taken/Planned to Mitigate the Release	Samples have been taken by the Osage Environmental Corp. The extent of contamination and remediation will be handled by Osage.
12. On-Scene Weather/Wind (Temp, Humidity, Wind Velocity, Visibility, etc)	Sunny 60 degrees/10 mph wind
13. Areas Threatened/Damaged (Beach, Wetlands, Water Intake, Aquifer, etc)	n/a
14. Potential Dangers (Fire, Explosion, Toxic Vapor, etc)	n/a
15. Notifications Made (NRC, Coast Guard, MSO, EPA, State, Local Agency, etc)	NCDEM (1325) Chris Tant NRC (1327) Chief Hollowood NCDENR (1335) Bruce Reed
16. Telephonic Report to NRC was made (NRC POC/Report Number)	Chief Hollowood # 888534
17. POC for Report (Person, Activity, Phone Number)	John Hamilton 910-451-5306
18. Document Any Other Relevant Information Pertaining to the Release	Did not reach navigable waters.

MCBCL/MCASNR SPCC			
State Notification of Discharge Report (POL's)			
Document the Presence of Free Product (If Known)	None		
State how the Release Was Discovered	Contractor found the contamination while installing wastewater lines.		
Are Their Any Water Supply Wells Within 1,500 Feet of the Release?	1 Water Supply Wells - near Midway Park Convenience Store		
If Yes, How Many Water Supply Wells are within 1,500 feet of the Release	1		
Was any surface water impacted or the spill within 100 feet or less of any surface water?	no		
Latitude and Longitude of Release	Latitude (Decimal Degrees)	34.727893	Longitude (Decimal Degrees) 77.339966
Directions to the spill site	Map Attached		

Report POL Releases to NCEM (800)858-0368 and contact Mr. Bruce Reed at (910) 796-7400. Email or Fax this report to Mr. Bruce Reed (Bruce.Reed@ncmail.net) within 24 hours of the Release.

MIDWAY PARK





Marine Corps Base Camp Lejeune
EMD Document Routing Slip

Open ☒ Closed ☐

Info ☐

1316

Correspondence ID Number

Due Date

Tickler # ☐

Tickler Closed ☐

Outgoing ☒

Incoming ☐

Review ☒

Action ☐

Routing ☐

Signature ☒

FROM: EQB

TO: DIRECTOR

RETURN:

COPY:

SUBJECT: LCH-4023 Soil Sample Results to NCDENR

COMMENTS: Johanna Arnold (4 Nov 08): The petroleum contamination near former building LCH-4023 could not be excavated and removed on 28 Oct 08 due to the excavation already being just above the ground water table. It is expected that NCDENR will reply with a request for an investigation similar to a Comprehensive Site Assessment (to include the installation of a monitoring well). The source of the contamination is a former AST and the site will become a SWMU site.

ROUTING: Originator: Johanna Arnold Initials: JA Date: 11/4/2008

1. Brynn Ashton Initials: BSA Date: 11/4/08

2. J. Ledford Initials: JLC Date: 11-4-08

3. Initials: Date:

Hard Copy Location: Bldg 12 Room: 241 Date filed: Filed by:

Official Electronic Copy Location Date filed: Filed by:

LINK TO
OFFICIAL:

*** TO CREATE A LINK, CREATE A SHORTCUT FOR YOUR DOCUMENT IN THE SAME DIRECTORY. RIGHT-CLICK ON THE SHORT CUT GO TO THE PROPERTIES AND COPY THE TARGET BY PRESSING CTRL+C. THEN GO TO THIS LINK AND PASTE WITH CTRL+V

Working Electronic Copy Location Date filed: 11/3/2008 Filed by: JA

LINK TO
WORKING: S:\I&E\EMD\EMD_Working_Files\5090_10_Installation_Restoration_Program\10000-10599_UST_Sites\Release_Notification\2008\LCH-4023\LCH-4023_Sample_Results_to_NCDENR_110308_v1_JA.doc

Special Mailing Instructions:

Date Mailed: Mailed By: Scanned ☐

Mail Tracking Info: ☒ Regular ☐ Certified ☐ FedEx #:

APPENDIX B

CATLIN

STANDARD METHODS OF INVESTIGATION

CATLIN STANDARD METHODS OF INVESTIGATION

(REVISED APRIL 2002)

1.0 DATA COLLECTION

1.1 BACKGROUND DATA

Background data and history information relevant to the site investigation is generated through numerous sources. These sources may include, but are not limited to, the following:

- Conversations with the client and regulatory officials involved with the incident.
- Review of pertinent regulatory correspondence.
- Review of previous and existing reports and other technical data.
- Review of available historical records.

1.2 SURVEYS AND POTENTIAL RECEPTOR DATA

Physical survey and potential receptor data are collected in accordance with the intended level of investigation. In general, the purpose is to collect sufficient information for site assessment and corrective action planning.

Individual receptors are identified and evaluated in the context of their potential for contaminant impact. Potential receptors of contamination can include surface water bodies, groundwater supply wells, wellhead protection areas, and subsurface building structures.

1.2.1 Horizontal Survey

Horizontal survey data was generated using a combination of accepted traditional field surveying and geographical positioning system (GPS) techniques incorporated into existing maps. All horizontal measurements were recorded in meters and referenced to the Universal Transverse Mercator (UTM) coordinate system and North American Datum 1983 (NAD 83) Continental United States (Conus) project datum.

1.2.2 Vertical Survey

A vertical survey is conducted at the site typically within an accuracy of 0.01 foot. The North American Vertical Datum 1988 (NAVD 88) datum plane as established with a survey grade geographical positioning

system (GPS) was used determining the elevation of existing monitoring wells used as temporary benchmarks (TBM). The vertical survey includes such points as top of all well casings, selected ground shots, important utility inverts, utility fluid levels, important surface water levels, and other items determined to be significant.

1.3 DRILLING AND MONITORING WELL/PIEZOMETER INSTALLATION

Necessary permits are applied for and obtained in accordance with federal, state, and local requirements prior to drilling or well construction activities. Additionally, the well locations are scanned for underground utilities prior to conducting intrusive subsurface activities. Wells are installed under applicable licensing requirements, and are designed and constructed in accordance with accepted standards and practices. Any wells purposely installed at off-site locations are permitted through appropriate right-of-entry agreements with all necessary property owners and/or their agents.

1.3.1 Drilling Methods and Subsurface Data Collection

Drilling is accomplished utilizing one or more of the following methods:

Auger Drilling

Auger drilling is the preferred, most often used method of subsurface investigation and is accomplished using a vehicle or trailer mounted drill rig. Continuous flight auger types used vary upon the site and situation, ranging from the 4-inch outside diameter solid stem to the 12-inch outside diameter hollow stem. Auger type is selected based upon appropriateness and/or site-specific requirements.

Hand Augering

Hand augering is utilized when economically and scientifically feasible, or when no other method is suitable. Hand augers typically produce three-inch diameter holes and are generally limited to depths of less than 15 feet.

Direct Push

Direct push methods of subsurface investigation are used generally for soil screening purposes or collection of groundwater samples where permanent wells are not viable.

Other Methods

Other drilling methods, such as mud and air rotary, rock coring, cable tool, and large bucket augering are used when site conditions or project requirements dictate.

Regardless of the drilling method used, the drill rig(s) and all drilling tools are thoroughly cleaned between boreholes to prevent cross introduction of contaminants. Split spoon samples are collected and field-described at intervals of five feet or less, and cuttings are continuously monitored for organic vapors. Drill cuttings are containerized for off-site disposal or are spread on the ground surface in proximity to the well or boring in accordance with North Carolina Department of Environment and Natural Resources (NCDENR) requirements. A geologist or engineer, trained in using visual/manual techniques, is always present during drilling and is responsible for subsurface contaminant and geologic data collection. Soils are classified in general agreement with the Unified Soils Classification System (USCS).

1.3.2 Hydropunch Installation

Hydropunch penetrometers (Hydropunches) are used to delineate the spatial extent of dissolved and free-phase phase plumes. Soil borings are advanced to the appropriate depth and then the Hydropunch is advanced through the soil boring into undisturbed material. Groundwater samples are collected by pulling back on the body of the Hydropunch and allowing the groundwater to enter the screened portion of the sample chamber. Samples are retrieved using a decontaminated Teflon bailer or peristaltic pump.

1.3.3 Well Installation

Wells are typically constructed of threaded PVC casing and screen. No glues or cements are used in joining PVC components. Well diameter, slot sizes, and protective covers vary depending upon site-specific conditions or situation-specific requirements.

1.3.4 Well Development

Wells are developed by over-pumping or surging using appropriate pumps, blocks, or bailers. Through development, unwanted fine materials are removed from the natural formation surrounding the well. Well development will be performed no sooner than 24-hours after grouting is completed for the Type III wells. Water generated during development is containerized and properly disposed or is discharged onto the ground in proximity of the well in accordance with NCDENR requirements.

1.4 HYDROGEOLOGIC DATA COLLECTION

Data used to help characterize hydrogeologic conditions at a site are obtained through various procedures including, but not necessarily limited to, those described below:

1.4.1 Regional Geology

Information pertaining to the regional geologic framework is compiled from existing publications, maps, and scientific papers.

1.4.2 Site Geology

Shallow site geology is generally determined from field descriptions and borehole samples. Interpretations with regard to hydrogeologically important contacts, zones, fractures, faults, cleavage, and facies changes are made when possible.

1.4.3 Groundwater Occurrence and Characteristics

Groundwater data is obtained utilizing a number of methods and procedures, not limited to the general list below:

Well Water Levels

After well development, wells are allowed to stabilize for a minimum of 24 hours prior to measuring. Water level and free-phase product thickness (where applicable) measurements are performed using an electronic interface probe or steel tape with water/product finding pastes.

The specific gravity of any accumulated product is determined and used to calculate true hydraulic grade from measured water levels. This information is combined with vertical survey data to determine relative potentiometric surface elevations for all wells.

Aquifer Testing

Various aquifer tests may be used to make determinations of hydraulic conductivity. Slug or pumping tests are often used to characterize site hydrogeologic conditions and to develop remedial action alternatives utilizing appropriate pumping technologies.

Other Methods

Other methods may be deemed appropriate for determining various groundwater characteristics. These other methods may include nested well configurations and/or clustered piezometer installations; sieve or pipette analysis; fracture trace analysis; computer modeling; and geophysical logging.

1.5 PETROLEUM HYDROCARBON DATA COLLECTION

1.5.1 Collection Methods

Petroleum hydrocarbon data is obtained through various methods including, but not limited to, the following:

Field Analysis

- Direct thickness measurement of phase separated components using tapes and/or probes.
- Manual vapor analysis using a photoionization detector (PID) or flame ionization detector (FID).
- Detectable odor and visual observation.

Laboratory Analysis

- Laboratory analysis of phase-separated products.
- Laboratory vapor, soil, and groundwater analysis using appropriate EPA Methods.

1.5.2 Field Sampling

Field sampling procedures are performed in accordance with recommended protocol, accepted industry standards, and under appropriate chain-of-custody procedures. Generally, sampling procedures are as follows:

Product Samples

Product samples are obtained using clean equipment and containers. Each is shipped to the analytical laboratory in protective containers.

Soil Samples

Soil samples are immediately packed into clean containers, and refrigerated for shipment to the analytical laboratory.

Groundwater Samples

Groundwater samples are collected in accordance with the following procedures:

- Creeks/Lakes/Etc.

Grab samples are obtained.

- Domestic Wells

Wells are pumped for a time sufficient to completely purge the well and any pressure or holding tanks prior to sampling.

- Monitoring Wells

Water level measurements are made and well volumes calculated for each well.

Three well volumes are removed from each well using a thoroughly cleaned Teflon bailer or appropriate purging pump. If it is not possible to remove three volumes, due to very low yields, a minimum of one volume is removed prior to obtaining a sample.

Where analysis for metals is required, wells are typically sampled utilizing low flow techniques, which reduce turbidity and the potential for matrix interference.

Samples are collected and containerized in a manner that minimizes agitation and contact with the air.

Sampling records are field prepared.

Samples are labeled and proper chain of custody documents are maintained.

Samples are promptly protectively packed, refrigerated, and shipped to the analytical laboratory for analysis.

2.0 DATA EVALUATION

Data obtained because of the site investigation is compiled and evaluated and a report is prepared for client review and distribution to the appropriate agencies. Generally, specific data are evaluated as follows:

- Background data are evaluated in context with the suspected or confirmed problem.
- Survey data are utilized to develop site maps and to evaluate contaminant receptors.
- Well construction records are compiled and presented as part of the report. As-built information is used in combination with other data to evaluate subsurface conditions and monitoring well screen settings as they relate to the investigation.
- Subsurface drilling logs are used to develop geologic cross-sections, fence diagrams, isopachs, structure contours, or other constructions. Regional geologic data are used to obtain an overall framework.
- Hydrogeologic data are used to develop contour maps, flow nets and other constructions. The data is also used to calculate various hydrogeologic parameters that describe aquifer characteristics.
- Hydrocarbon data are utilized to develop various plume geometry and isoconcentration maps.

All data are compiled and utilized for making specific recommendations with regard to remedial action alternate.

APPENDIX C

BORING LOGS, MONITORING WELL CONSTRUCTION DETAILS, AND NORTH CAROLINA WELL CONSTRUCTION RECORDS

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID: 4023DPT-01
NORTHING: 3,845,406.38		EASTING: 285,763.98	CREW: N/A
SYSTEM: UTM NAD83 (m)		BORING LOCATION:	LAND ELEV.: 30.6
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: 3.4	BORING DEPTH: 8.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: 3.1	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000				0.0	LAND SURFACE	30.62
0.0					SP			Tan, f. to vf. SAND. Moist. Fill.	
1.0		▲0.0			GW		1.0	Well graded GRAVEL.	29.6
							1.5		29.1
2.0				LCH 4023 DPT01 (1-3)					
3.0		▲0.0			CL			Brown to orange-brown, vf. SANDY to SILTY CLAY. Moist. No HCO.	
4.0							4.0		26.6
6.0		▲0.0			SM			Gray, SILTY, f. to vf. SAND. Tr. interlayered clayey sand. No HCO. Saturated at approximately 5' BLS.	
		▲0.0							
8.0							8.0	Boring Terminated at Elev. 22.6 ft	22.6

▽ = 0hr. DTW

▼ = 24hr. DTW

CATLIN ENVIRONMENTAL LOG 208-018 LCH-4023 G.P.L. CATLIN GDT 4/28/09

BORING LOG



CATLIN
Engineers and Scientists

208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID:
		DRILLER: John E. Wood, III	4023DPT-02
NORTHING: 3,845,403.28	EASTING: 285,769.38	CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 30.4
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: NE	BORING DEPTH: 4.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: 2.7	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	U S C S	LOG	SOIL AND ROCK DESCRIPTION	ELEVATION
	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000					
0.0							LAND SURFACE	30.41
			▲135.8		SM		Brown, SILTY, f. to vf. SAND w/ tr. gravel. Slight odor. Saturated. Possibly fill.	29.7
1.0								
			▲15.6	LCH 4023-DPT02 (1-3)	SC/CL		Native. Dark brown, CLAYEY vf. SAND to SANDY CLAY. Lightens in color with depth. Moist. No odor.	
3.0								27.4
			▲0.0		SC/SM		Grayish-brown, SILTY to CLAYEY vf. SAND. Higher sand content than above. Wet at approximately 3.5' BLS. No odor.	
4.0								26.4
							Boring Terminated at Elev. 26.4 ft	

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID:
		DRILLER: John E. Wood, III	4023DPT-03
NORTHING: 3,845,404.40	EASTING: 285,773.52	CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 30.3
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: NE	BORING DEPTH: 4.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: 3.6	ROCK DEPTH: --

DEPTH	BLOW COUNT 0.5 0.5 0.5 0.5	MOI.	OVA RESULTS (ppm) 0 1000 2000 3000 4000	LAB.	U S C S	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
0.0							0.0	LAND SURFACE	30.33
1.0			▲29.1		SM		1.0	Grayish-brown to dark brown, SILTY f. to vf. SAND. Tr. clay. Moist to wet. No odor.	29.3
3.0			▲34.5	LCH 4023 DPT03 (1-3)	SC/ CL		3.0	Brown to orange-brown, SILTY to CLAYEY vf. SAND to SANDY CLAY. Increasing clay content with depth. Moist. Strong odor.	27.3
4.0			▲60.3		CL		4.0	Same as above, but wet. Orange-brown to gray mottling. Strong odor.	26.3
								Boring Terminated at Elev. 26.3 ft	

CATLIN ENVRO. LOG_208-018.LCH-4023.GPJ CATLIN.GDT 4/28/09

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID: 4023DPT-04
NORTHING: 3,845,410.09		EASTING: 285,776.27	CREW: N/A
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 30.7
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: NE	BORING DEPTH: 4.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: 3.3	ROCK DEPTH: --

DEPTH	BLOW COUNT 0.5 0.5 0.5 0.5	MOI.	OVA RESULTS (ppm)	LAB.	U S C S	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
0.0			0 1000 2000 3000 4000				0.0	LAND SURFACE	30.68
1.0			▲113.8		SM		1.0	Dark brown, SILTY f. SAND. Tr. clay. Moist. No odor.	29.7
3.0			▲120.6	LCH 4023 DPT04 (1-3)	CL		3.0	Brown, grading to orange-brown, SILTY to vf. SANDY CLAY. Moist. No odor.	27.7
4.0			▲28.5		CL		4.0	Same as above, but orange-brown to gray in color. Mottled. Soft. Wet.	26.7
								Boring Terminated at Elev. 26.7 ft	

CATLIN ENVIRO. LOG_208-018 LCH-4023.GPJ CATLIN.GDT 4/28/09

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID: 4023DPT-05
NORTHING: 3,845,397.62		EASTING: 285,772.23	CREW: N/A
SYSTEM: UTM NAD83 (m)		BORING LOCATION:	LAND ELEV.: 30.5
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: 2.7	BORING DEPTH: 4.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: N/A	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	U S C S	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
0.0	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000				0.0	LAND SURFACE	30.49
2.0			▲0.0	LCH 4023 DPT05 (0-2)	SM			Grayish-brown, SILTY f. to vf. SAND. Possibly fill. Uniform grading to 4.0' BLS. Moist. Wet below approximately 3.0' BLS. Soft and wet at surface.	
4.0			▲0.0				4.0	Boring Terminated at Elev. 26.5 ft	26.5

▽ = 0hr. DTW

▼ = 24hr. DTW

CATLIN ENVIRO. LOG_208-018 LCH-4023.GPJ CATLIN.GDT_4/28/09

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID:
		DRILLER: John E. Wood, III	4023DPT-06
NORTHING: 3,845,398.23	EASTING: 285,775.78	CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 31.0
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: 3.8	BORING DEPTH: 8.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: 3.4	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	U S C S	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000				0.0	LAND SURFACE	30.97
0.0					SP			Tan, f. to vf. SAND. Moist. Septic odor. Fill.	
			▲29.2				1.3		29.7
					SM		1.5	TOPSOIL	29.5
2.0									
			▲0.3	LCH 4023 DPT06 (2-4)				Brown to orange-brown, SILTY to vf. SANDY CLAY. Low plasticity. Moist. No odor. Native.	
					CL				
4.0									
			▲0.0						
							5.5		25.5
					SC			Dark brown, SILTY to CLAYEY vf. SAND. Saturated. No odor.	
6.0							6.0		25.0
					SP/SM			Brown to tan, f. to vf. SAND. Tr. dark brown, silty layering. Saturated. No odor.	
			▲1.7						
8.0							8.0		23.0
								Boring Terminated at Elev. 23.0 ft	

▽ = 0hr. DTW

▼ = 24hr. DTW

CATLIN ENVIRO. LOG 208-018 LCH-4023 G.P.I. CATLIN GDT 4/28/09

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID: 4023DPT-07
NORTHING: 3,845,408.83		DRILLER: John E. Wood, III	
EASTING: 285,770.27		CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 30.5
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: NE	BORING DEPTH: 3.0
START DATE: 1/9/09	FINISH DATE: 1/9/09	24 HOUR DTW: N/A	ROCK DEPTH: --

DEPTH	BLOW COUNT 0.5 0.5 0.5 0.5	MOI.	OVA RESULTS (ppm) 0 1000 2000 3000 4000	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
0.0							0.0	LAND SURFACE	30.51
1.0			▲0.0		SP			Tan, vf. SAND. Tr. silt. Fill. Moist. No HCO.	
			▲1.9				1.5		29.0
2.0				LCH 4023 -DPT07 (1-3)	SM		2.0	Dark brown TOPSOIL. Moist. No HCO.	28.5
			▲38.1		SC			Brown, SILTY to CLAYEY f. to vf. SAND. Native. Slight HCO. Moist. Wet at base.	
3.0							3.0	Boring Terminated at Elev. 27.5 ft	27.5

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID:
		DRILLER: John E. Wood, III	4023DPT-08
NORTHING: 3,845,404.78	EASTING: 285,776.14	CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 31.1
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: NE	BORING DEPTH: 3.0
START DATE: 1/9/09	FINISH DATE: 1/9/09	24 HOUR DTW: N/A	ROCK DEPTH: --

DEPTH	BLOW COUNT 0.5 0.5 0.5 0.5	MOI.	OVA RESULTS (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
0.0			0 1000 2000 3000 4000				0.0	LAND SURFACE	31.12
			▲172.5		SM		0.5	Dark brown, SILTY f. to vf. SAND w/ organic fragments. Moist.	30.6
1.0			▲267.8		SC		1.8	Brown, CLAYEY vf. SAND. Moist. Strong HCO.	29.4
2.0			▲354.2	LCH 4023 DPT08 (1-3)	CL		3.0	Same as above, but higher clay content. Brown to orange-brown in color. Decreasing sand content with depth. Wet at base.	28.1
3.0								Boring Terminated at Elev. 28.1 ft	

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID: 4023DPT-09
NORTHING: 3,845,402.09		DRILLER: John E. Wood, III	
EASTING: 285,779.46		CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 31.4
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: 3.4	BORING DEPTH: 3.5
START DATE: 1/9/09	FINISH DATE: 1/9/09	24 HOUR DTW: N/A	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000				0.0	LAND SURFACE	31.36
0.0			▲5.0		SP			Tan, f. to vf. SAND. Fill. Moist. No HCO.	
1.0			▲73.4		SM		1.0	TOPSOIL. Strong organic odor.	30.4
					SM		1.5	Brown, SILTY to CLAYEY f. to vf. SAND. Grades downward to silty clay. Moist. No HCO.	29.9
2.0			▲0.9	LCH 4023 DPT09 (1-3)	CL		2.0		29.4
3.0					CL			Brown to orange-brown, med. plasticity CLAY. Tr. sand. Moist. No HCO. Wet at base.	
3.5							3.5	Boring Terminated at Elev. 27.9 ft	27.9

CATLIN ENVIRO. LOG_208-018.LCH-4023.GPJ CATLIN.GDT_4/28/09

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018		STATE: NC		COUNTY: Onslow		LOCATION: Jacksonville	
PROJECT NAME: Site LCH-4023 CSA				LOGGED BY: Tom Stetler		BORING ID:	
				DRILLER: John E. Wood, III		4023DPT-10	
NORTHING: 3,845,411.65		EASTING: 285,782.76		CREW: N/A			
SYSTEM: UTM NAD83 (m)		BORING LOCATION:				LAND ELEV.: 31.0	
DRILL MACHINE: Hand Auger		METHOD: Hand Auger		0 HOUR DTW: 2.8		BORING DEPTH: 3.0	
START DATE: 1/9/09		FINISH DATE: 1/9/09		24 HOUR DTW: N/A		ROCK DEPTH: --	
DEPTH	BLOW COUNT 0.5 0.5 0.5 0.5	MOI.	OVA RESULTS (ppm) 0 1000 2000 3000 4000	LAB.	U S C S	LOG	DEPTH SOIL AND ROCK DESCRIPTION ELEVATION
0.0							0.0 LAND SURFACE 30.96
			▲32.1		SM		TOPSOIL. Moist.
1.0							1.0 30.0
			▲1.1	LCH 4023 -DPT10 (1-2)	SC/ CL		Brown, SILTY vf. SAND grading downward to dark grayish-brown, f. SANDY CLAY. Moist. No HCO.
2.0							
			▲0.3				
3.0							3.0 28.0
Boring Terminated at Elev. 28.0 ft							

▽ = 0hr. DTW

▼ = 24hr. DTW

CATLIN ENVIRO LOG 208-018 LCH-4023.GPJ CATLIN GDI 4/28/09

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA	LOGGED BY: Tom Stetler	BORING ID: 4023DPT-11	
	DRILLER: John E. Wood, III		
NORTHING: 3,845,415.05	EASTING: 285,770.49	CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:	LAND ELEV.: 30.9	
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: NE	BORING DEPTH: 3.5
START DATE: 1/9/09	FINISH DATE: 1/9/09	24 HOUR DTW: N/A	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000				0.0	LAND SURFACE	30.86
0.0									
			▲0.9		SP			Tan, f. to vf. SAND. Tr. silt. Moist. No HCO. Fill.	
1.0									
			▲1.2				1.5		29.4
				LCH 4023 DPT11 (1-3)	SC			Dark brown, SILTY, f. to vf. SAND grading downward to SANDY CLAY. Moist. No HCO. Mod. organic content at top of interval. Native.	
2.0									
			▲0.5				2.5		28.4
					SC/CL			Grayish-brown to orange-brown, vf. SANDY CLAY to CLAYEY SAND. Moist. No HCO. Clay content increases with depth.	
3.0									
3.5							3.5		27.4
								Boring Terminated at Elev. 27.4 ft	

CATLIN ENVIRO. LOG 208-018 LCH-4023 GPL CATLIN GDT 4/28/09

▽ = 0hr. DTW

▼ = 24hr. DTW

BORING LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	BORING ID: 4023DPT-12
NORTHING: 3,845,395.57		DRILLER: John E. Wood, III	
EASTING: 285,767.63		CREW: N/A	
SYSTEM: UTM NAD83 (m)	BORING LOCATION:		LAND ELEV.: 31.3
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: 2.9	BORING DEPTH: 3.0
START DATE: 1/9/09	FINISH DATE: 1/9/09	24 HOUR DTW: N/A	ROCK DEPTH: --

DEPTH	BLOW COUNT	MOI.	OVA RESULTS (ppm)	LAB.	U S C S	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
	0.5 0.5 0.5 0.5		0 1000 2000 3000 4000				0.0	LAND SURFACE	31.26
0.0			▲75.3		SC/SM			Brown to dark brown, SILTY to CLAYEY f. to vf. SAND w/ tr. gravel. Moist. No HCO. Fill.	
1.0				LCH 4023 DPT12 (0-2)	GW		1.0		30.3
			▲1.8		SC		1.3	Well graded, SANDY GRAVEL.	30.0
2.0							2.0	Grayish-brown to brown, CLAYEY vf. SAND to SANDY CLAY. Moist. No HCO.	29.3
			▲3.0		CL			Same as above, but increasing CLAY content with depth. Wet at approximately 2.5' BLS. No HCO.	
3.0							3.0		28.3

Boring Terminated at Elev. 28.3 ft

CATLIN ENVIRO. LOG. 208-018 LCH-4023.GPJ CATLIN.GDT 4/28/09

▽ = 0hr. DTW

▼ = 24hr. DTW

SHEET 1 OF 1

 Portland Cement  Bentonite Pellets  #2 Medium Sand



Non RESIDENTIAL WELL CONSTRUCTION RECORD

North Carolina Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR CERTIFICATION #: 2869

1. WELL CONTRACTOR:

Bobbie D. Fowler

Well Contractor (Individual) Name

CATLIN Engineers and Scientists

Well Contractor Company Name

STREET ADDRESS 220 Old Dairy Road

Wilmington North Carolina 28405

City or Town State Zip Code

(910) - 452-5861

Area code - Phone number

2. WELL INFORMATION

SITE WELL ID #(if applicable): USTLCH 4023-MW02

STATE WELL PERMIT #(if applicable): N/A

DWQ or OTHER PERMIT # (if applicable): N/A

WELL USE (Check Applicable Box): Monitoring ☒ Municipal/Public ☐

Industrial/Commercial ☐ Agricultural ☐ Recovery ☐ Injection ☐

Irrigation ☐ Other ☐ (list use):

DATE DRILLED: 01/30/2009

TIME COMPLETED: 13:00

AM ☐ PM ☒

3. WELL LOCATION:

CITY: Jacksonville

COUNTY: Onslow

Butler Drive North and 3rd Street (Midway Park), 28544

(Street Name, Numbers, Community, Subdivision, Lot No., Parcel, Zip Code)

TOPOGRAPHIC / LAND SETTING

Slope ☐ Valley ☐ Flat ☒ Ridge ☐ Other: _____

NORTHING: 3,845,387.3

EASTING: 285,801.2

UTM NAD83 (m)

May be in degrees,
minutes, seconds, or
in a decimal format

Latitude/longitude source: ☒ GPS ☐ Topo. map

(Location of well must be shown on a USGS topo map and
attached to this form if not using a GPS.)

4. FACILITY - is the name of the business where the well is located.

FACILITY ID #(if applicable) N/A

NAME OF FACILITY: N/A

STREET ADDRESS: Butler Drive North and 3rd Street
(Midway Park)

Jacksonville NC 28544

City or Town State Zip Code

CONTACT PERSON: Dr. Johanna Arnold

STREET ADDRESS: Attn: I&E/ EMD/ EQB/ PSC Box 20004

Camp Lejeune NC 28542-0004

City or Town State Zip Code

(910)- 451-9017

Area code - Phone number

5. WELL DETAILS:

a. TOTAL DEPTH: 12

b. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

c. WATER LEVEL Below Top of Casing: 3.78 FT.

(Use "+" if Above Top of Casing)

d. TOP OF CASING IS 0 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires
a variance in accordance with 15A NCAC 2C.0118

e. YIELD (gpm): N/A METHOD OF TEST: N/A

f. DISINFECTION: Type N/A Amount: N/A

g. WATER ZONES (depth):

From _____ To _____ From _____ To _____

From _____ To _____ From _____ To _____

From _____ To _____ From _____ To _____

6. CASING:

Depth	Diameter	Thickness/ Weight	Material
From <u>0</u> To <u>2</u> ft.	<u>2"</u>	<u>Sch. 40</u>	<u>PVC</u>
From _____ To _____ ft.	<u>"</u>		
From _____ To _____ ft.	<u>"</u>		

7. GROUT:

Depth	Material	Method
From <u>0</u> To <u>0.5</u> Ft.	<u>Portland Cement</u>	<u>Surface Pour</u>
From <u>0.5</u> To <u>1</u> Ft.	<u>Bent. Pellets</u>	<u>Surface Pour</u>
From _____ To _____ Ft.		

8. SCREEN:

Depth	Diameter	Slot Size	Material
From <u>2</u> To <u>11.5</u> Ft.	<u>2 in.</u>	<u>Slot .010in.</u>	<u>PVC</u>
From _____ To _____ Ft.	<u>in.</u>	<u>in.</u>	
From _____ To _____ Ft.	<u>in.</u>	<u>in.</u>	

9. SAND/GRAVEL PACK:

Depth	Size	Material
From <u>1</u> To <u>12</u> Ft.	<u>#2 Medium</u>	<u>Torpedo Sand</u>
From _____ To _____ Ft.		
From _____ To _____ Ft.		

10. DRILLING LOG

From _____ To _____ Formation Description

SEE
ATTACHED

11. REMARKS:

Permanent Flush Type II Monitoring Well

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH
15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS
RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bobbie D. Fowler

SIGNATURE OF CERTIFIED WELL CONTRACTOR

2-10-09

DATE

Bobbie D. Fowler

PRINTED NAME OF PERSON CONSTRUCTING THE WELL

SHEET 1 OF 1

WELL LOG



208-018
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA		LOGGED BY: Tom Stetler	WELL ID: USTLCH 4023-MW03
NORTHING:		EASTING:	DRILLER: Bobbie D. Fowler
SYSTEM:		CREW: John E. Wood, III	T.O.C. ELEV.:
DRILL MACHINE: CME 45B ATV	METHOD: H.S. Augers	0 HOUR DTW: 4.9	TOTAL DEPTH: 12.0
START DATE: 2/2/09	FINISH DATE: 2/2/09	24 HOUR DTW: 3.5	WELL DEPTH: 12.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
6in	6in	6in	6in								
0.0	2	3	3	4		*-MW03 (0-2)**	SM		0.0	LAND SURFACE	0.0
									1.0	Brown, Silty, f. SAND w/tr. clay. No HCO. FILL	0.5
							SC/CL		2.0	Orange brown, Sandy low plast. CLAY to Clayey, f. SAND. No HCO.	1.0
3.0									3.0		2.0
	1	5	7	8			SC/CL		3.5	S.A.A.	
							SP		5.0	Lt. brown, f. SAND w/tr. silt. No HCO.	
8.0											
									8.0		
	0	0	0	1			CH/SM		10.0	Greenish gray, CLAY, high plast. with interbedded silty, f. sand. No HCO.	
											11.5
											12.0
										Boring Terminated at Depth 12.0 ft in * = Soil sample prefaced with "USTLCH4023" ** = Duplicate sample collected	12.0

2" Std. 010
Std. 40 PVC



Portland Cement



Bentonite Pellets



#2 Medium Sand

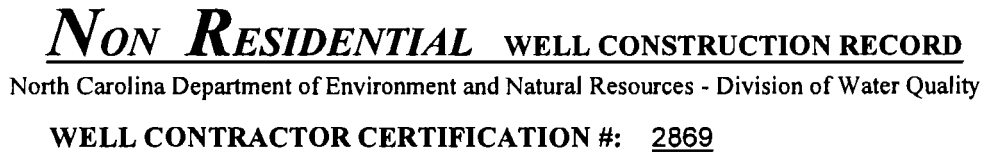
CATLIN BORING LOG 208-018 LCH-4023 G.P.I. CATLIN.GDI 4/3/09

SHEET 1 OF 1

 Portland Cement  Bentonite Pellets  #2 Medium Sand

SHEET 1 OF 1

 Portland Cement
  Bentonite Pellets
  #2 Medium Sand



d. TOP OF CASING IS 0 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires
a variance in accordance with 15A NCAC 2C.0118

e. YIELD (gpm): N/A METHOD OF TEST: N/A

f. DISINFECTION: Type N/A Amount: N/A

g. WATER ZONES (depth):
From _____ To _____ From _____ To _____
From _____ To _____ From _____ To _____
From _____ To _____ From _____ To _____

6. CASING:

Depth	Diameter	Thickness/ Weight	Material
From <u>0</u> To <u>22</u> ft.	<u>2"</u>	<u>Sch. 40</u>	<u>PVC</u>
From <u>0.5</u> To <u>19.5</u> ft.	<u>6"</u>	<u>Sch. 40</u>	<u>PVC</u>
From _____ To _____ ft.	<u>"</u>	_____	_____

7. GROUT:

Depth	Material	Method
From <u>0.5</u> To <u>18</u> Ft.	<u>Portland Cement</u>	<u>Tremie</u>
From <u>18</u> To <u>21</u> Ft.	<u>Bent. Pellets</u>	<u>Surface Pour</u>
From _____ To _____ Ft.	_____	_____

8. SCREEN:

Depth	Diameter	Slot Size	Material
From <u>22</u> To <u>26.5</u> Ft.	<u>2</u> in.	<u>Slot .010in.</u>	<u>PVC</u>
From _____ To _____ Ft.	_____ in.	_____ in.	_____
From _____ To _____ Ft.	_____ in.	_____ in.	_____

9. SAND/GRAVEL PACK:

Depth	Size	Material
From <u>21</u> To <u>29</u> Ft.	<u>#2 Medium</u>	<u>Torpedo Sand</u>
From _____ To _____ Ft.	_____	_____
From _____ To _____ Ft.	_____	_____

10. DRILLING LOG

From	To	Formation Description
_____ _____ _____ _____ _____ _____ _____ _____ _____ _____	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____	_____ _____ _____ _____ <u>SEE</u> <u>ATTACHED</u> _____ _____ _____ _____

11. REMARKS:
Permanent Flush Type III Monitoring Well

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH
15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS
RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bobbie D. Fowler 2-10-09
SIGNATURE OF CERTIFIED WELL CONTRACTOR DATE
Bobbie D. Fowler
PRINTED NAME OF PERSON CONSTRUCTING THE WELL

WELL LOG



CATLIN
Engineers and Scientists

208-018
Wilmington, NC

SHEET 1 OF 2

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA	LOGGED BY: Tom Stetler	WELL ID: USTLCH 4023-MW06	
	DRILLER: Bobbie D. Fowler		
NORTHING:	EASTING:	CREW: John E. Wood, III	
SYSTEM:	BORING LOCATION:	T.O.C. ELEV.:	
DRILL MACHINE: Diedrich D-50	METHOD: HSA w/ Mud Rotary	0 HOUR DTW: NM	TOTAL DEPTH: 36.0
START DATE: 2/3/09	FINISH DATE: 2/6/09	24 HOUR DTW: 17.3	WELL DEPTH: 27.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
	6in	6in	6in	6in					0.0	LAND SURFACE	0.0
							SC		1.0	Orange brown, Clayey, f. SAND. FILL	
							SW		1.5	F. SAND w/gravel and wood frags. FILL	
							SC/CL		2.0	Brown, Clayey, f. SAND to Sandy CLAY. Strong HCO @ 1.5'.	
									3.0		
							SM		4.7	Lt. brown, Silty, f. SAND. Mod. to strong HCO.	
							SC		5.0	Gray, Clayey, f. SAND. Sharp contact w/above. Mod. to strong HCO.	
									8.0		
10.0	1	1	2	3	266.3		CH/SM			Gray, CLAY, high plast. with interbedded clayey, f. sand. Possible slight HCO.	2" Sch. 40 PVC
12.0	1	1	4	2	162.1						
14.0	3	3	2	2	7.0				14.2		
16.0	0	0	0	3	16.5						
18.0	1	1	1	2	3.2		CH			Gray, CLAY. High plasticity w/tr. silt, interbedded sand, and possible slight HCO in top of strata.	6" Sch. 40 PVC
20.0	0	1	5	12	1.8						
									21.5		18.0
											19.5
											21.0

CATLIN BORING LOG 208-018 LCH-4023.GPJ CATLIN.GDT 4/3/09



Portland Cement



Bentonite Pellets



#2 Medium Sand

WELL LOG



208-018
Wilmington, NC

SHEET 2 OF 2

PROJECT NO.: 208-018	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Site LCH-4023 CSA	LOGGED BY: Tom Stetler	WELL ID: USTLCH 4023-MW06	
	DRILLER: Bobbie D. Fowler		
NORTHING:	EASTING:	CREW: John E. Wood, III	
SYSTEM:	BORING LOCATION:	T.O.C. ELEV.:	
DRILL MACHINE: Diedrich D-50	METHOD: HSA w/ Mud Rotary	0 HOUR DTW: NM	TOTAL DEPTH: 36.0
START DATE: 2/3/09	FINISH DATE: 2/6/09	24 HOUR DTW: 17.3	WELL DEPTH: 27.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
	6in	6in	6in	6in							
22.0							SM				22.0
	4	11	21	10	12.1						
24.0											
	5	8	6	6	7.6						
26.0							SM			Green gray to gray, Silty, f. SAND. Increasing silt content w/depth. No to possible slight HCO. (continued)	26.5
	3	7	8	11	9.4						27.0
28.0											
	5	9	9	9	2.2						
30.0									30.0		
	2	0	0	1	2.1				30.5	Friable Sandy Gravel. Weathered Limestone.	
32.0									32.0	Rod drop through interval. Solution cavity or void.	
	19	8	20	26	15.1						
34.0										Gray, mod. to highly weathered LIMESTONE. Slight HCO.	
	20	6	0	0	17.3				35.0		
									36.0	Rod drop through interval. Solution cavity or void.	
										Boring Terminated at Depth 36.0 ft at base of void/solution cavity on LIMESTONE lense.	36.0

CATLIN BORING LOG 208-018 LCH-4023 G&J CATLIN.GDT 4/3/09



Portland Cement



Bentonite Pellets



#2 Medium Sand

APPENDIX D

MONITORING WELL SAMPLING RECORDS

APPENDIX D

MONITORING WELL SAMPLING RECORDS
Comprehensive Site Assessment
and Corrective Actions
LCH-4023

Marine Corps Base
Camp Lejeune, NC

WELL IDENTIFICATION	USTLCH 4023-MW01	USTLCH 4023-MW02	USTLCH 4023-MW03	USTLCH 4023-MW04	USTLCH 4023-MW05
DATE SAMPLED	02/09/09	02/09/09	02/09/09	02/09/09	02/09/09
TIME SAMPLED	13:30	13:00	14:15	13:45	14:45
SAMPLED BY	T. Stetler	T. Stetler	T. Stetler	T. Stetler	T. Stetler
WELL DIAMETER	2"	2"	2"	2"	2"
WELL DEPTH - (A)*	14.92	15.03	15.88	12.64	16.13
DEPTH TO WATER - (B)	5.67'	3.91'	3.60'	3.51'	3.99'
(A-B) FT. WATER IN WELL - (C)	9.25	11.12	12.28	9.13	12.14
VOLUME PER FT. - (D)	0.163 gal.	0.163 gal.	0.163 gal.	0.163 gal.	0.163 gal.
(CxD) ONE WELL VOLUME - (E)	1.51 gal.	1.81 gal.	2.00 gal.	1.49 gal.	1.98 gal.
(3xE) THREE WELL VOLUMES - (F)	4.53 gal.	5.43 gal.	6.00 gal.	4.47 gal.	5.94 gal.
BAILER VOLUME** - (G)	0.24 gal.	0.24 gal.	0.24 gal.	0.24 gal.	0.24 gal.
(F/G) BAILS REQUIRED**	18.9	22.6	25.0	18.6	24.8
AMOUNT REMOVED	20 bails	23 bails	25 bails	19 bails	25 bails
TURBIDITY (clear, slight, moderate, high)	SLIGHT	SLIGHT	SLIGHT	SLIGHT	SLIGHT
ANALYSIS and / or COMMENTS	EPA 602	EPA 602	EPA 602	EPA 602	EPA 602
	EPA 625	EPA 625	EPA 625	EPA 625	EPA 625

WELL VOLUMES gal/ft

1" WELL = 0.045

2" WELL = 0.163

4" WELL = 0.661

6" WELL = 1.501

BAILER VOLUMES gal/bail

3' x 1.5" = 0.24

4' x 1.5" = 0.37

* - Includes adjustment of casing height/depth.

** - An entry of "PUMP" indicates that bailers were not used to develop/purge the well and that a pump was used to remove the volume indicated.

APPENDIX D

MONITORING WELL SAMPLING RECORDS

Comprehensive Site Assessment
and Corrective Actions

LCH-4023

Marine Corps Base
Camp Lejeune, NC

WELL IDENTIFICATION	USTLCH 4023-MW06				
DATE SAMPLED	02/09/09				
TIME SAMPLED	14:00				
SAMPLED BY	T. Stetler				
WELL DIAMETER	2"				
WELL DEPTH - (A)*	29.93				
DEPTH TO WATER - (B)	17.31'				
(A-B) FT. WATER IN WELL - (C)	12.62				
VOLUME PER FT. - (D)	0.163 gal.				
(CxD) ONE WELL VOLUME - (E)	2.06 gal.				
(3xE) THREE WELL VOLUMES - (F)	6.18 gal.				
BAILER VOLUME** - (G)	0.24 gal.				
(F/G) BAILS REQUIRED**	25.8				
AMOUNT REMOVED	10* bails				
TURBIDITY (clear, slight, moderate, high)	SLIGHT				
ANALYSIS and / or COMMENTS	EPA 602				
	EPA 625				
	*=BAILED DRY				

WELL VOLUMES gal/ft

1" WELL = 0.045

2" WELL = 0.163

4" WELL = 0.661

6" WELL = 1.501

BAILER VOLUMES gal/bail

3' x 1.5" = 0.24

4' x 1.5" = 0.37

* - Includes adjustment of casing height/depth.

** - An entry of "PUMP" indicates that bailers were not used to develop/purge the well and that a pump was used to remove the volume indicated.

APPENDIX E

**LABORATORY REPORTS AND
CHAIN-OF-CUSTODY DOCUMENTATION**

SGS Environmental Services, Inc.

Steve Hudson
Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

Report Number: G128-2299

Client Project: LCH-4023 CSA

Dear Steve Hudson,

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or the services performed during this project, please call SGS Environmental Services at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS Environmental Services for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
SGS Environmental Services, Inc.

for: Barbara Hagen 1.19.09
Project Manager Date
Ashley Nifong

SGS Environmental Services, Inc.

List of Reporting Abbreviations
And Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantification Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL/CL = Reporting Limit / Control Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT01 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-1A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 13:30
Date Received: 1/9/2009
Matrix: Soil
Solids 80.67

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.57	mg/Kg	1	01/13/09 11:51

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	100	99.9		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.68 g
Final Volume: 5 mL

Analyst: DVG

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT02 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-2A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 14:00
Date Received: 1/9/2009
Matrix: Soil
Solids 89.27

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.67	mg/Kg	1	01/13/09 13:11

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	102	102		70-130

Comments:

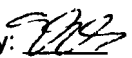
Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 7.2 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRO
Page 4 of 29

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT03 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-3A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 14:20
Date Received: 1/9/2009
Matrix: Soil
Solids 84.41

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	12.6	5.03	mg/Kg	1	01/13/09 14:04

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	107	107		70-130

Comments:

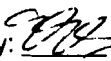
Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 7.07 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRO
Page 5 of 29

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT04 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-4A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 14:45
Date Received: 1/9/2009
Matrix: Soil
Solids 87.76

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.14	mg/Kg	1	01/13/09 14:31

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	108	108		70-130

Comments:

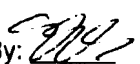
Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.65 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT05 (0-2)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-5A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 15:30
Date Received: 1/9/2009
Matrix: Soil
Solids 84.53

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.16	mg/Kg	1	01/13/09 14:57

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	106	106		70-130

Comments:

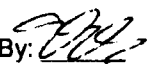
Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 5.76 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT06 (2-4)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-6A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 15:45
Date Received: 1/9/2009
Matrix: Soil
Solids 84.78

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.35	mg/Kg	1	01/13/09 15:24

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	103	103		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.62 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: [Signature]
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT07 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-7A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/9/2009 10:35
Date Received: 1/9/2009
Matrix: Soil
Solids 84.91

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.56	mg/Kg	1	01/13/09 15:50

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	114	114		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.35 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: [Signature]
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT08 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-8A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/9/2009 10:50
Date Received: 1/9/2009
Matrix: Soil
Solids 82.44

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	32.1	5.39	mg/Kg	1	01/13/09 16:17

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	130	130		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.75 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRC
Page 10 of 29

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT09 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-9A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/9/2009 11:20
Date Received: 1/9/2009
Matrix: Soil
Solids 77.80

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.90	mg/Kg	1	01/13/09 16:43

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	104	104		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.54 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRO
Page 11 of 29

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT10 (1-2)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-10A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/9/2009 11:40
Date Received: 1/9/2009
Matrix: Soil
Solids 85.53

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.27	mg/Kg	1	01/13/09 17:10

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	100	99.6		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.66 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: 
GRO
Page 12 of 29

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT11 (1-3)

Client Project ID: LCH-4023 CSA

Lab Sample ID: G128-2299-11A

Lab Project ID: G128-2299

Report Basis: Dry Weight

Analyzed By: DVG

Date Collected: 1/9/2009 11:55

Date Received: 1/9/2009

Matrix: Soil

Solids 84.07

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.25	mg/Kg	1	01/13/09 17:36

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	106	106		70-130

Comments:

Batch Information

Analytical Batch: VP011309

Analytical Method: 8015

Instrument ID: GC4

Analyst: DVG

Prep Method: 5035

Initial Wt/Vol: 6.8 g

Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: [Signature]
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT12 (0-2)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-12A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/9/2009 12:10
Date Received: 1/9/2009
Matrix: Soil
Solids 85.38

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.24	mg/Kg	1	01/13/09 18:03

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	104	104		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.71 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: [Signature]
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: Trip Blank
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-13A
Lab Project ID: G128-2299
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/9/2009 0:00
Date Received: 1/9/2009
Matrix: Soil
Solids 100.00

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.00	mg/Kg	1	01/13/09 11:25

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	106	106		70-130

Comments:

Batch Information

Analytical Batch: VP011309
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 5 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481

Reviewed By: [Signature]
GRO
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT01 (1-3)

Client Project ID: LCH-4023 CSA

Lab Sample ID: G128-2299-1D

Lab Project ID: G128-2299

Date Collected: 1/8/2009 13:30

Date Received: 1/9/2009

Matrix: Soil

Solids 80.67

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.32	mg/Kg	1	01/13/09 12:15

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	28.5	71.3

Comments:

Batch Information

Analytical Batch: EP011309

Analytical Method: 8015

Instrument: GC6

Analyst: DTF

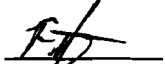
Prep batch: 13417

Prep Method: 3541

Prep Date: 01/12/09

Initial Prep Wt/Vol: 33.85 G

Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

Reviewed By: 
DRO.XLS

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT02 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-2D
Lab Project ID: G128-2299

Date Collected: 1/8/2009 14:00
Date Received: 1/9/2009
Matrix: Soil
Solids 89.27
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	6.51	mg/Kg	1	01/13/09 12:44

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	28.8	72.1

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 34.43 G
Prep Final Vol: 10 mL

Analyst: Fit

NC Certification #481

Reviewed By: 722
ORO.XLS

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT03 (1-3)

Client Project ID: LCH-4023 CSA

Lab Sample ID: G128-2299-3D

Lab Project ID: G128-2299

Date Collected: 1/8/2009 14:20

Date Received: 1/9/2009

Matrix: Soil

Solids 84.41

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	547	35.1	mg/Kg	5	01/14/09 12:44

Surrogate Spike Results

OTP

Spike Added
40

Control Limits
40-140

Spike Result
47.1

Percent Recovery
118

Comments:

Batch Information

Analytical Batch: EP011409

Analytical Method: 8015

Instrument: GC6

Analyst: DTF

Prep batch: 13417

Prep Method: 3541

Prep Date: 01/12/09

Initial Prep Wt/Vol: 33.71 G

Prep Final Vol: 10 mL

Analyst: FJ

NC Certification #481

Reviewed By: EP
DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT04 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-4D
Lab Project ID: G128-2299

Date Collected: 1/8/2009 14:45
Date Received: 1/9/2009
Matrix: Soil
Solids 87.76
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	6.87	mg/Kg	1	01/13/09 13:39
Surrogate Spike Results					
		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	24.9	62.3

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 33.15 G
Prep Final Vol: 10 mL

Analyst: FS

NC Certification #481

Reviewed By: CE
DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT05 (0-2)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-5D
Lab Project ID: G128-2299

Date Collected: 1/8/2009 15:30
Date Received: 1/9/2009
Matrix: Soil
Solids 84.53
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	19.3	7.08	mg/Kg	1	01/13/09 14:07

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	30.9	77.2

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 33.41 G
Prep Final Vol: 10 mL

Analyst: FT

NC Certification #481

Reviewed By: ME
DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT06 (2-4)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-6D
Lab Project ID: G128-2299

Date Collected: 1/8/2009 15:45
Date Received: 1/9/2009
Matrix: Soil
Solids 84.78
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.06	mg/Kg	1	01/13/09 14:35

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	27.2	68.1

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 33.41 G
Prep Final Vol: 10 mL

Analyst: FD

NC Certification #481

Reviewed By: FD
DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT07 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-7D
Lab Project ID: G128-2299

Date Collected: 1/9/2009 10:35
Date Received: 1/9/2009
Matrix: Soil
Solids 84.91
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	84.1	7.02	mg/Kg	1	01/13/09 15:03

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	28.3	70.7

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 33.55 G
Prep Final Vol: 10 mL

Analyst: DTF

NC Certification #481

Reviewed By: [Signature]
DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT08 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-8D
Lab Project ID: G128-2299

Date Collected: 1/9/2009 10:50
Date Received: 1/9/2009
Matrix: Soil
Solids 82.44
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	432	35.9	mg/Kg	5	01/14/09 13:12

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	37	92.6

Comments:

Batch Information

Analytical Batch: EP011409
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 33.76 G
Prep Final Vol: 10 mL

Analyst: FS

NC Certification #481

Reviewed By: FS
DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT09 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-9D
Lab Project ID: G128-2299

Date Collected: 1/9/2009 11:20
Date Received: 1/9/2009
Matrix: Soil
Solids 77.80
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.91	mg/Kg	1	01/13/09 15:59

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	25.7	64.2

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 32.5 G
Prep Final Vol: 10 mL

Analyst: FD

NC Certification #481

Reviewed By: ME
DRO.XLS
Page 24 of 29

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT10 (1-2)

Client Project ID: LCH-4023 CSA

Lab Sample ID: G128-2299-10D

Lab Project ID: G128-2299

Date Collected: 1/9/2009 11:40

Date Received: 1/9/2009

Matrix: Soil

Solids 85.53

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	8.69	7.19	mg/Kg	1	01/13/09 16:27

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	28.1	70.2

Comments:

Batch Information

Analytical Batch: EP011309

Analytical Method: 8015

Instrument: GC6

Analyst: DTF

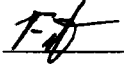
Prep batch: 13417

Prep Method: 3541

Prep Date: 01/12/09

Initial Prep Wt/Vol: 32.54 G

Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

Reviewed By: 

DRO.XLS

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT11 (1-3)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-11D
Lab Project ID: G128-2299

Date Collected: 1/9/2009 11:55
Date Received: 1/9/2009
Matrix: Soil
Solids 84.07
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.34	mg/Kg	1	01/13/09 16:55

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	28.4	71

Comments:

Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 32.41 G
Prep Final Vol: 10 mL

Analyst: Ed

NC Certification #481

Reviewed By: [Signature]
DRO.XLS
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-DPT12 (0-2)
Client Project ID: LCH-4023 CSA
Lab Sample ID: G128-2299-12D
Lab Project ID: G128-2299

Date Collected: 1/9/2009 12:10
Date Received: 1/9/2009
Matrix: Soil
Solids 85.38
Report Basis: Dry Weight

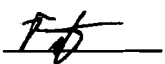
Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.30	mg/Kg	1	01/13/09 17:23
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	27	67.6

Comments:

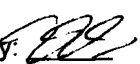
Batch Information

Analytical Batch: EP011309
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13417
Prep Method: 3541
Prep Date: 01/12/09
Initial Prep Wt/Vol: 32.11 G
Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

Reviewed By: 
DRO.XLS
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SGS Environmental Services Inc.
CHAIN OF CUSTODY RECORD

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• West Virginia

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1 CLIENT: <u>CATLIN</u>					SGS Reference #: <u>G128-2299</u>					page <u>1</u> of <u>2</u>								
CONTACT: <u>Steve Hudson</u> PHONE NO: <u>910-452-5861</u>					# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used											
PROJECT: <u>LCH-4023 CSA</u> SITE/PWSID#: <u>208-018</u>							Analysis Required											
REPORTS TO: <u>Steve Hudson @ Catlin</u> EMAIL:							3											
INVOICE TO: <u>Sheila @ Catlin</u> QUOTE #: <u>DOD-101</u> P.O. #: <u>290107-4</u>																		
2	LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE													REMARKS/LOC ID
		<u>LCH4023-DPT01 (1-3)</u>	<u>1-8-08</u>	<u>13:30</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										
		<u>LCH4023-DPT02 (1-3)</u>	<u>1-8-08</u>	<u>14:00</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										<u>- lajuene a</u>
		<u>LCH4023-DPT03 (1-3)</u>	<u>1-8-08</u>	<u>14:20</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										<u>summary</u>
		<u>LCH4023-DPT04 (1-3)</u>	<u>1-8-08</u>	<u>14:45</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										<u>EDD format</u>
		<u>LCH4023-DPT05 (0-2)</u>	<u>1-8-08</u>	<u>15:30</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										<u>- report low</u>
		<u>LCH4023-DPT06 (2-4)</u>	<u>1-8-08</u>	<u>15:45</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										
		<u>LCH4023-DPT07 (1-3)</u>	<u>1-9-08</u>	<u>10:35</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										
		<u>LCH4023-DPT08 (1-3)</u>	<u>1-9-08</u>	<u>10:50a</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										
		<u>LCH4023-DPT09 (1-3)</u>	<u>1-9-08</u>	<u>11:20a</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										
		<u>LCH4023-DPT10 (1-2)</u>	<u>1-9-08</u>	<u>11:40a</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>										
5	Collected/Relinquished By: (1) <u>Tam STE</u>		Date <u>1/7/09</u>	Time <u>1525</u>	Received By: <u>John</u>		4		DOD Project? YES NO		Special Deliverable Requirements:							
	Relinquished By: (2)		Date <u>1/9/09</u>	Time <u>11:55</u>	Received By: <u>[Signature]</u>				Cooler ID		Requested Turnaround Time and-or Special Instructions: <u>Standard</u>							
	Relinquished By: (3)		Date	Time	Received By:				Samples Received Cold? <u>YES</u> NO		Chain of Custody Seal: (Circle) INTACT BROKEN <u>ABSENT</u>							
	Relinquished By: (4)		Date	Time	Received For Laboratory By:				Temperature °C: <u>4.3°C</u>									

SGS Environmental Services, Inc.

Steve Hudson
Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

Report Number: G128-2310

Client Project: LCH-4023

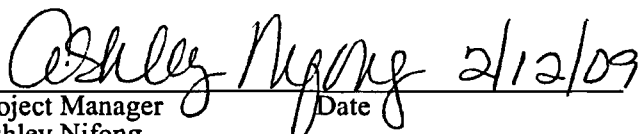
Dear Steve Hudson,

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or the services performed during this project, please call SGS Environmental Services at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS Environmental Services for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
SGS Environmental Services, Inc.


Project Manager Date
Ashley Nifong

List of Reporting Abbreviations
And Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantification Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL/CL = Reporting Limit / Control Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW01 (0-2)

Client Project ID: LCH-4023

Lab Sample ID: G128-2310-1A

Lab Project ID: G128-2310

Report Basis: Dry Weight

Analyzed By: DVG

Date Collected: 1/30/2009 10:20

Date Received: 2/4/2009

Matrix: Soil

Solids 86.62

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.53	mg/Kg	1	02/06/09 16:30

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	96	96.5		70-130

Comments:

Batch Information

Analytical Batch: VP020609

Analytical Method: 8015

Instrument ID: GC4

Analyst: DVG

Prep Method: 5035

Initial Wt/Vol: 6.26 g

Final Volume: 5 mL

Analyst: DVG

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW02 (0-2)
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-2A
Lab Project ID: G128-2310
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/30/2009 12:30
Date Received: 2/4/2009
Matrix: Soil
Solids 85.43

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.32	mg/Kg	1	02/06/09 16:56

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	96	95.8		70-130

Comments:

Batch Information

Analytical Batch: VP020609
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.6 g
Final Volume: 5 mL

Analyst: DVG

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW03 (0-2)
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-3A
Lab Project ID: G128-2310
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 2/2/2009 11:20
Date Received: 2/4/2009
Matrix: Soil
Solids 86.90

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.78	mg/Kg	1	02/06/09 17:22

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	96	96.2		70-130

Comments:

Batch Information

Analytical Batch: VP020609
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 5.97 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481
N.C. Certification #481

Reviewed By: [Signature]
Page 5 of 15 ^{GRO}

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW04 (0-2)

Client Project ID: LCH-4023

Lab Sample ID: G128-2310-4A

Lab Project ID: G128-2310

Report Basis: Dry Weight

Analyzed By: DVG

Date Collected: 2/2/2009 13:00

Date Received: 2/4/2009

Matrix: Soil

Solids 84.04

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.79	mg/Kg	1	02/06/09 17:49

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	99	98.6		70-130

Comments:

Batch Information

Analytical Batch: VP020609
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.17 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481
N.C. Certification #481

Reviewed By: [Signature]
Page 6 of 15 GRO

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW05 (0-2)
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-5A
Lab Project ID: G128-2310
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 2/2/2009 14:40
Date Received: 2/4/2009
Matrix: Soil
Solids 86.91

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	18.0	4.94	mg/Kg	1	02/06/09 18:15

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	108	108		70-130

Comments:

Batch Information

Analytical Batch: VP020609
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 6.99 g
Final Volume: 5 mL

Analyst: DVG

NC Certification #481
N.C. Certification #481

Reviewed By: DVG
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW03 (0-2) DUP
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-6A
Lab Project ID: G128-2310
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 2/2/2009 11:20
Date Received: 2/4/2009
Matrix: Soil
Solids 86.16

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.85	mg/Kg	1	02/06/09 18:42

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	100	99.8		70-130

Comments:

Batch Information

Analytical Batch: VP020609
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVG

Prep Method: 5035
Initial Wt/Vol: 5.95 g
Final Volume: 5 mL

Analyst: DVG

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW01 (0-2)

Client Project ID: LCH-4023

Lab Sample ID: G128-2310-1D

Lab Project ID: G128-2310

Date Collected: 1/30/2009 10:20

Date Received: 2/4/2009

Matrix: Soil

Solids 86.62

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	15.6	7.13	mg/Kg	1	02/05/09 17:44

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	28.3	70.8

Comments:

Batch Information

Analytical Batch: EP020509
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13598
Prep Method: 3541
Prep Date: 02/05/09
Initial Prep Wt/Vol: 32.4 G
Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

N.C. Certification #481

Reviewed By: 

DRO.XLS
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW02 (0-2)

Date Collected: 1/30/2009 12:30

Client Project ID: LCH-4023

Date Received: 2/4/2009

Lab Sample ID: G128-2310-2D

Matrix: Soil

Lab Project ID: G128-2310

Solids 85.43

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.01	mg/Kg	1	02/05/09 18:12

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	29.4	73.6

Comments:

Batch Information

Analytical Batch: EP020509
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13598
Prep Method: 3541
Prep Date: 02/05/09
Initial Prep Wt/Vol: 33.42 G
Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS
Page 10 of 15

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW03 (0-2)
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-3D
Lab Project ID: G128-2310

Date Collected: 2/2/2009 11:20
Date Received: 2/4/2009
Matrix: Soil
Solids 86.90
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	6.77	mg/Kg	1	02/05/09 18:40
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	29.9	74.6

Comments:

Batch Information

Analytical Batch: EP020509
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13598
Prep Method: 3541
Prep Date: 02/05/09
Initial Prep Wt/Vol: 34.01 G
Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS
Page 11 of 15

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW04 (0-2)

Client Project ID: LCH-4023

Lab Sample ID: G128-2310-4D

Lab Project ID: G128-2310

Date Collected: 2/2/2009 13:00

Date Received: 2/4/2009

Matrix: Soil

Solids 84.04

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	11.0	6.93	mg/Kg	1	02/05/09 19:08

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	24.3	60.9

Comments:

Batch Information

Analytical Batch: EP020509
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13598
Prep Method: 3541
Prep Date: 02/05/09
Initial Prep Wt/Vol: 34.35 G
Prep Final Vol: 10 mL

Analyst: Gu

NC Certification #481

N.C. Certification #481

Reviewed By: [Signature]

DRO.XLS
Page 12 of 15

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW05 (0-2)
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-5D
Lab Project ID: G128-2310

Date Collected: 2/2/2009 14:40
Date Received: 2/4/2009
Matrix: Soil
Solids 86.91
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	120	6.77	mg/Kg	1	02/05/09 19:36

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	29.2	73.1

Comments:

Batch Information

Analytical Batch: EP020509
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13598
Prep Method: 3541
Prep Date: 02/05/09
Initial Prep Wt/Vol: 34.01 G
Prep Final Vol: 10 mL

Analyst: 

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS
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SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: USTLCH4023-MW03 (0-2) DUP
Client Project ID: LCH-4023
Lab Sample ID: G128-2310-6D
Lab Project ID: G128-2310

Date Collected: 2/2/2009 11:20
Date Received: 2/4/2009
Matrix: Soil
Solids 86.16
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.21	mg/Kg	1	02/05/09 20:03

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	27.7	69.2

Comments:

Batch Information

Analytical Batch: EP020509
Analytical Method: 8015
Instrument: GC6
Analyst: DTF

Prep batch: 13598
Prep Method: 3541
Prep Date: 02/05/09
Initial Prep Wt/Vol: 32.21 G
Prep Final Vol: 10 mL

Analyst: *Gu*

NC Certification #481

N.C. Certification #481

Reviewed By: *[Signature]*
DRO.XLS
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SGS Environmental Services Inc.
CHAIN OF CUSTODY RECORD

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1 CLIENT: <u>Catlin</u>					SGS Reference #: <u>6128-2310</u>					page <u>1</u> of <u>1</u>	
CONTACT: <u>Steve Hudson</u> PHONE NO: <u>910-452-5861</u>					# CONTAINERS SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples Preservatives Used Analysis Required <u>3</u> <u>EPA 5030/9015 (TPH GAO)</u> <u>EPA 3550/5015 (TPH DAO)</u>						
PROJECT: <u>LCH-4023</u> SITE/PWSID#:											
REPORTS TO: <u>Steve Hudson @ Catlin</u> EMAIL:											
INVOICE TO: <u>Sheila @ Catlin</u> QUOTE #: <u>DOD101</u> P.O. #: <u>290204-1</u>											
LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE							REMARKS/LOC ID
	<u>USTLCH4023-MW01 (0-2)</u>	<u>1-30-09</u>	<u>10:20a</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>	<u>✓</u>			
	<u>USTLCH4023-MW02 (0-2)</u>	<u>1-30-09</u>	<u>12:30</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>	<u>✓</u>			<u>- lejeune and</u>
	<u>USTLCH4023-MW03 (0-2)</u>	<u>2-2-09</u>	<u>11:20a</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>	<u>✓</u>			<u>summary</u>
	<u>USTLCH4023-MW04 (0-2)</u>	<u>2-2-09</u>	<u>13:00</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>	<u>✓</u>			<u>format.</u>
	<u>USTLCH4023-MW05 (0-2)</u>	<u>2-2-09</u>	<u>14:40</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>	<u>✓</u>			<u>- report low results</u>
	<u>USTLCH4023-MW03(0-2) DUP</u>	<u>2-2-09</u>	<u>11:20a</u>	<u>S</u>	<u>3</u>	<u>G</u>	<u>✓</u>	<u>✓</u>			
5 Collected/Relinquished By: (1) <u>Tom Stitt</u> Date <u>2/4/09</u> Time <u>09:12</u> Received By: <u>[Signature]</u>					4 DOD Project? YES NO Cooler ID _____					Special Deliverable Requirements:	
Relinquished By: (2)					Requested Turnaround Time and-or Special Instructions: <u>Standard</u>						
Relinquished By: (3)					Samples Received Cold? <u>YES</u> NO Cooler TB					Chain of Custody Seal: (Circle) INTACT BROKEN <u>ABSENT</u>	
Relinquished By: (4)					Temperature °C: <u>3.6</u>						

SGS Environmental Services, Inc.

Steve Hudson
Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

Report Number: G128-2312

Client Project: LCH-4023

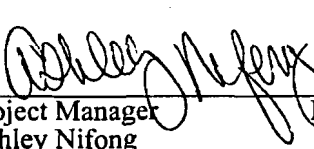
Dear Steve Hudson,

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or the services performed during this project, please call SGS Environmental Services at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS Environmental Services for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
SGS Environmental Services, Inc.

 2/20/09
Project Manager Date
Ashley Nifong

List of Reporting Abbreviations
And Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantification Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL/CL = Reporting Limit / Control Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.

SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW01

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 13:30

Lab Sample ID: G128-2312-1A

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.428	1	2/16/2009	
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/16/2009	
Ethylbenzene	BQL	1.00	0.341	1	2/16/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/16/2009	
Toluene	BQL	1.00	0.404	1	2/16/2009	
m/p-Xylene	BQL	2.00	0.671	1	2/16/2009	
o-Xylene	BQL	1.00	0.302	1	2/16/2009	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.5	101

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW02

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 13:00

Lab Sample ID: G128-2312-2A

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.428	1	2/16/2009	
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/16/2009	
Ethylbenzene	BQL	1.00	0.341	1	2/16/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/16/2009	
Toluene	BQL	1.00	0.404	1	2/16/2009	
m/p-Xylene	BQL	2.00	0.671	1	2/16/2009	
o-Xylene	BQL	1.00	0.302	1	2/16/2009	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.9	102

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW03

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 14:15

Lab Sample ID: G128-2312-3A

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.428	1	2/16/2009	
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/16/2009	
Ethylbenzene	BQL	1.00	0.341	1	2/16/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/16/2009	
Toluene	BQL	1.00	0.404	1	2/16/2009	
m/p-Xylene	BQL	2.00	0.671	1	2/16/2009	
o-Xylene	BQL	1.00	0.302	1	2/16/2009	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.6	101

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.



SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW04

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 13:45

Lab Sample ID: G128-2312-4B

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.428	1	2/17/2009	
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/17/2009	
Ethylbenzene	BQL	1.00	0.341	1	2/17/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/17/2009	
Toluene	BQL	1.00	0.404	1	2/17/2009	
m/p-Xylene	BQL	2.00	0.671	1	2/17/2009	
o-Xylene	BQL	1.00	0.302	1	2/17/2009	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	41.5	104

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Reviewed By: 
GC5_WA
Page 6 of 28

SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW05

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 14:45

Lab Sample ID: G128-2312-5A

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	0.689	1.00	0.428	1	2/16/2009	J
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/16/2009	
Ethylbenzene	29.0	1.00	0.341	1	2/16/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/16/2009	
Toluene	BQL	1.00	0.404	1	2/16/2009	
m/p-Xylene	5.39	2.00	0.671	1	2/16/2009	
o-Xylene	0.823	1.00	0.302	1	2/16/2009	J

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	42.0	105

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Reviewed By: 
 Page 7 of 28

SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW05 DUP

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 14:45

Lab Sample ID: G128-2312-6B

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	0.638	1.00	0.428	1	2/17/2009	J
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/17/2009	
Ethylbenzene	29.7	1.00	0.341	1	2/17/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/17/2009	
Toluene	BQL	1.00	0.404	1	2/17/2009	
m/p-Xylene	5.45	2.00	0.671	1	2/17/2009	
o-Xylene	0.308	1.00	0.302	1	2/17/2009	J

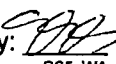
Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	42.0	105

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Reviewed By: 
GC5 WA
Page 8 of 28

SGS Environmental Services, Inc.

Results for Volatiles

by GC 602

Client Sample ID: USTLCH4023-MW06

Analyzed By: RSB

Client Project ID: LCH-4023

Date Collected: 2/9/2009 14:00

Lab Sample ID: G128-2312-7B

Date Received: 2/10/2009

Lab Project ID: G128-2312

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.428	1	2/17/2009	
Diisopropyl ether (DIPE)	BQL	1.00	0.391	1	2/17/2009	
Ethylbenzene	BQL	1.00	0.341	1	2/17/2009	
Methyl-tert butyl ether (MTBE)	BQL	1.00	0.778	1	2/17/2009	
Toluene	BQL	1.00	0.404	1	2/17/2009	
m/p-Xylene	0.761	2.00	0.671	1	2/17/2009	J
o-Xylene	BQL	1.00	0.302	1	2/17/2009	

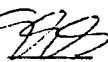
Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	41.5	104

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Reviewed By: 
 Page 9 of 28

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW01
 Client Project ID: LCH-4023
 Lab Sample ID: G128-2312-1F
 Lab Project ID: G128-2312

Analyzed By: DCS
 Date Collected: 2/9/2009 13:30
 Date Received: 2/10/2009
 Date Extracted: 2/12/2009
 Matrix: Water

Initial/Final Amt: 970 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	5.15	0.768	1	2/14/2009	
Acenaphthylene	BQL	5.15	0.768	1	2/14/2009	
Anthracene	BQL	5.15	0.902	1	2/14/2009	
Benzo[a]anthracene	BQL	5.15	0.701	1	2/14/2009	
Benzo[a]pyrene	BQL	5.15	0.655	1	2/14/2009	
Benzo[b]fluoranthene	BQL	5.15	0.737	1	2/14/2009	
Benzo[g,h,i]perylene	BQL	5.15	0.634	1	2/14/2009	
Benzo[k]fluoranthene	BQL	5.15	0.567	1	2/14/2009	
Bis(2-chloroethoxy)methane	BQL	5.15	1.06	1	2/14/2009	
Bis(2-chloroethyl)ether	BQL	5.15	1.07	1	2/14/2009	
Bis(2-chloroisopropyl)ether	BQL	5.15	1.01	1	2/14/2009	
Bis(2-ethylhexyl)phthalate	BQL	5.15	0.423	1	2/14/2009	
4-bromophenyl phenyl ether	BQL	5.15	0.804	1	2/14/2009	
Butylbenzylphthalate	BQL	5.15	0.459	1	2/14/2009	
2-Chloronaphthalene	BQL	5.15	0.892	1	2/14/2009	
2-Chlorophenol	BQL	5.15	1.21	1	2/14/2009	
4-Chloro-3-methylphenol	BQL	5.15	0.820	1	2/14/2009	
4-Chlorophenyl phenyl ether	BQL	5.15	3.36	1	2/14/2009	
Chrysene	BQL	5.15	0.572	1	2/14/2009	
Dibenzo[a,h]anthracene	BQL	5.15	0.454	1	2/14/2009	
Di-n-Butylphthalate	BQL	5.15	0.851	1	2/14/2009	
3,3'-Dichlorobenzidine	BQL	10.3	1.26	1	2/14/2009	
2,4-Dichlorophenol	BQL	5.15	1.15	1	2/14/2009	
Diethylphthalate	BQL	5.15	0.763	1	2/14/2009	
Dimethylphthalate	BQL	5.15	0.572	1	2/14/2009	
2,4-Dimethylphenol	BQL	5.15	1.67	1	2/14/2009	
Di-n-octylphthalate	BQL	5.15	0.598	1	2/14/2009	
4,6-Dinitro-2-methylphenol	BQL	25.8	0.567	1	2/14/2009	
2,4-Dinitrophenol	BQL	25.8	0.660	1	2/14/2009	
2,4-Dinitrotoluene	BQL	5.15	0.552	1	2/14/2009	
2,6-Dinitrotoluene	BQL	5.15	0.670	1	2/14/2009	
Diphenylamine *	BQL	5.15	0.588	1	2/14/2009	
Fluoranthene	BQL	5.15	0.727	1	2/14/2009	
Fluorene	BQL	5.15	0.747	1	2/14/2009	
Hexachlorobenzene	BQL	5.15	0.521	1	2/14/2009	
Hexachlorobutadiene	BQL	5.15	0.784	1	2/14/2009	
Hexachlorocyclopentadiene	BQL	10.3	10.3	1	2/14/2009	
Hexachloroethane	BQL	5.15	0.768	1	2/14/2009	
Indeno(1,2,3-c,d)pyrene	BQL	5.15	2.36	1	2/14/2009	
Isophorone	BQL	5.15	0.912	1	2/14/2009	
Naphthalene	BQL	5.15	0.938	1	2/14/2009	
Nitrobenzene	BQL	5.15	1.08	1	2/14/2009	
2-Nitrophenol	BQL	5.15	1.27	1	2/14/2009	
4-Nitrophenol	BQL	25.8	1.11	1	2/14/2009	
N-Nitrosodi-n-propylamine	BQL	5.15	1.55	1	2/14/2009	
Pentachlorophenol	BQL	25.8	1.46	1	2/14/2009	
Phenanthrene	BQL	5.15	0.459	1	2/14/2009	

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW01
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-1F
Lab Project ID: G128-2312

Analyzed By: DCS
Date Collected: 2/9/2009 13:30
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Matrix: Water

Initial/Final Amt: 970 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Phenol	BQL	5.15	1.09	1	2/14/2009	
Pyrene	BQL	5.15	2.13	1	2/14/2009	
1,2,4-Trichlorobenzene	BQL	5.15	0.742	1	2/14/2009	
2,4,6-Trichlorophenol	BQL	5.15	0.954	1	2/14/2009	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	9.4	94		
2-Fluorophenol		10	8.9	89		
Nitrobenzene-d5		10	10.7	107		
Phenol-d6		10	9.1	91		
2,4,6-Tribromophenol		10	8.3	83		
4-Terphenyl-d14		10	6.1	61		

Comments:

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTLCH4023-MW01
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-1F
Lab Project ID: G128-2312
Sample Wt/Vol: 970 ML
Dilution: 1

Analyzed By: DES
Date Collected: 2/9/2009 13:30
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Date Analyzed: 2/14/2009
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result ug/L
	No TIC's present				

Comment:

Tentatively Identified Compound (TIC) refers to substances which are not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist.

Quantitation is accomplished by relative peak area of the compound compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is equal to or greater than 10% of that of the nearest internal standard. Quantitation provided is an estimate.

Reviewed by: 

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW02
 Client Project ID: LCH-4023
 Lab Sample ID: G128-2312-2F
 Lab Project ID: G128-2312

Analyzed By: DCS
 Date Collected: 2/9/2009 13:00
 Date Received: 2/10/2009
 Date Extracted: 2/12/2009
 Matrix: Water

Initial/Final Amt: 952 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	5.25	0.783	1	2/14/2009	
Acenaphthylene	BQL	5.25	0.783	1	2/14/2009	
Anthracene	BQL	5.25	0.919	1	2/14/2009	
Benzo[a]anthracene	BQL	5.25	0.714	1	2/14/2009	
Benzo[a]pyrene	BQL	5.25	0.667	1	2/14/2009	
Benzo[b]fluoranthene	BQL	5.25	0.751	1	2/14/2009	
Benzo[g,h,i]perylene	BQL	5.25	0.646	1	2/14/2009	
Benzo[k]fluoranthene	BQL	5.25	0.578	1	2/14/2009	
Bis(2-chloroethoxy)methane	BQL	5.25	1.08	1	2/14/2009	
Bis(2-chloroethyl)ether	BQL	5.25	1.09	1	2/14/2009	
Bis(2-chloroisopropyl)ether	BQL	5.25	1.02	1	2/14/2009	
Bis(2-ethylhexyl)phthalate	BQL	5.25	0.431	1	2/14/2009	
4-bromophenyl phenyl ether	BQL	5.25	0.819	1	2/14/2009	
Butylbenzylphthalate	BQL	5.25	0.467	1	2/14/2009	
2-Chloronaphthalene	BQL	5.25	0.909	1	2/14/2009	
2-Chlorophenol	BQL	5.25	1.23	1	2/14/2009	
4-Chloro-3-methylphenol	BQL	5.25	0.835	1	2/14/2009	
4-Chlorophenyl phenyl ether	BQL	5.25	3.42	1	2/14/2009	
Chrysene	BQL	5.25	0.583	1	2/14/2009	
Dibenzo[a,h]anthracene	BQL	5.25	0.462	1	2/14/2009	
Di-n-Butylphthalate	BQL	5.25	0.867	1	2/14/2009	
3,3'-Dichlorobenzidine	BQL	10.5	1.28	1	2/14/2009	
2,4-Dichlorophenol	BQL	5.25	1.18	1	2/14/2009	
Diethylphthalate	BQL	5.25	0.777	1	2/14/2009	
Dimethylphthalate	BQL	5.25	0.583	1	2/14/2009	
2,4-Dimethylphenol	BQL	5.25	1.70	1	2/14/2009	
Di-n-octylphthalate	BQL	5.25	0.609	1	2/14/2009	
4,6-Dinitro-2-methylphenol	BQL	26.3	0.578	1	2/14/2009	
2,4-Dinitrophenol	BQL	26.3	0.672	1	2/14/2009	
2,4-Dinitrotoluene	BQL	5.25	0.562	1	2/14/2009	
2,6-Dinitrotoluene	BQL	5.25	0.683	1	2/14/2009	
Diphenylamine *	BQL	5.25	0.599	1	2/14/2009	
Fluoranthene	BQL	5.25	0.741	1	2/14/2009	
Fluorene	BQL	5.25	0.762	1	2/14/2009	
Hexachlorobenzene	BQL	5.25	0.530	1	2/14/2009	
Hexachlorobutadiene	BQL	5.25	0.798	1	2/14/2009	
Hexachlorocyclopentadiene	BQL	10.5	10.5	1	2/14/2009	
Hexachloroethane	BQL	5.25	0.783	1	2/14/2009	
Indeno(1,2,3-c,d)pyrene	BQL	5.25	2.40	1	2/14/2009	
Isophorone	BQL	5.25	0.930	1	2/14/2009	
Naphthalene	6.62	5.25	0.956	1	2/14/2009	
Nitrobenzene	BQL	5.25	1.10	1	2/14/2009	
2-Nitrophenol	BQL	5.25	1.29	1	2/14/2009	
4-Nitrophenol	BQL	26.3	1.13	1	2/14/2009	
N-Nitrosodi-n-propylamine	BQL	5.25	1.58	1	2/14/2009	
Pentachlorophenol	BQL	26.3	1.49	1	2/14/2009	
Phenanthrene	BQL	5.25	0.467	1	2/14/2009	

SGS Environmental Services, Inc.

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTLCH4023-MW02
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-2F
Lab Project ID: G128-2312

Analyzed By: DCS
Date Collected: 2/9/2009 13:00
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Matrix: Water

Initial/Final Amt: 952 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Phenol	BQL	5.25	1.11	1	2/14/2009	
Pyrene	BQL	5.25	2.17	1	2/14/2009	
1,2,4-Trichlorobenzene	BQL	5.25	0.756	1	2/14/2009	
2,4,6-Trichlorophenol	BQL	5.25	0.972	1	2/14/2009	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	8.9	89		
2-Fluorophenol		10	7.6	76		
Nitrobenzene-d5		10	10.5	105		
Phenol-d6		10	8.6	86		
2,4,6-Tribromophenol		10	8.3	83		
4-Terphenyl-d14		10	9.2	92		

Comments:

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 



Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTLCH4023-MW02
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-2F
Lab Project ID: G128-2312
Sample Wt/Vol: 952 ML
Dilution: 1

Analyzed By: DES
Date Collected: 2/9/2009 13:00
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Date Analyzed: 2/14/2009
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result ug/L
	No TIC's present				

Comment:

Tentatively Identified Compound (TIC) refers to substances which are not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist.

Quantitation is accomplished by relative peak area of the compound compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is equal to or greater than 10% of that of the nearest internal standard. Quantitation provided is an estimate.

Reviewed by: 

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW03
 Client Project ID: LCH-4023
 Lab Sample ID: G128-2312-3F
 Lab Project ID: G128-2312

Analyzed By: DCS
 Date Collected: 2/9/2009 14:15
 Date Received: 2/10/2009
 Date Extracted: 2/12/2009
 Matrix: Water

Initial/Final Amt: 960 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	5.21	0.776	1	2/14/2009	
Acenaphthylene	BQL	5.21	0.776	1	2/14/2009	
Anthracene	BQL	5.21	0.911	1	2/14/2009	
Benzo[a]anthracene	BQL	5.21	0.708	1	2/14/2009	
Benzo[a]pyrene	BQL	5.21	0.661	1	2/14/2009	
Benzo[b]fluoranthene	BQL	5.21	0.745	1	2/14/2009	
Benzo[g,h,i]perylene	BQL	5.21	0.641	1	2/14/2009	
Benzo[k]fluoranthene	BQL	5.21	0.573	1	2/14/2009	
Bis(2-chloroethoxy)methane	BQL	5.21	1.07	1	2/14/2009	
Bis(2-chloroethyl)ether	BQL	5.21	1.08	1	2/14/2009	
Bis(2-chloroisopropyl)ether	BQL	5.21	1.02	1	2/14/2009	
Bis(2-ethylhexyl)phthalate	BQL	5.21	0.427	1	2/14/2009	
4-bromophenyl phenyl ether	BQL	5.21	0.812	1	2/14/2009	
Butylbenzylphthalate	BQL	5.21	0.464	1	2/14/2009	
2-Chloronaphthalene	BQL	5.21	0.901	1	2/14/2009	
2-Chlorophenol	BQL	5.21	1.22	1	2/14/2009	
4-Chloro-3-methylphenol	BQL	5.21	0.828	1	2/14/2009	
4-Chlorophenyl phenyl ether	BQL	5.21	3.39	1	2/14/2009	
Chrysene	BQL	5.21	0.578	1	2/14/2009	
Dibenzo[a,h]anthracene	BQL	5.21	0.458	1	2/14/2009	
Di-n-Butylphthalate	BQL	5.21	0.859	1	2/14/2009	
3,3'-Dichlorobenzidine	BQL	10.4	1.27	1	2/14/2009	
2,4-Dichlorophenol	BQL	5.21	1.17	1	2/14/2009	
Diethylphthalate	BQL	5.21	0.771	1	2/14/2009	
Dimethylphthalate	BQL	5.21	0.578	1	2/14/2009	
2,4-Dimethylphenol	BQL	5.21	1.69	1	2/14/2009	
Di-n-octylphthalate	BQL	5.21	0.604	1	2/14/2009	
4,6-Dinitro-2-methylphenol	BQL	26.0	0.573	1	2/14/2009	
2,4-Dinitrophenol	BQL	26.0	0.667	1	2/14/2009	
2,4-Dinitrotoluene	BQL	5.21	0.557	1	2/14/2009	
2,6-Dinitrotoluene	BQL	5.21	0.677	1	2/14/2009	
Diphenylamine *	BQL	5.21	0.594	1	2/14/2009	
Fluoranthene	BQL	5.21	0.734	1	2/14/2009	
Fluorene	BQL	5.21	0.755	1	2/14/2009	
Hexachlorobenzene	BQL	5.21	0.526	1	2/14/2009	
Hexachlorobutadiene	BQL	5.21	0.792	1	2/14/2009	
Hexachlorocyclopentadiene	BQL	10.4	10.4	1	2/14/2009	
Hexachloroethane	BQL	5.21	0.776	1	2/14/2009	
Indeno(1,2,3-c,d)pyrene	BQL	5.21	2.38	1	2/14/2009	
Isophorone	BQL	5.21	0.922	1	2/14/2009	
Naphthalene	BQL	5.21	0.948	1	2/14/2009	
Nitrobenzene	BQL	5.21	1.09	1	2/14/2009	
2-Nitrophenol	BQL	5.21	1.28	1	2/14/2009	
4-Nitrophenol	BQL	26.0	1.13	1	2/14/2009	
N-Nitrosodi-n-propylamine	BQL	5.21	1.56	1	2/14/2009	
Pentachlorophenol	BQL	26.0	1.47	1	2/14/2009	
Phenanthrene	BQL	5.21	0.464	1	2/14/2009	

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW03
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-3F
Lab Project ID: G128-2312

Analyzed By: DCS
Date Collected: 2/9/2009 14:15
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Matrix: Water

Initial/Final Amt: 960 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Phenol	BQL	5.21	1.10	1	2/14/2009	
Pyrene	BQL	5.21	2.15	1	2/14/2009	
1,2,4-Trichlorobenzene	BQL	5.21	0.750	1	2/14/2009	
2,4,6-Trichlorophenol	BQL	5.21	0.964	1	2/14/2009	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	9.4	94		
2-Fluorophenol		10	8.5	85		
Nitrobenzene-d5		10	10.9	109		
Phenol-d6		10	9.4	94		
2,4,6-Tribromophenol		10	8.3	83		
4-Terphenyl-d14		10	6.7	67		

Comments:

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTLCH4023-MW03
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-3F
Lab Project ID: G128-2312
Sample Wt/Vol: 960 ML
Dilution: 1

Analyzed By: DES
Date Collected: 2/9/2009 14:15
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Date Analyzed: 2/14/2009
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result ug/L
	No TIC's present				

Comment:

Tentatively Identified Compound (TIC) refers to substances which are not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist.

Quantitation is accomplished by relative peak area of the compound compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is equal to or greater than 10% of that of the nearest internal standard. Quantitation provided is an estimate.

Reviewed by: 

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW04
 Client Project ID: LCH-4023
 Lab Sample ID: G128-2312-4F
 Lab Project ID: G128-2312

Analyzed By: DCS
 Date Collected: 2/9/2009 13:45
 Date Received: 2/10/2009
 Date Extracted: 2/12/2009
 Matrix: Water

Initial/Final Amt: 942 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	5.31	0.791	1	2/14/2009	
Acenaphthylene	BQL	5.31	0.791	1	2/14/2009	
Anthracene	BQL	5.31	0.929	1	2/14/2009	
Benzo[a]anthracene	BQL	5.31	0.722	1	2/14/2009	
Benzo[a]pyrene	BQL	5.31	0.674	1	2/14/2009	
Benzo[b]fluoranthene	BQL	5.31	0.759	1	2/14/2009	
Benzo[g,h,i]perylene	BQL	5.31	0.653	1	2/14/2009	
Benzo[k]fluoranthene	BQL	5.31	0.584	1	2/14/2009	
Bis(2-chloroethoxy)methane	BQL	5.31	1.09	1	2/14/2009	
Bis(2-chloroethyl)ether	BQL	5.31	1.10	1	2/14/2009	
Bis(2-chloroisopropyl)ether	BQL	5.31	1.04	1	2/14/2009	
Bis(2-ethylhexyl)phthalate	BQL	5.31	0.435	1	2/14/2009	
4-bromophenyl phenyl ether	BQL	5.31	0.828	1	2/14/2009	
Butylbenzylphthalate	BQL	5.31	0.472	1	2/14/2009	
2-Chloronaphthalene	BQL	5.31	0.918	1	2/14/2009	
2-Chlorophenol	BQL	5.31	1.24	1	2/14/2009	
4-Chloro-3-methylphenol	BQL	5.31	0.844	1	2/14/2009	
4-Chlorophenyl phenyl ether	BQL	5.31	3.46	1	2/14/2009	
Chrysene	BQL	5.31	0.589	1	2/14/2009	
Dibenzo[a,h]anthracene	BQL	5.31	0.467	1	2/14/2009	
Di-n-Butylphthalate	BQL	5.31	0.876	1	2/14/2009	
3,3'-Dichlorobenzidine	BQL	10.6	1.30	1	2/14/2009	
2,4-Dichlorophenol	BQL	5.31	1.19	1	2/14/2009	
Diethylphthalate	BQL	5.31	0.786	1	2/14/2009	
Dimethylphthalate	BQL	5.31	0.589	1	2/14/2009	
2,4-Dimethylphenol	BQL	5.31	1.72	1	2/14/2009	
Di-n-octylphthalate	BQL	5.31	0.616	1	2/14/2009	
4,6-Dinitro-2-methylphenol	BQL	26.5	0.584	1	2/14/2009	
2,4-Dinitrophenol	BQL	26.5	0.679	1	2/14/2009	
2,4-Dinitrotoluene	BQL	5.31	0.568	1	2/14/2009	
2,6-Dinitrotoluene	BQL	5.31	0.690	1	2/14/2009	
Diphenylamine *	BQL	5.31	0.605	1	2/14/2009	
Fluoranthene	BQL	5.31	0.748	1	2/14/2009	
Fluorene	BQL	5.31	0.770	1	2/14/2009	
Hexachlorobenzene	BQL	5.31	0.536	1	2/14/2009	
Hexachlorobutadiene	BQL	5.31	0.807	1	2/14/2009	
Hexachlorocyclopentadiene	BQL	10.6	10.6	1	2/14/2009	
Hexachloroethane	BQL	5.31	0.791	1	2/14/2009	
Indeno(1,2,3-c,d)pyrene	BQL	5.31	2.43	1	2/14/2009	
Isophorone	BQL	5.31	0.939	1	2/14/2009	
Naphthalene	BQL	5.31	0.966	1	2/14/2009	
Nitrobenzene	BQL	5.31	1.11	1	2/14/2009	
2-Nitrophenol	BQL	5.31	1.31	1	2/14/2009	
4-Nitrophenol	BQL	26.5	1.15	1	2/14/2009	
N-Nitrosodi-n-propylamine	BQL	5.31	1.59	1	2/14/2009	
Pentachlorophenol	BQL	26.5	1.50	1	2/14/2009	
Phenanthrene	BQL	5.31	0.472	1	2/14/2009	

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW04
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-4F
Lab Project ID: G128-2312

Analyzed By: DCS
Date Collected: 2/9/2009 13:45
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Matrix: Water

Initial/Final Amt: 942 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Phenol	BQL	5.31	1.13	1	2/14/2009	
Pyrene	BQL	5.31	2.19	1	2/14/2009	
1,2,4-Trichlorobenzene	BQL	5.31	0.764	1	2/14/2009	
2,4,6-Trichlorophenol	BQL	5.31	0.982	1	2/14/2009	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	9	90		
2-Fluorophenol		10	8.4	84		
Nitrobenzene-d5		10	10.5	105		
Phenol-d6		10	8.8	88		
2,4,6-Tribromophenol		10	8	80		
4-Terphenyl-d14		10	4.4	43		

Comments:

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTLCH4023-MW04

Client Project ID: LCH-4023

Lab Sample ID: G128-2312-4F

Lab Project ID: G128-2312

Sample Wt/Vol: 942 ML

Dilution: 1

Analyzed By: DES

Date Collected: 2/9/2009 13:45

Date Received: 2/10/2009

Date Extracted: 2/12/2009

Date Analyzed: 2/14/2009

Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result ug/L
1	Unknown	9.77			148
2	Unknown	9.55			192.4
3	Silane, trimethyl(phenylethynyl)-	9.76			96.7
4	Unknown	9.68			66.4
5	Aromatic, Unknown	10.60			61.5
6	Unknown	9.66			37
7	Unknown	9.89			28.36
8					
9					
10					

Comment:

Tentatively Identified Compound (TIC) refers to substances which are not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist.

Quantitation is accomplished by relative peak area of the compound compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is equal to or greater than 10% of that of the nearest internal standard. Quantitation provided is an estimate.

Reviewed by: 

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW05
 Client Project ID: LCH-4023
 Lab Sample ID: G128-2312-5F
 Lab Project ID: G128-2312

Analyzed By: DCS
 Date Collected: 2/9/2009 14:45
 Date Received: 2/10/2009
 Date Extracted: 2/12/2009
 Matrix: Water

Initial/Final Amt: 961 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	3.23	5.20	0.775	1	2/18/2009	J
Acenaphthylene	BQL	5.20	0.775	1	2/18/2009	
Anthracene	BQL	5.20	0.911	1	2/18/2009	
Benzo[a]anthracene	BQL	5.20	0.708	1	2/18/2009	
Benzo[a]pyrene	BQL	5.20	0.661	1	2/18/2009	
Benzo[b]fluoranthene	BQL	5.20	0.744	1	2/18/2009	
Benzo[g,h,i]perylene	BQL	5.20	0.640	1	2/18/2009	
Benzo[k]fluoranthene	BQL	5.20	0.572	1	2/18/2009	
Bis(2-chloroethoxy)methane	BQL	5.20	1.07	1	2/18/2009	
Bis(2-chloroethyl)ether	BQL	5.20	1.08	1	2/18/2009	
Bis(2-chloroisopropyl)ether	BQL	5.20	1.01	1	2/18/2009	
Bis(2-ethylhexyl)phthalate	0.468	5.20	0.427	1	2/18/2009	J
4-bromophenyl phenyl ether	BQL	5.20	0.812	1	2/18/2009	
Butylbenzylphthalate	BQL	5.20	0.463	1	2/18/2009	
2-Chloronaphthalene	BQL	5.20	0.900	1	2/18/2009	
2-Chlorophenol	BQL	5.20	1.22	1	2/18/2009	
4-Chloro-3-methylphenol	BQL	5.20	0.827	1	2/18/2009	
4-Chlorophenyl phenyl ether	BQL	5.20	3.39	1	2/18/2009	
Chrysene	BQL	5.20	0.578	1	2/18/2009	
Dibenzo[a,h]anthracene	BQL	5.20	0.458	1	2/18/2009	
Di-n-Butylphthalate	BQL	5.20	0.858	1	2/18/2009	
3,3'-Dichlorobenzidine	BQL	10.4	1.27	1	2/18/2009	
2,4-Dichlorophenol	BQL	5.20	1.17	1	2/18/2009	
Diethylphthalate	BQL	5.20	0.770	1	2/18/2009	
Dimethylphthalate	BQL	5.20	0.578	1	2/18/2009	
2,4-Dimethylphenol	BQL	5.20	1.69	1	2/18/2009	
Di-n-octylphthalate	BQL	5.20	0.604	1	2/18/2009	
4,6-Dinitro-2-methylphenol	BQL	26.0	0.572	1	2/18/2009	
2,4-Dinitrophenol	BQL	26.0	0.666	1	2/18/2009	
2,4-Dinitrotoluene	BQL	5.20	0.557	1	2/18/2009	
2,6-Dinitrotoluene	BQL	5.20	0.676	1	2/18/2009	
Diphenylamine *	BQL	5.20	0.593	1	2/18/2009	
Fluoranthene	BQL	5.20	0.734	1	2/18/2009	
Fluorene	3.49	5.20	0.754	1	2/18/2009	J
Hexachlorobenzene	BQL	5.20	0.525	1	2/18/2009	
Hexachlorobutadiene	BQL	5.20	0.791	1	2/18/2009	
Hexachlorocyclopentadiene	BQL	10.4	10.4	1	2/18/2009	
Hexachloroethane	BQL	5.20	0.775	1	2/18/2009	
Indeno(1,2,3-c,d)pyrene	BQL	5.20	2.38	1	2/18/2009	
Isophorone	BQL	5.20	0.921	1	2/18/2009	
Naphthalene	76.6	5.20	0.947	1	2/18/2009	
Nitrobenzene	BQL	5.20	1.09	1	2/18/2009	
2-Nitrophenol	BQL	5.20	1.28	1	2/18/2009	
4-Nitrophenol	BQL	26.0	1.12	1	2/18/2009	
N-Nitrosodi-n-propylamine	BQL	5.20	1.56	1	2/18/2009	
Pentachlorophenol	BQL	26.0	1.47	1	2/18/2009	
Phenanthrene	3.12	5.20	0.463	1	2/18/2009	J

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW05
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-5F
Lab Project ID: G128-2312

Analyzed By: DCS
Date Collected: 2/9/2009 14:45
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Matrix: Water

Initial/Final Amt: 961 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Phenol	BQL	5.20	1.10	1	2/18/2009	
Pyrene	BQL	5.20	2.15	1	2/18/2009	
1,2,4-Trichlorobenzene	BQL	5.20	0.749	1	2/18/2009	
2,4,6-Trichlorophenol	BQL	5.20	0.963	1	2/18/2009	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	9.5	95		
2-Fluorophenol		10	9.5	95		
Nitrobenzene-d5		10	10.9	109		
Phenol-d6		10	10.2	102		
2,4,6-Tribromophenol		10	8.3	83		
4-Terphenyl-d14		10	6.7	67		

Comments:

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTLCH4023-MW05
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-5F
Lab Project ID: G128-2312
Sample Wt/Vol: 961 ML
Dilution: 1

Analyzed By: DES
Date Collected: 2/9/2009 14:45
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Date Analyzed: 2/18/2009
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result ug/L
1	Naphthalene, 1,7-dimethyl-	6.78	575-37-1	98	26.8
2	Benzo[c]thiophene	5.39	270-82-6	97	25
3	Unknown	6.85			24.9
4	2,3-Dihydro-1-methylindene	5.05	27133-93-3	93	24
5	1,2,4-Trimethylbenzene	3.95	95-36-3	95	22.6
6	Aromatic, Unknown	4.27			21.8
7	Unknown	8.46			19.2
8	Naphthalene, 2,6-dimethyl-	6.70	581-42-0	98	18.7
9	Benzo[c]thiophene, 1,3-dihydro-	5.79	2471-92-3	93	18
10	Alkane, Unknown	8.16			7.66

Comment:

Tentatively Identified Compound (TIC) refers to substances which are not present in the list of target compounds. Therefore, not all TICs are identified and quantitated using individual standards. TIC listings are prepared utilizing a computerized library search of electron impact mass spectral data and evaluation of the relevant data by a mass spectral data specialist.

Quantitation is accomplished by relative peak area of the compound compared to that of the nearest internal standard from the total ion chromatogram. TICs are identified and quantitated only if the peak area is equal to or greater than 10% of that of the nearest internal standard. Quantitation provided is an estimate.

Reviewed by: 

SGS Environmental Services, Inc.

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTLCH4023-MW06
 Client Project ID: LCH-4023
 Lab Sample ID: G128-2312-7F
 Lab Project ID: G128-2312

Analyzed By: DCS
 Date Collected: 2/9/2009 14:00
 Date Received: 2/10/2009
 Date Extracted: 2/12/2009
 Matrix: Water

Initial/Final Amt: 768 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	BQL	6.51	0.970	1	2/18/2009	
Acenaphthylene	BQL	6.51	0.970	1	2/18/2009	
Anthracene	BQL	6.51	1.14	1	2/18/2009	
Benzo[a]anthracene	BQL	6.51	0.885	1	2/18/2009	
Benzo[a]pyrene	BQL	6.51	0.827	1	2/18/2009	
Benzo[b]fluoranthene	BQL	6.51	0.931	1	2/18/2009	
Benzo[g,h,i]perylene	BQL	6.51	0.801	1	2/18/2009	
Benzo[k]fluoranthene	BQL	6.51	0.716	1	2/18/2009	
Bis(2-chloroethoxy)methane	BQL	6.51	1.34	1	2/18/2009	
Bis(2-chloroethyl)ether	BQL	6.51	1.35	1	2/18/2009	
Bis(2-chloroisopropyl)ether	BQL	6.51	1.27	1	2/18/2009	
Bis(2-ethylhexyl)phthalate	1.56	6.51	0.534	1	2/18/2009	J
4-bromophenyl phenyl ether	BQL	6.51	1.02	1	2/18/2009	
Butylbenzylphthalate	BQL	6.51	0.579	1	2/18/2009	
2-Chloronaphthalene	BQL	6.51	1.13	1	2/18/2009	
2-Chlorophenol	BQL	6.51	1.52	1	2/18/2009	
4-Chloro-3-methylphenol	BQL	6.51	1.04	1	2/18/2009	
4-Chlorophenyl phenyl ether	BQL	6.51	4.24	1	2/18/2009	
Chrysene	BQL	6.51	0.723	1	2/18/2009	
Dibenzo[a,h]anthracene	BQL	6.51	0.573	1	2/18/2009	
Di-n-Butylphthalate	BQL	6.51	1.07	1	2/18/2009	
3,3'-Dichlorobenzidine	BQL	13.0	1.59	1	2/18/2009	
2,4-Dichlorophenol	BQL	6.51	1.46	1	2/18/2009	
Diethylphthalate	BQL	6.51	0.964	1	2/18/2009	
Dimethylphthalate	BQL	6.51	0.723	1	2/18/2009	
2,4-Dimethylphenol	BQL	6.51	2.11	1	2/18/2009	
Di-n-octylphthalate	BQL	6.51	0.755	1	2/18/2009	
4,6-Dinitro-2-methylphenol	BQL	32.6	0.716	1	2/18/2009	
2,4-Dinitrophenol	BQL	32.6	0.833	1	2/18/2009	
2,4-Dinitrotoluene	BQL	6.51	0.697	1	2/18/2009	
2,6-Dinitrotoluene	BQL	6.51	0.846	1	2/18/2009	
Diphenylamine *	BQL	6.51	0.742	1	2/18/2009	
Fluoranthene	BQL	6.51	0.918	1	2/18/2009	
Fluorene	BQL	6.51	0.944	1	2/18/2009	
Hexachlorobenzene	BQL	6.51	0.658	1	2/18/2009	
Hexachlorobutadiene	BQL	6.51	0.990	1	2/18/2009	
Hexachlorocyclopentadiene	BQL	13.0	13.0	1	2/18/2009	
Hexachloroethane	BQL	6.51	0.970	1	2/18/2009	
Indeno(1,2,3-c,d)pyrene	BQL	6.51	2.98	1	2/18/2009	
Isophorone	BQL	6.51	1.15	1	2/18/2009	
Naphthalene	BQL	6.51	1.18	1	2/18/2009	
Nitrobenzene	BQL	6.51	1.37	1	2/18/2009	
2-Nitrophenol	BQL	6.51	1.60	1	2/18/2009	
4-Nitrophenol	BQL	32.6	1.41	1	2/18/2009	
N-Nitrosodi-n-propylamine	BQL	6.51	1.95	1	2/18/2009	
Pentachlorophenol	BQL	32.6	1.84	1	2/18/2009	
Phenanthrene	BQL	6.51	0.579	1	2/18/2009	

SGS Environmental Services, Inc.

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTLCH4023-MW06
Client Project ID: LCH-4023
Lab Sample ID: G128-2312-7F
Lab Project ID: G128-2312

Analyzed By: DCS
Date Collected: 2/9/2009 14:00
Date Received: 2/10/2009
Date Extracted: 2/12/2009
Matrix: Water

Initial/Final Amt: 768 mL / 5.0 mL

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Phenol	BQL	6.51	1.38	1	2/18/2009	
Pyrene	BQL	6.51	2.69	1	2/18/2009	
1,2,4-Trichlorobenzene	BQL	6.51	0.937	1	2/18/2009	
2,4,6-Trichlorophenol	BQL	6.51	1.20	1	2/18/2009	
		Spike Added	Spike Result	Percent Recovered		
2-Fluorobiphenyl		10	9.7	97		
2-Fluorophenol		10	8.8	88		
Nitrobenzene-d5		10	10	100		
Phenol-d6		10	9.6	96		
2,4,6-Tribromophenol		10	8.3	83		
4-Terphenyl-d14		10	5.6	56		

Comments:

Flags:

BQL = Below Quantitation Limits.
J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTLCH4023-MW06

Client Project ID: LCH-4023

Lab Sample ID: G128-2312-7F

Lab Project ID: G128-2312

Sample Wt/Vol: 768 ML

Dilution: 1

Analyzed By: DES

Date Collected: 2/9/2009 14:00

Date Received: 2/10/2009

Date Extracted: 2/12/2009

Date Analyzed: 2/18/2009

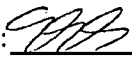
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result ug/L
1	Unknown	10.80			50.3
2	Unknown	7.71			27.5
3	Unknown	5.88			18
4	Unknown	6.85			17.3
5	Aromatic acid, Unknown	7.72			13.8
6	Unknown	8.46			12.6
7	Dodecanamide, N,N-bis(2-hydroxyethyl)-	7.40	120-40-1	91	10.1
8	Unknown	5.00			9.86
9	Unknown	10.70			7.29

Comment:

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Reviewed by: 

SGS Environmental Services Inc. CHAIN OF CUSTODY RECORD

Locations Nationwide

- Alaska
- New Jersey
- North Carolina
- West Virginia
- Maryland
- New York
- Ohio

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[illegible]



Ben Ashba
Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

Report Number: G128-2374

Client Project: LCH 4023

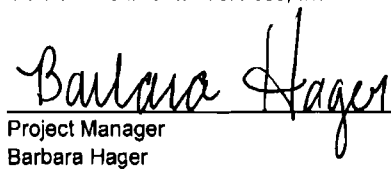
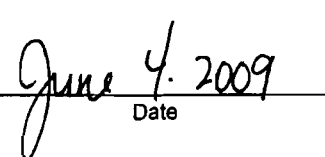
Dear Ben Ashba,

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or services performed during this project, please call Barbara Hager at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS Environmental Services for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS Environmental Services, Inc.

 
Project Manager Date
Barbara Hager

SGS North America, Inc.

List of Reporting Abbreviations
And Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantification Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL/CL = Reporting Limit / Control Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-5 (Floor 6-7')

Client Project ID: LCH 4023

Lab Sample ID: G128-2374-1A

Lab Project ID: G128-2374

Report Basis: Dry Weight

Analyzed By: DVO

Date Collected: 5/29/2009 11:30

Date Received: 5/29/2009

Matrix: Soil

Solids 79.88

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.18	mg/Kg	1	06/02/09 18:22

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	97.5	97.5		70-130

Comments:

Batch Information

Analytical Batch: VP060209

Analytical Method: 8015

Instrument ID: GC4

Analyst: DVO

Prep Method: 5035

Initial Wt/Vol: 6.08 g

Final Volume: 5 mL

Analyst: DVO

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-6 (Floor 6')

Client Project ID: LCH 4023

Lab Sample ID: G128-2374-2A

Lab Project ID: G128-2374

Report Basis: Dry Weight

Analyzed By: DVO

Date Collected: 5/28/2009 18:30

Date Received: 5/29/2009

Matrix: Soil

Solids 80.16

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.61	mg/Kg	1	06/02/09 18:49

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	99.0	99.0		70-130

Comments:**Batch Information**

Analytical Batch: VP060209

Analytical Method: 8015

Instrument ID: GC4

Analyst: DVO

Prep Method: 5035

Initial Wt/Vol: 5.66 g

Final Volume: 5 mL

Analyst: DVO

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-5 (Floor 6-7')
Client Project ID: LCH 4023
Lab Sample ID: G128-2374-1D
Lab Project ID: G128-2374

Date Collected: 5/29/2009 11:30
Date Received: 5/29/2009
Matrix: Soil
Solids 79.88
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	9.79	7.63	mg/Kg	1	06/01/09 16:43

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	45.2	113

Comments:

Batch Information

Analytical Batch: EP060109
Analytical Method: 8015
Instrument: GC6
Analyst: EAW

Prep batch: 14355
Prep Method: 3541
Prep Date: 06/01/09
Initial Prep Wt/Vol: 32.8 G
Prep Final Vol: 10 mL

Analyst: OTF

NC Certification #481

N.C. Certification #481

Reviewed By: MD
DRO.XLS

Page 5 of 7

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-6 (Floor 6')
Client Project ID: LCH 4023
Lab Sample ID: G128-2374-2D
Lab Project ID: G128-2374

Date Collected: 5/28/2009 18:30
Date Received: 5/29/2009
Matrix: Soil
Solids 80.16
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.10	mg/Kg	1	06/01/09 17:12
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	41.4	103

Comments:

Batch Information

Analytical Batch: EP060109
Analytical Method: 8015
Instrument: GC6
Analyst: EAW

Prep batch: 14355
Prep Method: 3541
Prep Date: 06/01/09
Initial Prep Wt/Vol: 30.8 G
Prep Final Vol: 10 mL

Analyst: DTE

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS

Page 6 of 7

CHAIN OF CUSTODY RECORD
SGS Environmental Services Inc.

Locations Nationwide

- Alaska
- Ohio
- New Jersey
- West Virginia
- Hawaii
- Maryland
- North Carolina

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091862

[illegible]



Ben Ashba
Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

Report Number: G128-2375

Client Project: LCH 4023

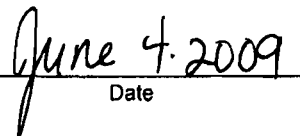
Dear Ben Ashba,

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Project Manager Date
Barbara Hager

SGS North America, Inc.

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% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.

MI34.021808.4

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-1 (N5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-1A
Lab Project ID: G128-2375
Report Basis: Dry Weight

Analyzed By: DVO
Date Collected: 5/27/2009 10:00
Date Received: 5/29/2009
Matrix: Soil
Solids 77.56

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.12	mg/Kg	1	06/02/09 16:37

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	99.6	99.6		70-130

Comments:

Batch Information

Analytical Batch: VP060209
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVO

Prep Method: 5035
Initial Wt/Vol: 6.32 g
Final Volume: 5 mL

Analyst: DVO

SGS North America, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-2 (E5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-2A
Lab Project ID: G128-2375
Report Basis: Dry Weight

Analyzed By: DVO
Date Collected: 5/27/2009 11:00
Date Received: 5/29/2009
Matrix: Soil
Solids 79.14

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.67	mg/Kg	1	06/02/09 17:03

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	97.4	97.4		70-130

Comments:

Batch Information

Analytical Batch: VP060209
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVO

Prep Method: 5035
Initial Wt/Vol: 6.69 g
Final Volume: 5 mL

Analyst: DVO

NC Certification #481
N.C. Certification #481

Reviewed By: 
GRO XLS
Page 4 of 11

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-3 (S5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-3A
Lab Project ID: G128-2375
Report Basis: Dry Weight

Analyzed By: DVO
Date Collected: 5/28/2009 15:00
Date Received: 5/29/2009
Matrix: Soil
Solids 78.79

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.06	mg/Kg	1	06/02/09 17:30

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	99.2	99.2		70-130

Comments:

Batch Information

Analytical Batch: VP060209
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVO

Prep Method: 5035
Initial Wt/Vol: 6.28 g
Final Volume: 5 mL

Analyst: DVO

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-4 (W5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-4A
Lab Project ID: G128-2375
Report Basis: Dry Weight

Analyzed By: DVO
Date Collected: 5/28/2009 19:00
Date Received: 5/29/2009
Matrix: Soil
Solids 80.11

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	7.00	mg/Kg	1	06/02/09 17:56

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	100.0	100.0		70-130

Comments:

Batch Information

Analytical Batch: VP060209
Analytical Method: 8015
Instrument ID: GC4
Analyst: DVO

Prep Method: 5035
Initial Wt/Vol: 5.35 g
Final Volume: 5 mL

Analyst: DVO

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-1 (N5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-1D
Lab Project ID: G128-2375

Date Collected: 5/27/2009 10:00
Date Received: 5/29/2009
Matrix: Soil
Solids 77.56
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.96	mg/Kg	1	06/01/09 17:40

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	39.4	98.6

Comments:

Batch Information

Analytical Batch: EP060109
Analytical Method: 8015
Instrument: GC6
Analyst: EAW

Prep batch: 14355
Prep Method: 3541
Prep Date: 06/01/09
Initial Prep Wt/Vol: 32.41 G
Prep Final Vol: 10 mL

Analyst: OTF

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS
Page 7 of 11

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-2 (E5')

Client Project ID: LCH 4023

Lab Sample ID: G128-2375-2D

Lab Project ID: G128-2375

Date Collected: 5/27/2009 11:00

Date Received: 5/29/2009

Matrix: Soil

Solids 79.14

Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.31	mg/Kg	1	06/01/09 18:09

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	39.8	99.5

Comments:

Batch Information

Analytical Batch: EP060109
Analytical Method: 8015
Instrument: GC6
Analyst: EAW

Prep batch: 14355
Prep Method: 3541
Prep Date: 06/01/09
Initial Prep Wt/Vol: 34.57 G
Prep Final Vol: 10 mL

Analyst: OTF

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-3 (S5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-3D
Lab Project ID: G128-2375

Date Collected: 5/28/2009 15:00
Date Received: 5/29/2009
Matrix: Soil
Solids 78.79
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.38	mg/Kg	1	06/01/09 18:38

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	41.7	104

Comments:

Batch Information

Analytical Batch: EP060109
Analytical Method: 8015
Instrument: GC6
Analyst: EAW

Prep batch: 14355
Prep Method: 3541
Prep Date: 06/01/09
Initial Prep Wt/Vol: 34.4 G
Prep Final Vol: 10 mL

Analyst: OTF

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: LCH4023-EX-4 (W5')
Client Project ID: LCH 4023
Lab Sample ID: G128-2375-4D
Lab Project ID: G128-2375

Date Collected: 5/28/2009 19:00
Date Received: 5/29/2009
Matrix: Soil
Solids 80.11
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.57	mg/Kg	1	06/01/09 19:06

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	38.5	96.4

Comments:**Batch Information**

Analytical Batch: EP060109
Analytical Method: 8015
Instrument: GC6
Analyst: EAW

Prep batch: 14355
Prep Method: 3541
Prep Date: 06/01/09
Initial Prep Wt/Vol: 32.99 G
Prep Final Vol: 10 mL

Analyst: OTF

NC Certification #481

N.C. Certification #481

Reviewed By: 
DRO.XLS
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CHAIN OF CUSTODY RECORD
SGS Environmental Services Inc.

Locations Nationwide

- Alaska
- Ohio
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- Hawaii
- Maryland
- North Carolina

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1

CLIENT: CATUN

CONTACT: Ben Ashba

PROJECT: LCH 4023

REPORTS TO: Ben Ashba

INVOICE TO: Sheila @ CATUN

PHONE NO: ()

SITE/PWSID# :

E-MAIL: ben.ashba@catl-nuse.com

FAX NO: ()

QUOTE # DOD 101

P.O. NUMBER 291529-3

SGS Reference: G128-2375

PAGE 1 OF 1

2

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No	CONTAINERS	SAMPLE TYPE	Preservatives Used	Analysis Required	REMARKS
	LCH4023-EX-1(N5')	5/27/09	1000	Soil	3	G				
	LCH4023-EX-2(ES')	5/27/09	1100							
	LCH4023-EX-3(S5')	5/28/09	1500							
	LCH4023-EX-4(W5')	5/28/09	1900							

4

Shipping Carrier:

Shipping Ticket No:

Special Deliverable Requirements: Summary EDD

Special Instructions:

Samples Received Cold? (Circle) YES NO

Temperature /C: 5.6

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

Requested Turnaround Time: ☐ RUSH ☒ STD

5

Collected/Relinquished By: (1) Ben Ashba

Relinquished By: (2)

Relinquished By: (3)

Relinquished By: (4)

Date 5/29/09

Time 1107

Date

Time

Received By: [Signature]

Received By:

Received By:

Received By:

Date 5/29/09

Time 11:07

Date

Time

N.C. Certification #487

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APPENDIX F

**VERTICAL HYDRAULIC GRADIENT
DETERMINATION**

APPENDIX F

VERTICAL HYDRAULIC GRADIENT DETERMINATION

**Comprehensive Site Assessment
and Corrective Actions
LCH-4023**

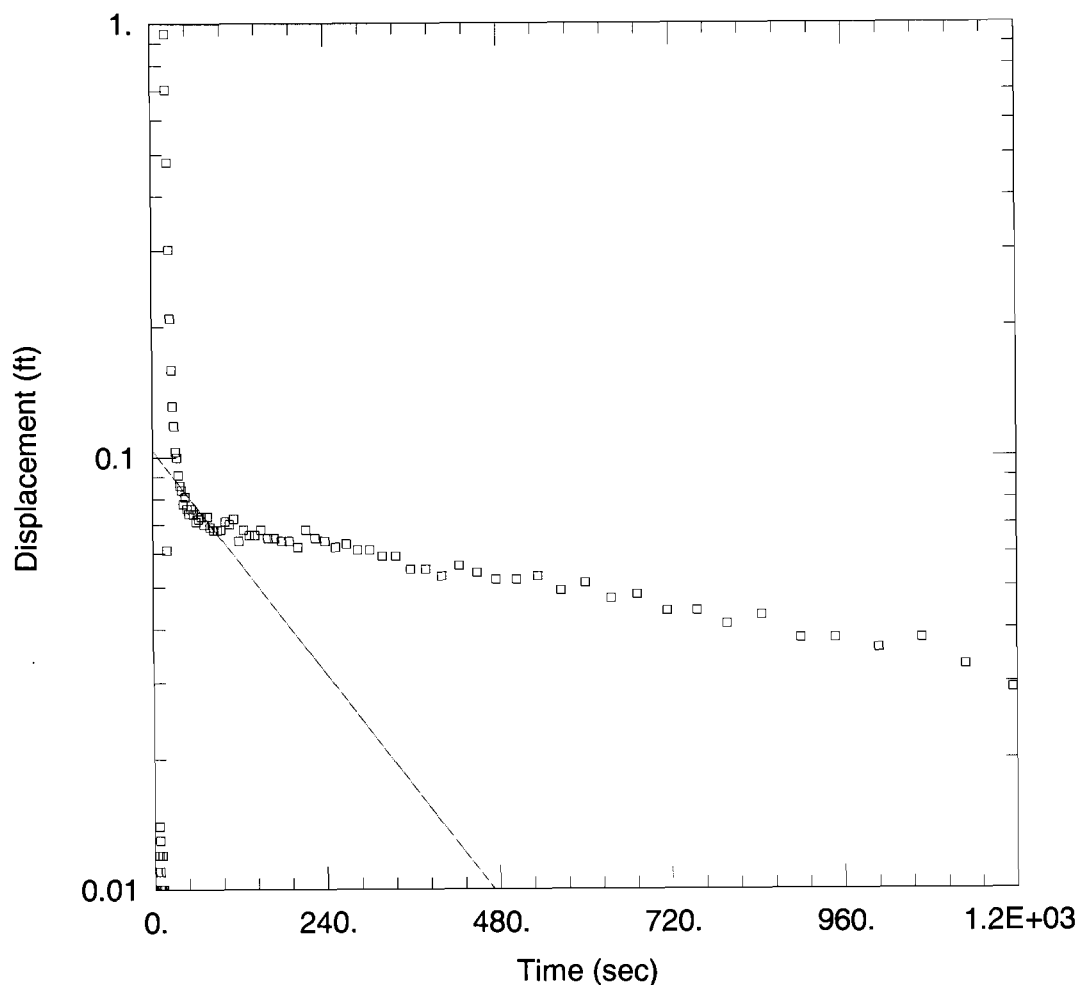
**Marine Corps Base
Camp Lejeune, NC**

GAUGING DATE: April 8, 2009	WELL PAIR	
	SHALLOW	DEEP
WELL IDENTIFICATION	USTLCH4023-MW05	USTLCH4023-MW06
TOP OF CASING ELEVATION (FEET)	34.13	32.93
DEPTH TO WATER (FEET)	7.43	25.03
APPROXIMATE MID-SCREEN DEPTH (FEET)	6.75	24.25
APPROXIMATE MID-SCREEN ELEVATION (FEET)	27.38	8.68
STATIC WATER LEVEL ELEVATION (FEET)	26.70	7.90
DIFFERENCE IN STATIC WATER LEVEL ELEVATION (FEET)	18.80	
DIFFERENCE IN MID-SCREEN ELEVATION (FEET)	18.70	
VERTICAL GRADIENT	1.0053	

POSITIVE GRADIENT INDICATES "DOWNWARDS"
GROUNDWATER MIGRATION POTENTIAL.

APPENDIX G

FALLING HEAD SLUG TEST DATA



LCH-4023

Data Set: S:\WPMKTG\PROJECT2008\2058E0~1\LCH-40~1\SLUGTE~1\MW5.AQT
 Date: 04/21/09 Time: 08:49:20

PROJECT INFORMATION

Company: CATLIN Eng. and Scientists
 Client: LANTDIV
 Project: 208-018
 Test Location: Camp Lejeune, NC
 Test Well: MW-5
 Test Date: 2/9/2009

AQUIFER DATA

Saturated Thickness: 25. ft Anisotropy Ratio (K_z/K_r): 1.

WELL DATA

Initial Displacement: 1.33 ft Water Column Height: 8.28 ft
 Casing Radius: 0.0833 ft Wellbore Radius: 0.3333 ft
 Screen Length: 10. ft Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined $K = 1.719E-05$ ft/sec
 Solution Method: Bouwer-Rice $y_0 = 0.1037$ ft

Report Date: 2/10/2009 14:54
 Report User Name: scan
 Report Computer: SCANPC

Log File Properties

File Name lch4023 mw05-2 2009-02-09 18.35.56.wsl
 Create Date 2/9/2009 18:35

Device Properties

Device Level TROLL® 700
 Site lch4023
 Device Name
 Serial Number 125515
 Firmware Version 2.07

Log Configuration

Log Name mw05-2
 Created By Unknown
 Computer Name Field PC
 Application WinSituMobile.exe
 Application Version 5.4.2.0
 Create Date 2/9/2009 17:38
 Notes Size(bytes) 4096
 Type True Logarithmic
 Overwrite when full Disabled
 Scheduled Start Manual Start
 Scheduled Stop No Stop Time
 Max Interval Days: 0 Hours: 00 Mins: 20 Secs: 00

Level Reference Settings At Log Creation

Level Measure Level-DTW
 Specific Gr: 0.999
 Level Referen Set first logged value to offset
 Level Referenc 0 (ft)

Log Notes:

Date and Time Note

2/9/2009 17:06 User Note: "Level reference initialized to zero at start of log."
 2/9/2009 17:30 Manual Start Command
 2/9/2009 17:31 User Note: "Downloading log - Used Batt: 6% Memory: 29% User: Unknown"
 2/9/2009 17:42 User Note: "Downloading log - Used Batt: 6% Memory: 29% User: Unknown"
 2/9/2009 17:48 User Note: "Downloading log - Used Batt: 6% Memory: 29% User: Unknown"
 2/9/2009 17:53 User Note: "Downloading log - Used Batt: 6% Memory: 29% User: Unknown"
 2/9/2009 17:58 User Note: "Downloading log - Used Batt: 6% Memory: 29% User: Unknown"
 2/9/2009 18:03 User Note: "Downloading log - Used Batt: 6% Memory: 29% User: Unknown"
 2/9/2009 18:04 Manual Stop Command

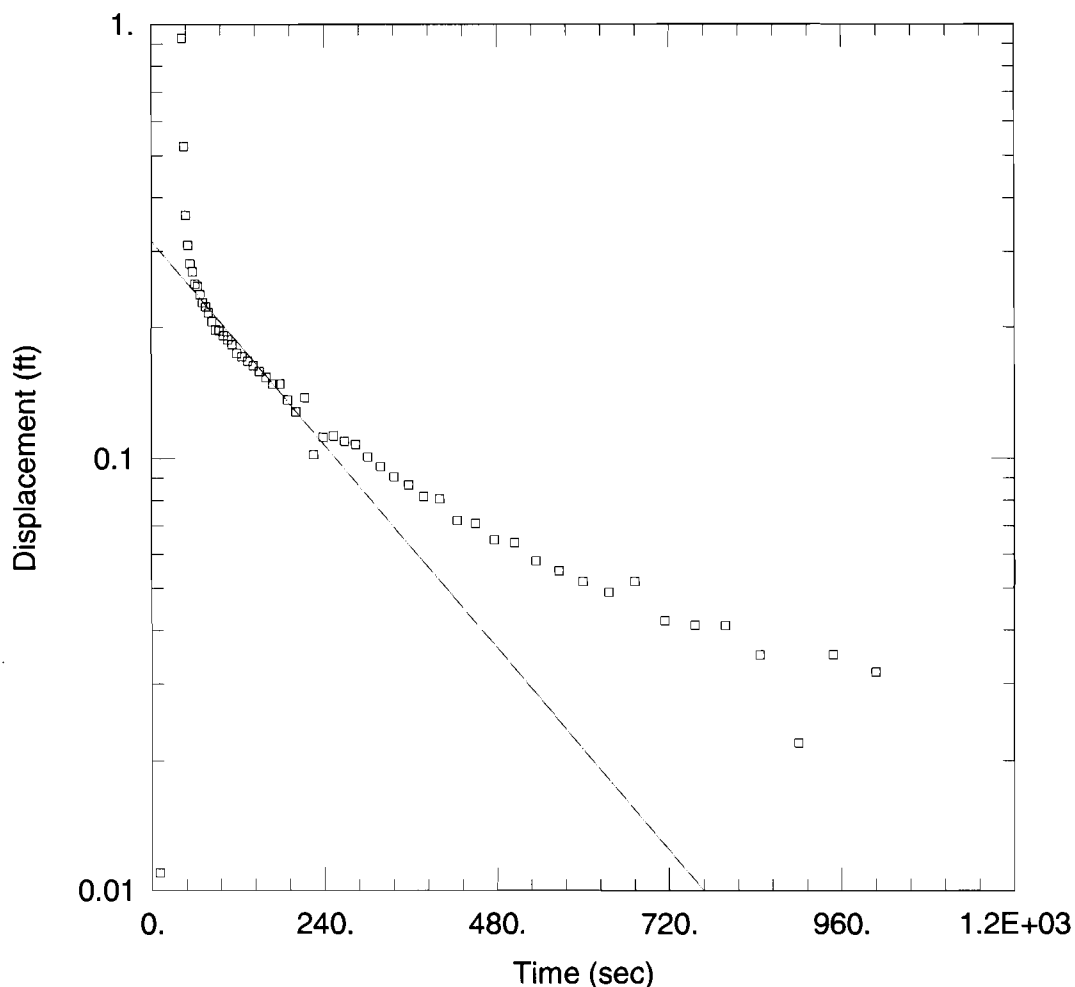
Log Data:

Record Count 126

Date and Time	Elapsed Time Seconds	Sensor: Pres 30G SN#: 125515 Level-DTW (ft)	Sensor: Pr SN#: 1255 Temperatu	Sensor: Pres 30G SN#: 125515 Pressure (PSI)
2/9/2009 17:30	0	0	11.674	3.357
2/9/2009 17:30	0.281	0.006	11.693	3.355
2/9/2009 17:30	0.501	0.006	11.712	3.355
2/9/2009 17:30	0.751	0.009	11.719	3.353
2/9/2009 17:30	1.001	0.009	11.726	3.354
2/9/2009 17:30	1.251	0.005	11.733	3.355
2/9/2009 17:30	1.501	0.005	11.739	3.355
2/9/2009 17:30	1.751	0.008	11.74	3.354
2/9/2009 17:30	2.001	0.009	11.747	3.353
2/9/2009 17:30	2.251	0.007	11.748	3.354
2/9/2009 17:30	2.501	0.01	11.753	3.353
2/9/2009 17:30	2.751	0.008	11.756	3.354
2/9/2009 17:30	3.229	0.004	11.741	3.356
2/9/2009 17:30	3.451	0.005	11.752	3.355
2/9/2009 17:30	3.673	0.009	11.759	3.354
2/9/2009 17:30	3.894	0.011	11.763	3.353
2/9/2009 17:30	4.362	0.006	11.746	3.355
2/9/2009 17:30	4.583	0.008	11.755	3.354
2/9/2009 17:30	4.805	0.012	11.767	3.352
2/9/2009 17:30	5.026	-0.016	11.769	3.365
2/9/2009 17:30	5.505	0.008	11.805	3.354
2/9/2009 17:30	5.726	0.006	11.802	3.355
2/9/2009 17:30	5.948	0.007	11.796	3.355
2/9/2009 17:30	6.168	0.002	11.84	3.357
2/9/2009 17:30	6.603	0.005	11.822	3.355
2/9/2009 17:30	6.825	0.012	11.815	3.352
2/9/2009 17:30	7.049	0.014	11.809	3.352
2/9/2009 17:30	7.271	0.01	11.809	3.353
2/9/2009 17:30	7.561	0.013	11.8	3.352
2/9/2009 17:30	7.981	0.011	11.782	3.353
2/9/2009 17:30	8.461	0.01	11.77	3.353
2/9/2009 17:30	9.001	0.007	11.761	3.354
2/9/2009 17:30	9.481	0.01	11.756	3.353
2/9/2009 17:30	10.081	0.007	11.746	3.354
2/9/2009 17:30	10.681	0.012	11.744	3.352
2/9/2009 17:30	11.281	0.009	11.742	3.353
2/9/2009 17:30	11.941	0.01	11.741	3.353
2/9/2009 17:30	12.66	0.009	11.739	3.354
2/9/2009 17:30	13.441	0.009	11.731	3.354
2/9/2009 17:30	14.221	0.006	11.732	3.355
2/9/2009 17:30	15.061	0.009	11.729	3.354
2/9/2009 17:30	15.961	0.009	11.728	3.354
2/9/2009 17:30	16.921	0.005	11.727	3.355
2/9/2009 17:30	17.881	0.004	11.727	3.356
2/9/2009 17:30	18.961	0.061	11.723	3.331
2/9/2009 17:30	20.101	0.947	11.722	2.947

2/9/2009 17:30	21.301	0.704	11.722	3.052
2/9/2009 17:30	22.561	0.48	11.72	3.15
2/9/2009 17:30	23.881	0.302	11.721	3.227
2/9/2009 17:30	25.321	0.209	11.72	3.267
2/9/2009 17:30	26.821	0.159	11.719	3.289
2/9/2009 17:30	28.381	0.131	11.72	3.301
2/9/2009 17:30	30.061	0.118	11.721	3.307
2/9/2009 17:30	31.86	0.103	11.718	3.313
2/9/2009 17:30	33.721	0.1	11.716	3.314
2/9/2009 17:30	35.761	0.091	11.717	3.318
2/9/2009 17:30	37.861	0.086	11.716	3.32
2/9/2009 17:30	40.081	0.084	11.716	3.321
2/9/2009 17:30	42.481	0.078	11.715	3.324
2/9/2009 17:30	45	0.081	11.715	3.322
2/9/2009 17:30	47.641	0.076	11.715	3.324
2/9/2009 17:30	50.461	0.074	11.715	3.325
2/9/2009 17:31	53.461	0.076	11.711	3.324
2/9/2009 17:31	56.64	0.074	11.712	3.325
2/9/2009 17:31	60.001	0.071	11.712	3.327
2/9/2009 17:31	63.601	0.072	11.713	3.326
2/9/2009 17:31	67.2	0.073	11.712	3.326
2/9/2009 17:31	71.4	0.07	11.712	3.327
2/9/2009 17:31	75.601	0.073	11.711	3.326
2/9/2009 17:31	79.801	0.069	11.713	3.328
2/9/2009 17:31	84.601	0.068	11.709	3.328
2/9/2009 17:31	90	0.068	11.71	3.328
2/9/2009 17:31	94.8	0.068	11.714	3.328
2/9/2009 17:31	100.801	0.071	11.712	3.327
2/9/2009 17:31	106.8	0.07	11.713	3.327
2/9/2009 17:32	112.801	0.072	11.709	3.326
2/9/2009 17:32	119.4	0.064	11.712	3.33
2/9/2009 17:32	126.601	0.068	11.712	3.328
2/9/2009 17:32	134.4	0.066	11.711	3.329
2/9/2009 17:32	142.2	0.066	11.711	3.329
2/9/2009 17:32	150.601	0.068	11.713	3.328
2/9/2009 17:32	159.601	0.065	11.712	3.329
2/9/2009 17:32	169.2	0.065	11.713	3.329
2/9/2009 17:33	178.8	0.064	11.712	3.33
2/9/2009 17:33	189.6	0.064	11.712	3.33
2/9/2009 17:33	201	0.062	11.714	3.331
2/9/2009 17:33	213	0.068	11.715	3.328
2/9/2009 17:33	225.6	0.065	11.718	3.329
2/9/2009 17:34	238.8	0.064	11.715	3.33
2/9/2009 17:34	253.2	0.062	11.715	3.331
2/9/2009 17:34	268.201	0.063	11.719	3.33
2/9/2009 17:34	283.8	0.061	11.719	3.331
2/9/2009 17:35	300.6	0.061	11.72	3.331
2/9/2009 17:35	318.6	0.059	11.721	3.332
2/9/2009 17:35	337.201	0.059	11.724	3.332
2/9/2009 17:36	357.6	0.055	11.727	3.334
2/9/2009 17:36	378.6	0.055	11.73	3.333
2/9/2009 17:36	400.8	0.053	11.73	3.335

2/9/2009 17:37	424.8	0.056	11.731	3.333
2/9/2009 17:37	450.001	0.054	11.727	3.334
2/9/2009 17:38	476.4	0.052	11.721	3.335
2/9/2009 17:38	504.6	0.052	11.715	3.335
2/9/2009 17:39	534.6	0.053	11.694	3.334
2/9/2009 17:39	566.4	0.049	11.678	3.336
2/9/2009 17:40	600	0.051	11.655	3.335
2/9/2009 17:40	636	0.047	11.637	3.337
2/9/2009 17:41	672	0.048	11.62	3.337
2/9/2009 17:42	714	0.044	11.607	3.338
2/9/2009 17:42	756	0.044	11.601	3.338
2/9/2009 17:43	798	0.041	11.592	3.34
2/9/2009 17:44	846	0.043	11.583	3.339
2/9/2009 17:45	900	0.038	11.576	3.341
2/9/2009 17:45	948	0.038	11.575	3.341
2/9/2009 17:46	1008	0.036	11.573	3.342
2/9/2009 17:47	1068	0.038	11.578	3.341
2/9/2009 17:48	1128	0.033	11.582	3.343
2/9/2009 17:50	1194	0.029	11.588	3.345
2/9/2009 17:51	1266	0.027	11.596	3.346
2/9/2009 17:52	1344	0.029	11.603	3.345
2/9/2009 17:53	1422	0.026	11.619	3.346
2/9/2009 17:55	1506	0.027	11.63	3.346
2/9/2009 17:56	1596	0.022	11.635	3.348
2/9/2009 17:58	1692	0.025	11.642	3.346
2/9/2009 17:59	1788	0.024	11.65	3.347
2/9/2009 18:01	1896	0.022	11.648	3.348
2/9/2009 18:03	2010	0.02	11.636	3.349



LCH-4023

Data Set: S:\WPMKTG\PROJECT\2008\2058E0~1\LCH-40~1\SLUGTE~1\MW1.AQT
 Date: 04/21/09 Time: 08:51:21

PROJECT INFORMATION

Company: CATLIN Eng. and Scientists
 Client: LANTDIV
 Project: 208-018
 Test Location: Camp Lejeune
 Test Well: MW-1
 Test Date: 2/9/2009

AQUIFER DATA

Saturated Thickness: 25. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.33 ft Water Column Height: 6.41 ft
 Casing Radius: 0.0833 ft Wellbore Radius: 0.333 ft
 Screen Length: 10. ft Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined K = 1.462E-05 ft/sec
 Solution Method: Bouwer-Rice y0 = 0.3168 ft

Report Date: 2/10/2009 14:54
 Report User Name: scan
 Report Computer Name: SCANPC

Log File Properties

File Name lch4023 mw01 2009-02-09 16.46.19.wsl
 Create Date 2/9/2009 16:46

Device Properties

Device Level TROLL® 700
 Site lch4023
 Device Name
 Serial Number 125515
 Firmware Version 2.07

Log Configuration

Log Name mw01
 Created By Unknown
 Computer Name Field PC
 Application WinSituMobile.exe
 Application Version 5.4.2.0
 Create Date 2/9/2009 15:57
 Notes Size(bytes) 4096
 Type True Logarithmic
 Overwrite when full Disabled
 Scheduled Start Manual Start
 Scheduled Stop No Stop Time
 Max Interval Days: 0 Hours: 00 Mins: 20 Secs: 00

Level Reference Settings At Log Creation

Level Measurement Method Level-DTW
 Specific Gravity 0.999
 Level Reference Mod Set first logged value to offset
 Level Reference Offset 0 (ft)

Log Notes:

Date and Time	Note
2/9/2009 15:26	User Note: "Level reference initialized to zero at start of log."
2/9/2009 15:37	Manual Start Command
2/9/2009 15:38	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:41	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:43	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:44	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:46	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:50	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:52	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:55	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 15:57	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 16:00	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 16:03	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 16:04	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 16:13	User Note: "Downloading log - Used Batt: 6% Memory: 26% User: Unknown"
2/9/2009 16:14	Manual Stop Command

Log Data:

Record Count

127

Date and Time	Elapsed Time Seconds	Sensor: Pres 30C SN#: 125515	Sensor: Pres 30G SN#: 125515	Sensor: Pres 30G SN#: 125515
		Level-DTW (ft)	Temperature (C)	Pressure (PSI)
2/9/2009 15:37	0	0	12.797	2.599
2/9/2009 15:37	0.272	0.003	12.819	2.598
2/9/2009 15:37	0.5	0	12.833	2.599
2/9/2009 15:37	0.75	0.001	12.842	2.599
2/9/2009 15:37	1.204	-0.001	12.838	2.599
2/9/2009 15:37	1.426	0.001	12.853	2.599
2/9/2009 15:37	1.647	-0.001	12.861	2.599
2/9/2009 15:37	1.869	-0.019	12.866	2.608
2/9/2009 15:37	2.335	-0.002	12.905	2.6
2/9/2009 15:37	2.556	0	12.902	2.599
2/9/2009 15:37	2.777	0.006	12.903	2.597
2/9/2009 15:37	2.998	-0.004	12.955	2.601
2/9/2009 15:37	3.49	0.007	12.934	2.596
2/9/2009 15:37	3.712	-0.001	12.926	2.599
2/9/2009 15:37	3.936	0.003	12.922	2.598
2/9/2009 15:37	4.158	-0.001	12.907	2.6
2/9/2009 15:37	4.49	0.005	12.907	2.597
2/9/2009 15:37	4.726	0.001	12.918	2.599
2/9/2009 15:37	4.969	0.005	12.914	2.597
2/9/2009 15:37	5.191	0.004	12.917	2.597
2/9/2009 15:37	5.412	0.006	12.917	2.596
2/9/2009 15:37	5.633	0.005	12.917	2.597
2/9/2009 15:37	5.853	0.009	12.921	2.595
2/9/2009 15:37	6.074	0.005	12.918	2.597
2/9/2009 15:37	6.296	0.009	12.92	2.595
2/9/2009 15:37	6.518	0.002	12.919	2.598
2/9/2009 15:37	6.74	0.006	12.923	2.596
2/9/2009 15:37	7.14	0.005	12.905	2.597
2/9/2009 15:37	7.56	0.004	12.895	2.597
2/9/2009 15:37	7.98	0.006	12.893	2.597
2/9/2009 15:37	8.46	0.007	12.883	2.596
2/9/2009 15:37	9	0.009	12.876	2.595
2/9/2009 15:37	9.48	0.006	12.876	2.597
2/9/2009 15:37	10.08	0.007	12.87	2.596
2/9/2009 15:37	10.68	0.011	12.866	2.594
2/9/2009 15:37	11.28	0.005	12.867	2.597
2/9/2009 15:37	11.94	0.004	12.867	2.597
2/9/2009 15:37	12.66	0.002	12.862	2.598
2/9/2009 15:37	13.44	0.005	12.863	2.597
2/9/2009 15:37	14.22	0.007	12.858	2.596
2/9/2009 15:37	15.06	0.003	12.858	2.598
2/9/2009 15:37	15.96	0.004	12.856	2.597
2/9/2009 15:37	16.92	0.004	12.856	2.597
2/9/2009 15:37	17.88	0.002	12.856	2.598
2/9/2009 15:37	18.96	0.003	12.854	2.598
2/9/2009 15:37	20.1	0.004	12.853	2.598
2/9/2009 15:37	21.3	0.005	12.853	2.597
2/9/2009 15:37	22.56	0.003	12.851	2.598
2/9/2009 15:37	23.88	0.004	12.852	2.598
2/9/2009 15:38	25.32	0.003	12.854	2.598
2/9/2009 15:38	26.82	0.004	12.852	2.598

2/9/2009 15:38	28.38	0.006	12.851	2.596
2/9/2009 15:38	30.06	0.004	12.852	2.598
2/9/2009 15:38	31.86	0.005	12.854	2.597
2/9/2009 15:38	33.72	0.006	12.849	2.596
2/9/2009 15:38	35.76	0.005	12.854	2.597
2/9/2009 15:38	37.86	0.003	12.854	2.598
2/9/2009 15:38	40.08	0.003	12.853	2.598
2/9/2009 15:38	42.48	0.928	12.851	2.197
2/9/2009 15:38	45	0.525	12.851	2.372
2/9/2009 15:38	47.64	0.364	12.854	2.441
2/9/2009 15:38	50.46	0.31	12.85	2.465
2/9/2009 15:38	53.46	0.281	12.849	2.477
2/9/2009 15:38	56.64	0.269	12.851	2.482
2/9/2009 15:38	60	0.252	12.851	2.49
2/9/2009 15:38	63.6	0.249	12.851	2.491
2/9/2009 15:38	67.199	0.238	12.851	2.496
2/9/2009 15:38	71.4	0.228	12.849	2.5
2/9/2009 15:38	75.6	0.223	12.849	2.503
2/9/2009 15:38	79.8	0.216	12.847	2.505
2/9/2009 15:38	84.733	0.206	12.844	2.51
2/9/2009 15:39	90	0.197	12.839	2.514
2/9/2009 15:39	94.8	0.196	12.837	2.514
2/9/2009 15:39	100.8	0.191	12.844	2.516
2/9/2009 15:39	106.8	0.187	12.837	2.518
2/9/2009 15:39	112.806	0.182	12.849	2.52
2/9/2009 15:39	119.4	0.174	12.834	2.524
2/9/2009 15:39	126.6	0.171	12.834	2.525
2/9/2009 15:39	134.4	0.167	12.833	2.527
2/9/2009 15:39	142.2	0.163	12.83	2.529
2/9/2009 15:40	150.6	0.158	12.833	2.531
2/9/2009 15:40	159.6	0.153	12.832	2.533
2/9/2009 15:40	169.2	0.148	12.831	2.535
2/9/2009 15:40	178.8	0.148	12.838	2.535
2/9/2009 15:40	189.599	0.136	12.835	2.54
2/9/2009 15:40	201	0.128	12.836	2.544
2/9/2009 15:41	213	0.138	12.841	2.539
2/9/2009 15:41	225.607	0.102	12.845	2.555
2/9/2009 15:41	238.8	0.112	12.85	2.55
2/9/2009 15:41	253.2	0.113	12.859	2.55
2/9/2009 15:42	268.199	0.11	12.861	2.552
2/9/2009 15:42	283.8	0.108	12.869	2.552
2/9/2009 15:42	300.6	0.101	12.878	2.556
2/9/2009 15:42	318.599	0.096	12.883	2.557
2/9/2009 15:43	337.2	0.091	12.889	2.56
2/9/2009 15:43	357.599	0.087	12.898	2.561
2/9/2009 15:43	378.6	0.082	12.906	2.563
2/9/2009 15:44	400.799	0.081	12.914	2.564
2/9/2009 15:44	424.799	0.072	12.917	2.568
2/9/2009 15:45	450	0.071	12.919	2.569
2/9/2009 15:45	476.4	0.065	12.922	2.571
2/9/2009 15:45	504.6	0.064	12.92	2.572
2/9/2009 15:46	534.599	0.058	12.916	2.574
2/9/2009 15:47	566.399	0.055	12.919	2.575
2/9/2009 15:47	599.999	0.052	12.91	2.577
2/9/2009 15:48	635.999	0.049	12.906	2.578
2/9/2009 15:48	671.999	0.052	12.898	2.577
2/9/2009 15:49	714	0.042	12.886	2.581
2/9/2009 15:50	755.999	0.041	12.874	2.581

2/9/2009 15:50	798	0.041	12.866	2.581
2/9/2009 15:51	846	0.035	12.853	2.584
2/9/2009 15:52	900	0.022	12.834	2.589
2/9/2009 15:53	948	0.035	12.82	2.584
2/9/2009 15:54	1007.999	0.032	12.811	2.585
2/9/2009 15:55	1068.124	0.032	12.806	2.585
2/9/2009 15:56	1127.999	0.027	12.814	2.587
2/9/2009 15:57	1193.999	0.051	12.813	2.577
2/9/2009 15:58	1265.999	0.047	12.815	2.579
2/9/2009 15:59	1344	0.049	12.813	2.578
2/9/2009 16:01	1422	0.028	12.821	2.587
2/9/2009 16:02	1506	0.008	12.802	2.596
2/9/2009 16:04	1595.999	0.016	12.689	2.592
2/9/2009 16:05	1691.999	0.021	12.586	2.59
2/9/2009 16:07	1787.999	0.016	12.514	2.592
2/9/2009 16:09	1896	0.014	12.455	2.593
2/9/2009 16:11	2010	0.015	12.418	2.593
2/9/2009 16:13	2129.999	0.012	12.379	2.594

APPENDIX H

**AVERAGE GROUNDWATER LINEAR
FLOW VELOCITY**

APPENDIX H

AVERAGE GROUNDWATER LINEAR FLOW
VELOCITY CALCULATIONSComprehensive Site Assessment
and Corrective Actions
LCH-4023Marine Corps Base
Camp Lejeune, NC

$$V_{AVG} = (K/Ne_{AVG}) (dh/dl)$$

Where:

 V_{AVG} = Average Groundwater Linear Flow Velocity (ft/day)

 K_{AVG} = Average Hydraulic Conductivity in ft/day from slug tests on MW01* and MW05*. (Appendix G) = **1.374** ft/day

 dh = Change in Hydraulic Head (ft) between wells*

MW04 and MW01 = 27.90 - 24.63
 *=All well nomenclature prefaced with "USTLCH4023" = **3.27** ft.

 dl = Horizontal Distance (ft) between wells

MW04 and MW01 = **142.7** ft.

 Ne_{AVG} = Effective Porosity = Average of **0.437** from Table 2.1 in Todd (1980) for fine-grained sand, silt, and clay.

Using:

 K = 1.374 ft/day

 dh/dl = 0.023 ft/ft

 Ne_{AVG} = 0.437 unitless

$$V_{AVG} = \frac{1.37}{0.437} \times 0.023$$

V_{AVG}	=	0.072	ft/day	TO THE	NORTHWEST
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COMPUTED BY: Steven Hudson
 DATE: 4/21/2009

CHECKED BY: Michael B. Mason
 DATE: 7/18/09

APPENDIX I

CONTAMINANT VELOCITY CALCULATIONS

APPENDIX I

CONTAMINANT VELOCITY CALCULATIONS

for

NAPHTHALENE

Comprehensive Site Assessment

and Corrective Actions

LCH-4023

Marine Corps Base

Camp Lejeune, NC

$K_{ow} = 2300$ for NAPHTHALENE (p. 23, Table II-9, EPA, WQA Part I)

DETERMINE CONTAMINANT VELOCITY

$$V_c = V_{AVG}/R_d$$

WHERE:

V_c = Contaminant Velocity (ft/day)

V_{AVG} = Average Groundwater Linear Flow Velocity (ft/day) (Appendix G)

R_d = Retardation Factor

CALCULATE RETARDATION FACTOR

$$R_d = 1 + [K_d (r_b / P)]$$

WHERE:

K_d = Distribution Coefficient (ml/g)

ρ_b = Bulk Density (ml/g)

P = Porosity (decimal)

DISTRIBUTION COEFFICIENT

$$K_d = K_{oc} [0.2 (1-F) x_{oc}^s + F (x_{oc}^f)]$$

WHERE:

F = Mass of Silt and Clay/Mass of Sand, Silt, and Clay

x_{oc}^s = Organic Fraction of Sand [$0 \leq x_{oc}^s \leq 0.1$]

x_{oc}^f = Organic Fraction of Silt and Clay [$0 \leq x_{oc}^f \leq 0.1$]

$K_{oc} = 0.63 (K_{ow})$

K_{ow} = Octanol Water Partition Coefficient

$F = 0.032$ Estimated from grain size analysis on samples with similar lithology.

FROM:

$$K_{ow} = 2300$$

$$K_{oc} = 0.63 \quad (\quad 2300 \quad)$$

$$K_{oc} = 1449$$

$$\rho_b = 1.47 \text{ g/cm}^3 \text{ for AVERAGE* (p. 314, Table VII-2, EPA, WQA Part II)}$$

$$P = 0.44 \text{ for AVERAGE* (p. 318, Table VII-4, EPA, WQA Part II)}$$

$$x_{oc}^s = 0.025 \text{ (Mean Value)}$$

* = Average for f. sand, silt, and clay.

$$x_{oc}^f = 0.065 \text{ (Mean Value)}$$

THEREFORE:

$$K_d = K_{oc} [0.2(1-F) x_{oc}^s + F (x_{oc}^f)]$$

$$K_d = 1449 \quad [0.2(1- 0.032) \quad 0.025 + 0.032 \quad (\quad 0.065 \quad)]$$

$$K_d = 10.03$$

$$R_d = 1 + K_d [(\rho_b / P)]$$

$$R_d = 1 + [10.03 \quad (\quad 1.47 \quad / \quad 0.44 \quad)]$$

$$R_d = 34.50$$

CALCULATE CONTAMINANT VELOCITY

$$V_c = V_{AVG} / R_d$$

$$V_c = 0.072 \text{ (ft/day)} / 34.50$$

$V_c = 0.002087 \quad (\text{ft/day}) \quad \text{for NAPHTHALENE}$

COMPUTED BY: Steven Hudson

DATE: 4/21/2009

CHECKED BY: Michael B. Hansen

DATE: 7/18/09

* Contaminant velocity equations and reference data are from:

U.S. Environmental Protection Agency, September 1985, *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water*, PB865-122496, Parts 1, 2, and 3, EPA #s 600685002a,b, and c.

U.S. Environmental Protection Agency, Environmental Research Laboratory, Office of Research and Development, Revised 1985, *Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants*, Part II, 444 pp.

APPENDIX J

SOIL DISPOSAL MANIFESTS

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 11124

LOAD # 1 07417

GENERATOR

DOD
Former LCH-4023
Midway Park Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023
Bar ABMT: CATLIN agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 83500

Truck #: PF 103

Tare Weight (lbs.): 33060

Truck Tag #/State: 2B 16949

Net Weight (lbs.): 50440

Driver Name (Print): Walter Parker

Net Weight (tons): 25.22

I hereby certify that the material stated herein was received at the waste origination site listed.

I hereby certify that the material stated herein was delivered without incident to the destination listed.

Walter Parker 5/27/09
Driver Signature Date

Walter Parker 5/27/09
Driver Signature Date

Inspected and Accepted By:

As per 5/27/09 James Bridger

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804

Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 11124

LOAD # 2 07415

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION: Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION: Former AST LCH-4023
Be A2N = CARL (Nagen + for DOD)

Transporter: P & F Environmental

Gross Weight (lbs.): 76260

Truck #: PF 106

Tare Weight (lbs.): 24500

Truck Tag #/State: 2B 37964

Net Weight (lbs.): 51760

Driver Name (Print): Bryant Pridgen

Net Weight (tons): 25.88

I hereby certify that the material stated herein was received at the waste origination site listed.

I hereby certify that the material stated herein was delivered without incident to the destination listed.

Bryant Pridgen 5.27.09
Driver Signature Date

Bryant Pridgen 5.27.09
Driver Signature Date

Inspected and Accepted By: E. A. Jones 5/27/09 Jane Pridgen

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804

Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 11124

LOAD# 3 07416

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION: Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former Ast LCH-4023
Ben Ashby - CATW agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 81780

Truck #: PF 102

Tare Weight (lbs.): 33420

Truck Tag #/State: 2B 25821

Net Weight (lbs.): 48360

Driver Name (Print): Tim Thorne

Net Weight (tons): 24.18

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Tim Thorne 5-27-09
Driver Signature Date

Tim Thorne 5-27-09
Driver Signature Date

Inspected and Accepted By:

E. A. for 5/27/09 Janet Ridge

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 11124

LOAD # 4 07418

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023
Ben Ashk: CATL W agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 78020

Truck #: PF 102

Tare Weight (lbs.): 31700

Truck Tag #/State: 2B 12252

Net Weight (lbs.): 46320

Driver Name (Print): Franklin Rhodes

Net Weight (tons): 23.16

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Franklin Rhodes 5.27.09
Driver Signature Date

Franklin Rhodes 5/27/09
Driver Signature Date

Inspected and Accepted By:

Emilio J. [Signature] 5/27/09 Jared Ridge

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

1352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL #

07425
(11124)

LOAD #

5

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE:

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023

Burn Ash L: CATLIN agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 80340

Truck #: PF ~~104~~ 104

Tare Weight (lbs.): 31700

Truck Tag #/State: 2B 12252

Net Weight (lbs.): 48640

Driver Name (Print): Franklin Rhodes

Net Weight (tons): 24.32

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Franklin Rhodes 5/23/09
Driver Signature Date

Franklin Rhodes 5/27/09
Driver Signature Date

Inspected and Accepted By:

Franklin Rhodes 5/27/09 Janet Pridgen

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07426

LOAD # 6

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023

Per App: CAT/Agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 87360

Truck #: 103

Tare Weight (lbs.): 33060

Truck Tag #/State: 2B-16949

Net Weight (lbs.): 54300

Driver Name (Print): Walter Parker

Net Weight (tons): 27.15

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Walter Parker 5-27-09
Driver Signature Date

Walter Parker 5-27-09
Driver Signature Date

Inspected and Accepted By: E. H. J. 5/27/09 James Prichard

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07424

LOAD # 7

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023
Ben Ashk = CATL Agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 82060

Truck #: PF 102

Tare Weight (lbs.): 33420

Truck Tag #/State: ZB 25821

Net Weight (lbs.): 48640

Driver Name (Print): Tim Thorne

Net Weight (tons): 24.32

I hereby certify that the material stated herein
was received at the waste origination site listed.

Tim Thorne 5-27-09
Driver Signature Date

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Tim Thorne 5-27-09
Driver Signature Date

Inspected and Accepted By:

[Signature] 5/27/09 Jared Bridger

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 11124

LOAD # 8 07423

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023
Ben Allen: CAPIN agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 76900

Truck #: 106

Tare Weight (lbs.): 24500

Truck Tag #/State: 2B-37964

Net Weight (lbs.): 52400

Driver Name (Print): Bryant Bridger

Net Weight (tons): 26.20

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Bryant Bridger 5.27.09
Driver Signature Date

Bryant Bridger 5.27.09
Driver Signature Date

Inspected and Accepted By:

En W Jr 5/27/09

Bryant Bridger

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804

Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 11124

LOAD # 9 07419

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGATION:

Former AST LCH-4023

Bentley CATLIN agent for DEP

Transporter: P & F Environmental

Gross Weight (lbs.): 59220

Truck #: PF 101

Tare Weight (lbs.): 23560

Truck Tag #/State: 2B 12254

Net Weight (lbs.): 35660

Driver Name (Print): Bryant Bridger

Net Weight (tons): 17.83

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Bryant Bridger 5-27-09
Driver Signature Date

Bryant Bridger 5-27-09
Driver Signature Date

Inspected and Accepted By:

E. H. for 3/27/05 Jessie Bridger

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804

Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07430

LOAD # 10

GENERATOR

DOD
Former LCH-4023
Midway Park Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023

Ben Arch: CAT Agent for DOD

Transporter: P&F Environmental

Gross Weight (lbs.): 80180

Truck #: 162

Tare Weight (lbs.): 33420

Truck Tag #/State: ZB25821

Net Weight (lbs.): 46760

Driver Name (Print): Tim Thorne

Net Weight (tons): 23.38

I hereby certify that the material stated herein was received at the waste origination site listed.

I hereby certify that the material stated herein was delivered without incident to the destination listed.

Tim Thorne 5-28-09
Driver Signature Date

Tim Thorne 5-28-09
Driver Signature Date

Inspected and Accepted By:

E. Allen 5/28/09 Janet Bridgman

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804

Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 07427

LOAD# 11

GENERATOR

DDO
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023
Ben Allen - ARUN agent for DDO

Transporter: P & F Environmental

Truck #: 103

Truck Tag #/State: 2B-16949

Driver Name (Print): Walter Parker

Gross Weight (lbs.): 75960

Tare Weight (lbs.): 33060

Net Weight (lbs.): 42900

Net Weight (tons): 21.45

I hereby certify that the material stated herein was received at the waste origination site listed.

Walter Parker 5-28-09
Driver Signature Date

I hereby certify that the material stated herein was delivered without incident to the destination listed.

Walter Parker 5-28-09
Driver Signature Date

Inspected and Accepted By:

E. A. Jr 5/28/09 Janet Bridge

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

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Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 07431

LOAD # 12

GENERATOR

DOD
Former LCH-4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH-4023
Ben Holt: CAPN Agent Fr DOD

Transporter: P&F Environmental

Gross Weight (lbs.): 62240

Truck #: PF 101

Tare Weight (lbs.): 23560

Truck Tag #/State: 2B-12254

Net Weight (lbs.): 38680

Driver Name (Print): Jason Bridger

Net Weight (tons): 19.34

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Jason Bridger 5.28.09
Driver Signature Date

Jason Bridger 5.28.09
Driver Signature Date

Inspected and Accepted By: [Signature] 5/28/09 Jason Bridger

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 07429

LOAD # 13

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION: Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION: Former AST LCH-4023

Ben Ashl: CATLW agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 77100

Truck #: PF 106

Tare Weight (lbs.): 24500

Truck Tag #/State: ZB 37164

Net Weight (lbs.): 52600

Driver Name (Print): Bryant Pridgen

Net Weight (tons): 26.30

I hereby certify that the material stated herein was received at the waste origination site listed.

I hereby certify that the material stated herein was delivered without incident to the destination listed.

Bryant Pridgen 5.28.09
Driver Signature Date

Bryant Pridgen 5.28.09
Driver Signature Date

Inspected and Accepted By: [Signature] 5/28/09

[Signature]

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

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Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 07428

LOAD # 14

GENERATOR

DDP
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former ART LCH-4023
Ben Art: APN agent for DDP

Transporter: P&F Environmental

Gross Weight (lbs.): 75540

Truck #: 104

Tare Weight (lbs.): 31700

Truck Tag #/State: ZB-12252

Net Weight (lbs.): 43840

Driver Name (Print): Franklin Rhodes

Net Weight (tons): 21.92

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Franklin Rhodes 5/28/09
Driver Signature Date

Franklin Rhodes 5/28/09
Driver Signature Date

Inspected and Accepted By:

Franklin Rhodes 5/28/09 James Bridges

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 0783

LOAD # 15

GENERATOR

DOD
former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGATION:

Former AST LCH 4023

Ben Ash: CATUN agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 76600

Truck #: 104

Tare Weight (lbs.): 31700

Truck Tag #/State: ZB-12252

Net Weight (lbs.): 44900

Driver Name (Print): Franklin Rhodes

Net Weight (tons): 22.45

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Franklin Rhodes 5/28/09
Driver Signature Date

Franklin Rhodes 5/28/09
Driver Signature Date

Inspected and Accepted By: E. Ash 5/28/09

Janet Priddy

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 11124

LOAD # 16 07432

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH 4023

Ben Asher: CAPN Agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 80580

Truck #: 102

Tare Weight (lbs.): 33420

Truck Tag #/State: ZB 25821

Net Weight (lbs.): 47160

X Driver Name (Print): Tim Thorne

Net Weight (tons): 23.58

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

X Jim Thorne 5-28-09
Driver Signature Date

Jim Thorne 5-28-09
Driver Signature Date

Inspected and Accepted By: [Signature] 5/28/09

[Signature]

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

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NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07435

LOAD # 17

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH 4023
Ben Ashb: CAP Agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 79460

Truck #: 106

Tare Weight (lbs.): 24500

Truck Tag #/State: 7B 37964

Net Weight (lbs.): 54960

Driver Name (Print): Bryant Pridgen

Net Weight (tons): 27.48

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Bryant Pridgen 5.28.09
Driver Signature Date

Bryant Pridgen 5.28.09
Driver Signature Date

Inspected and Accepted By:

E. H. [Signature] 5/28/09 Bryant Pridgen

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

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Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 07434

LOAD # 18

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST 4023
Ben Ayck: CATLIN agent for DOD

Transporter: P&F Environmental

Gross Weight (lbs.): 79040

Truck #: 103

Tare Weight (lbs.): 33060

Truck Tag #/State: ZB 16949

Net Weight (lbs.): 45980

X Driver Name (Print): Walter

Net Weight (tons): 22.99

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Walter 5-28-09
Driver Signature Date

5-28-09 Walter
Driver Signature Date

Inspected and Accepted By:

[Signature] [Signature]
Inspected and Accepted By: _____

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07440

LOAD # #5 19

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH 4023

Ben Ashby: CATUN agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 76360

Truck #: 106

Tare Weight (lbs.): 24500

Truck Tag #/State: ZB 37964

Net Weight (lbs.): 51860

Driver Name (Print): Bryant Pridgen

Net Weight (tons): 25.93

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Bryant Pridgen 5.29.09
Driver Signature Date

Bryant Pridgen 5.29.09
Driver Signature Date

Inspected and Accepted By: E. Ashby 5/29/09 James Pridgen

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07439

LOAD # #6 20

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH 4023

Ben Ashh: CATLIN agent for DOD

Transporter: P&F Environmental

Gross Weight (lbs.): 77900

Truck #: 104

Tare Weight (lbs.): 31700

Truck Tag #/State: 2B 12252

Net Weight (lbs.): 46200

Driver Name (Print): Franklin Rhodes

Net Weight (tons): 23.10

I hereby certify that the material stated herein
was received at the waste origination site listed.

Franklin Rhodes 5.29.09
Driver Signature Date

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Franklin Rhodes 5/29/09
Driver Signature Date

Inspected and Accepted By:

[Signature] 5/29/09 Janet Ridge

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804
Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL # 07437

LOAD # 7 21

GENERATOR

DOD
Former LCH 4023
Midway Park, Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former AST LCH 4023
Ben AWH: CATIN agent for DOD

Transporter: P&F Environmental

Gross Weight (lbs.): 73720

Truck #: 102

Tare Weight (lbs.): 33420

Truck Tag #/State: 23-25821

Net Weight (lbs.): 40300

Driver Name (Print): Tim Thorne

Net Weight (tons): 20.15

I hereby certify that the material stated herein was received at the waste origination site listed.

I hereby certify that the material stated herein was delivered without incident to the destination listed.

Tim Thorne 5-29-07
Driver Signature Date

Tim Thorne 5-29-07
Driver Signature Date

Inspected and Accepted By:

Ed A. [Signature] 5/29/07 Janet Bridger
Date

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

P & F Environmental

4352 N. Old Carriage Road • Rocky Mount, NC 27804

Phone: (252) 443-4083 • Fax: (252) 443-4104

NON-HAZARDOUS WASTE MANIFEST

APPROVAL# 07438

LOAD# 78 22

GENERATOR

DOD
Former LCH 4023
Midway Park Jacksonville, NC

DESTINATION

Land Application Facility Permit No. SR0500106
Speights Chapel Road
Whitakers, NC 27891

PHONE: _____

PHONE: (252) 443-4083

WASTE DESCRIPTION:

Non-Hazardous Petroleum Contaminated Soil

WASTE ORIGINATION:

Former ASTA 4023
LCH
Ben Ashk: CATLIN agent for DOD

Transporter: P & F Environmental

Gross Weight (lbs.): 80700

Truck #: 103

Tare Weight (lbs.): 33060

Truck Tag #/State: 2B-16949

Net Weight (lbs.): 47640

Driver Name (Print): Walter

Net Weight (tons): 23.82

I hereby certify that the material stated herein
was received at the waste origination site listed.

I hereby certify that the material stated herein was
delivered without incident to the destination listed.

Walter Park 5-29-09
Driver Signature Date

Walter Park 5/29/09
Driver Signature Date

Inspected and Accepted By: [Signature] 5/29/09 [Signature]

NOTICE TO TRANSPORTER

TRUCKS WILL NOT BE PERMITTED TO ENTER
THE FACILITY WITHOUT THIS ENTRANCE TICKET

WHITE - Invoice

YELLOW - Generator

PINK - Trucker

GOLD - P & F Environmental