



Post Office Box 10279
Wilmington, North Carolina 28404-0279

Telephone: (910) 452-5861
Fax: (910) 452-7563

www.catlinusa.com

January 28, 2009

NAVFAC Mid-Atlantic
Marine Corps North Carolina IPT
Environmental Business Line
Code: OPCEV3MA
Attn: Mr. Melvin Acree
6506 Hampton Boulevard
Building C, Room 314
Norfolk, VA 23508-1278

Re: AST Site LCH-4015 – Additional Soil Assessment
Marine Corps Base, Camp Lejeune, North Carolina
Navy Contract No. N62470-05-D-6200
Delivery Order No. 0016
CATLIN Project No. 205-077

Dear Mr. Acree:

CATLIN Engineers and Scientists (CATLIN) has collected two soil samples at the former fuel island associated with the LCH-4015 Above ground Storage Tank (AST) system per the request of Mr. Bruce Reed of the North Carolina Department of Environment and Natural Resources (NCDENR). The samples were collected to determine if soil contamination above the NCDENR action levels was present in these locations. Please find below a summary of the sampling activities, results and CATLIN's recommendations.

General Site Information and History

The Building LCH-4015 site is located within the Midway Park Community Center of Marine Corps Base (MCB), Camp Lejeune in Onslow County, North Carolina. The site consists of the Community Center Building (LCH-4014), former fueling and maintenance area (LCH-4015), Marine Corps Exchange Convenience Store (LCH-4034), and the former fuel tank farm (SLCH-4024). The site is located at the intersection of North Carolina Highway 24 and the entrance to Midway Park (Butler Drive). See Figure 1 for site location.

Various site assessments were conducted in the early 1990s to determine the integrity of the AST system and delineate the extent, if applicable, of free-phase product, soil contamination, and groundwater contamination in the vicinity of Building LCH-4015. LAW Engineering and Environmental Services, Inc. (LAW) prepared and submitted a

Corrective Action Plan (CAP) dated August 27, 1996 utilizing the findings from these various site assessments.

The recommended remediation strategy within the CAP for site restoration was a treatment system consisting of a biosparge system and a Soil Vapor Extraction (SVE) system. It is our understanding that J. A. Jones Environmental Services Company (JA Jones) installed the biosparge and horizontal SVE treatment system in 1998 and began operation of the system in November 1998. Various contractors have maintained and operated the remediation system over the years. The system is currently active and being operated by Shaw Environment and Infrastructure, Inc. (Shaw).

Investigations associated with a UST system at Building LCH-4034 have been conducted concurrently with the investigations associated with the AST system at Building LCH-4015. Data collected during these investigations appears to indicate that soil contamination has not commingled from these separate systems. Therefore, no further information about the investigations of the UST system will be discussed in this summary due to the fact that it does not pertain to the soil investigation which was conducted in the vicinity of the former AST supply lines.

CATLIN prepared an Remedial Action Optimization and Revised Corrective Action Plan (RAO & RCAP) dated May 6, 2004 that concluded at that time the applicable remedial requirements for the contamination associated with the LCH-4015 ASTs was based on the corrective action requirements per 15A NCAC 2L .0106 which became effective on January 2, 1998 and the document entitled "*Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater*" (2000 Guidelines) as released by the NCDENR Division of Water Quality, Groundwater Section, effective July 2000.

The RAO & RCAP concluded that the portion of the site associated with the former LCH-4015 AST system should be regulated under the current Groundwater Section Guidelines.

Research of the historical soil sampling conducted at the AST portion of the LCH-4015 site indicates that soil samples were not collected from directly beneath the former fuel dispensers. Therefore, the current investigation was conducted to determine if soil contamination existed above the NCDENR action levels at these locations.

Current Soil Sampling

On January 8, 2009 CATLIN personnel arrived on-site to conduct soil sampling activities. To obtain soil samples it was necessary to core through the former fuel island concrete pad. Once the pad was cored, two borings (ASTLCH4015-SB49 and ASTLCH4015-SB50) were installed to approximately four feet below land surface (BLS) by hand auger technique. Soil samples were collected continuously during

advancement and divided into one foot intervals for description. In addition, soil samples collected from the borings were screened with a Photo-Ionization Detector (PID). One soil sample for laboratory analysis was collected from each boring at a depth of one to two feet (1-2') BLS. Boring logs are provided in Appendix A.

The soil samples collected for laboratory analysis were packed in the appropriate pre-labeled glassware and placed in a chilled cooler pending delivery to SGS Laboratories in Wilmington, North Carolina for analysis per EPA Method 3550/8015 and 5030/8015.

The complete laboratory report and Chain of Custody (COC) documentation is included in Appendix B and summarized as follows:

As indicated in Table 1 and illustrated on Figure 2, Gasoline Range Organics (GRO) was detected in both the ASTLCH4015-SB49 (1-2) and ASTLCH4015-SB50 (1-2) samples and a duplicate sample from ASTLCH4015-SB50 (1-2) at concentrations of 61.3 mg/kg, 23.2 mg/kg and 21.0 mg/kg, respectively. All of the detected concentrations of GRO were above the NCDENR action level of 10 mg/kg for this contaminant. Diesel Range Organics (DRO) was detected in both the ASTLCH4015-SB49 (1-2) and ASTLCH4015-SB50 (1-2) samples and a duplicate sample from ASTLCH4015-SB50 (1-2) at concentrations of 57.7 mg/kg, 33.3 mg/kg and 16.1 mg/kg, respectively. Only the detected concentration of 57.7 mg/kg in sample ASTLCH4015-SB49 (1-2) was above the NCDENR action level of 40 mg/kg for DRO.

Recommendations

The two soil samples collected during the current investigation at the former fuel island both revealed GRO and/or DRO above the NCDENR action levels. As illustrated on Figure 2, a portion of the biosparge and horizontal SVE treatment system is located below the former fuel island. CATLIN recommends the continued operation of the biosparge and SVE system to treat the soil and groundwater contamination identified in the area of the former fuel island. CATLIN further recommends that the soil be re-sampled in the vicinity of the former fuel island at which time the groundwater contaminant levels have been reduced to below the NCDENR 2L Groundwater Quality Standards (GWQSs).

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CATLIN Engineers and Scientists appreciate the opportunity to continue to provide services to NAVFAC Mid-Atlantic and the MCB on your environmental projects.

Sincerely,

Shane A. Chasteen
Shane A. Chasteen
Project Manager

Michael E. Mason
Michael E. Mason, P.E.
Program Manager



cc: Ms. Susan Tsimpinos - NAVFAC Mid-Atlantic Contracts
Commanding Officer - Attn: Director I&E/EMD/EQB (with two copies)

205077_LCH4015_LtrRpt.doc

TABLES

**TABLE 1
SUMMARY OF SOIL LABORATORY RESULTS
EPA METHOD 3550/5030**

Incident Name and No.: LCH-4015 - 85352

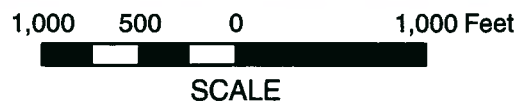
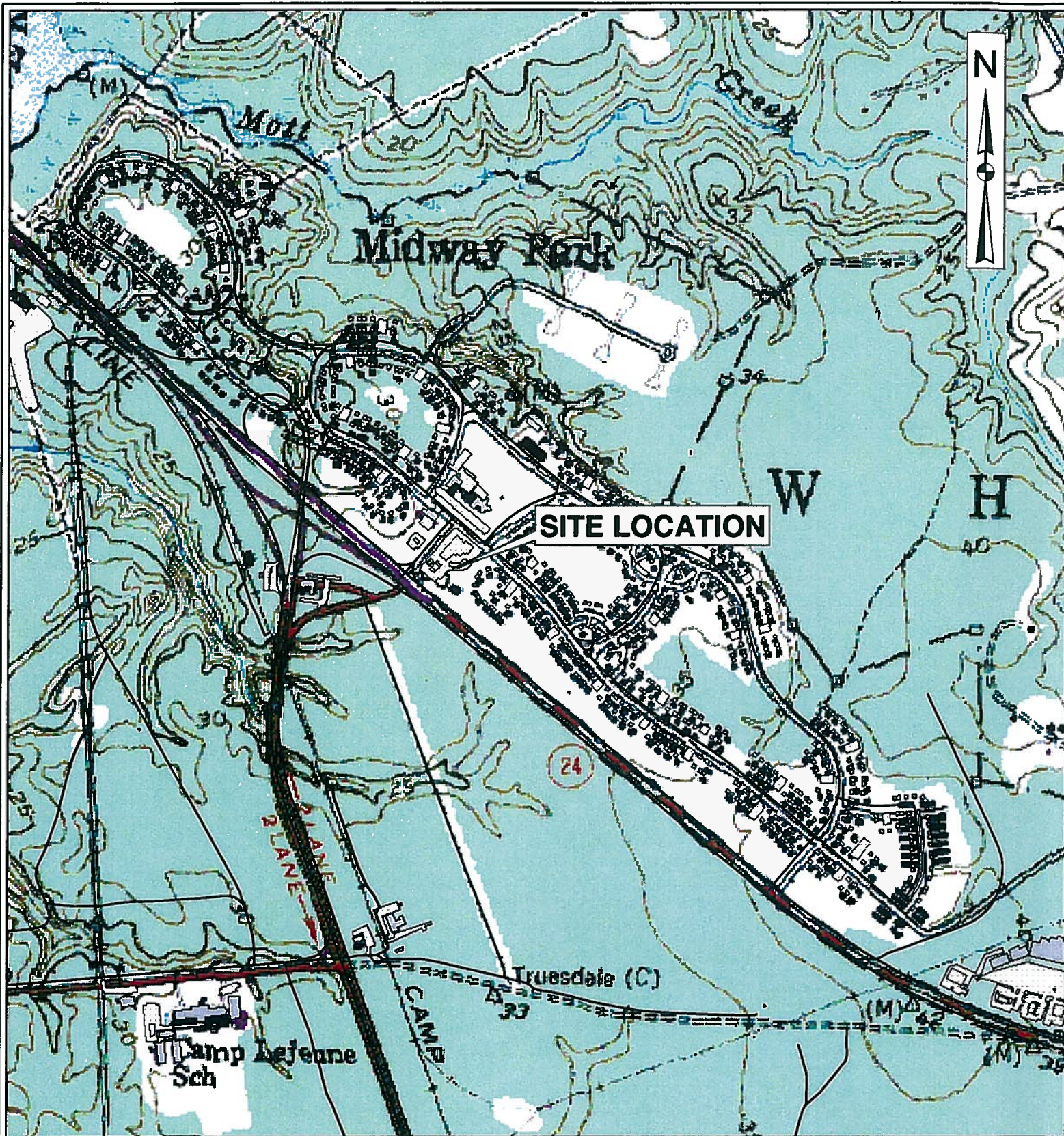
Sample ID	Contaminant of Concern →		Gasoline Range Organics	Diesel Range Organics
	Date Collected	Sample Depth (ft. BLS)		
NCDENR Action Level (mg/kg)			10	40
ASTLCH4015-SB49 (1-2)	1/8/2009	1-2	61.3	57.7
ASTLCH4015-SB50 (1-2)	1/8/2009	1-2	23.2	33.3
ASTLCH4015-SB50 (1-2) DUP	1/8/2009	1-2	21.0	16.1

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


NCDENR = North Carolina Department of Environment and Natural Resources

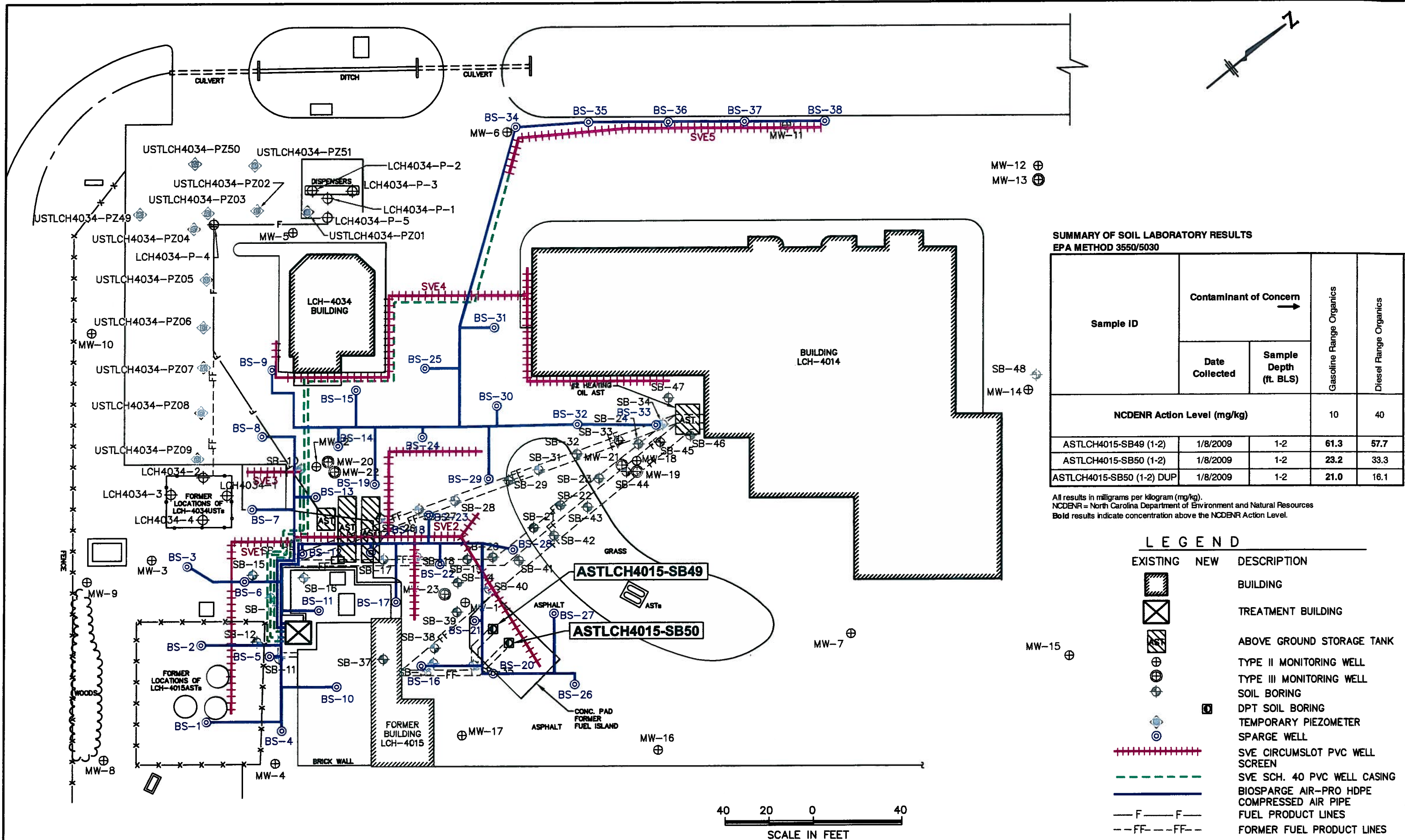
Bold results indicate concentration above the NCDENR Action Level.

FIGURES



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

	PROJECT ADDITIONAL SOIL ASSESSMENT LCH4015 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE SITE LOCATION MAP		FIGURE 1
	JOB NO. 205-077	DATE JAN 2009	SCALE AS SHOWN	DRAWN BY SAC	CHECKED BY MEM



SUMMARY OF SOIL LABORATORY RESULTS
EPA METHOD 3550/5030

Sample ID	Contaminant of Concern		Gasoline Range Organics	Diesel Range Organics
	Date Collected	Sample Depth (ft. BLS)		
NCDENR Action Level (mg/kg)			10	40
ASTLCH4015-SB49 (1-2)	1/8/2009	1-2	61.3	57.7
ASTLCH4015-SB50 (1-2)	1/8/2009	1-2	23.2	33.3
ASTLCH4015-SB50 (1-2) DUP	1/8/2009	1-2	21.0	16.1

All results in milligrams per kilogram (mg/kg).
 NCDENR = North Carolina Department of Environment and Natural Resources
 Bold results indicate concentration above the NCDENR Action Level.

LEGEND

EXISTING	NEW	DESCRIPTION
[Hatched Box]		BUILDING
[Crossed Box]		TREATMENT BUILDING
[Box with AST]		ABOVE GROUND STORAGE TANK
[Circle with ⊕]		TYPE II MONITORING WELL
[Circle with ⊕]		TYPE III MONITORING WELL
[Circle]		SOIL BORING
[Circle with ⊕]		DPT SOIL BORING
[Circle with ⊕]		TEMPORARY PIEZOMETER
[Circle with ⊕]		SPARGE WELL
[Red Dashed Line]		SVE CIRCUMSLOT PVC WELL SCREEN
[Green Dashed Line]		SVE SCH. 40 PVC WELL CASING
[Blue Solid Line]		BIOSPARGE AIR-PRO HDPE COMPRESSED AIR PIPE
[Blue Dashed Line]		FUEL PRODUCT LINES
[Blue Dotted Line]		FORMER FUEL PRODUCT LINES

NOTE:
 1. DRAWING ADAPTED FROM SITE MAP/REMEDIAL SYSTEM LAYOUT BY J.A. JONES ENVIRONMENTAL SERVICES, DATED 10/14/98.
 2. LCH4034 SOIL BORING LOCATIONS OBTAINED FROM UST CLOSURE REPORT.

SCALE IN FEET
40 20 0 40

 CATLIN Engineers and Scientists	PROJECT ADDITIONAL SOIL ASSESSMENT LCH 4015 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL SAMPLING RESULTS	FIGURE 2
	JOB NO. 205-077 DATE JAN 2009	SCALE: 1"=40'	DRAWN BY: LCJ CHECKED BY: SAC

APPENDIX A
BORING LOGS

BORING LOG

PROJECT NO.: 205-077	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: LCH-4015		LOGGED BY: Tom Stetler	BORING ID: ASTLCH 4015-SB49
NORTHING: 3,845,167.47	EASTING: 285,749.76	DRILLER: John E. Wood, III	
SYSTEM: UTM NAD83 (m)		CREW: Roger Caulder	LAND ELEV.: NM
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: 3.8	BORING DEPTH: 4.0
START DATE: 1/8/09	FINISH DATE: 1/8/09	24 HOUR DTW: 1.1	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	SOIL AND ROCK DESCRIPTION	
							DEPTH	ELEVATION
							0.0	LAND SURFACE
							0.8	CONCRETE
1.0		M	▲620.8	AST LCH 4015-SB49 (1-2)	SP	▼	1.8	Brown to tan, f. to vf. SAND. Tr. silt. Fill. Moist
2.0		M	▲553.1		SC		2.5	Dark brown, organic-rich, CLAYEY vf. SAND. Strong HCO. Moist.
3.0		W	▲264.9		SC		4.0	Grayish-brown, CLAYEY vf. SAND. In gradational contact with above- Lower organic content with depth and increased sand. Wet at approximately 3.0' BLS.
4.0						▽		Boring Terminated at Depth 4.0 ft in CLAYEY SAND.

CATLIN ENVIRO. LOG - 205-077 LCH-4015.GPJ CATLIN.GDT - 1/12/09

▽ = 0hr. DTW ▼ = 24hr. DTW

BORING LOG

PROJECT NO.: 205-077	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: LCH-4015		LOGGED BY: Tom Stetler	BORING ID: ASTLCH 4015-SB50
NORTHING: 3,845,167.11	EASTING: 285,752.52	DRILLER: John E. Wood, III	
SYSTEM: UTM NAD83 (m)		CREW: Roger Caulder	LAND ELEV.: NM
DRILL MACHINE: Hand Auger		METHOD: Hand Auger	0 HOUR DTW: 3.4
START DATE: 1/8/09		FINISH DATE: 1/8/09	BORING DEPTH: 3.5
		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	SOIL AND ROCK DESCRIPTION	
							DEPTH	ELEVATION
0.0							0.0	LAND SURFACE
		M	329.0				0.7	CONCRETE
1.0		M	409.4	AST LCH 4015 -SB50 (1-2) +DUP	SP		1.7	Gray, f. to vf. SAND. Tr. silt. Fill. Uniform grading. Slight HCO.
2.0					SC		2.5	Dark brown, CLAYEY to SILTY vf. SAND. High organic content by color. Native. Moist. Strong HCO. Sharp contact with above.
		W	257.3		SC		3.5	Grayish-brown, CLAYEY vf. SAND. Wet at 3.0' BLS. Saturated at 3.5'. In gradational contact with above.
3.5								Boring Terminated at Depth 3.5 ft in CLAYEY SAND.

CATLIN ENVIRO. LOG 205-077 LCH-4015.GPJ CATLIN.GDT 1/12/09

▽ = 0hr. DTW

▼ = 24hr. DTW

APPENDIX B

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

SGS Environmental Services, Inc.

Mr. Shane Chasteen
Richard Catlin & Associates
P.O. Box 10279
Wilmington NC 28404-0279

Report Number: G128-2300

Client Project: LCH-4015 Additional Soil Assessment

Dear Mr. Chasteen:

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 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: 

Project Manager
Ashley Nifong

1.19.09
Date

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.

SGS Environmental Services, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: ASTLCH4015-SB49 (1-2)

Analyzed By: DVG

Client Project ID: LCH-4015 Additional Soil Assessment

Date Collected: 1/8/2009 12:30

Lab Sample ID: G128-2300-1A

Date Received: 1/9/2009

Lab Project ID: G128-2300

Matrix: Soil

Report Basis: Dry Weight

Solids 70.14

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	61.3	9.46	mg/Kg	1	01/13/09 18:29

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	113	113		70-130

Comments:

Batch Information

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

Prep Method: 5035
Initial Wt/Vol: 4.52 g
Final Volume: 5 mL

Analyst: 

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: ASTLCH4015-SB50 (1-2)
Client Project ID: LCH-4015 Additional Soil Assessment
Lab Sample ID: G128-2300-2A
Lab Project ID: G128-2300
Report Basis: Dry Weight

Analyzed By: DVG
Date Collected: 1/8/2009 12:00
Date Received: 1/9/2009
Matrix: Soil
Solids 76.51

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	23.2	6.52	mg/Kg	1	01/13/09 18:56

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	117	117		70-130

Comments:

Batch Information

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

Prep Method: 5035
Initial Wt/Vol: 6.01 g
Final Volume: 5 mL

Analyst: 38

NC Certification #481

Reviewed By: [Signature]
GRO

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: ASTLCH4015-SB50 (1-2) DUP

Analyzed By: DVG

Client Project ID: LCH-4015 Additional Soil Assessment

Date Collected: 1/8/2009 12:00

Lab Sample ID: G128-2300-3A

Date Received: 1/9/2009

Lab Project ID: G128-2300

Matrix: Soil

Report Basis: Dry Weight

Solids 77.42

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	21.0	6.50	mg/Kg	1	01/13/09 19:22

Surrogate Spike Results

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

Comments:

Surrogate recovery confirmed by duplicate analysis.

Batch Information

Analytical Batch: VP011309

Prep Method: 5035

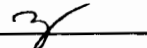
Analytical Method: 8015

Initial Wt/Vol: 5.96 g

Instrument ID: GC4

Final Volume: 5 mL

Analyst: DVG

Analyst: 

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: ASTLCH4015-SB49 (1-2) Date Collected: 1/8/2009 12:30
Client Project ID: LCH-4015 Additional Soil Assessment Date Received: 1/9/2009
Lab Sample ID: G128-2300-1D Matrix: Soil
Lab Project ID: G128-2300 Solids 70.14
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	57.7	8.81	mg/Kg	1	01/13/09 17:51
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	22.2	55.5

Comments:

Batch Information

Analytical Batch: EP011309 Prep batch: 13417
Analytical Method: 8015 Prep Method: 3541
Instrument: GC6 Prep Date: 01/12/09
Analyst: DTF Initial Prep Wt/Vol: 32.36 G
Prep Final Vol: 10 mL

Analyst: *GW*

NC Certification #481

Reviewed By: *[Signature]*
DRO.XLS
Page 6 of 9

Results for Total Petroleum Hydrocarbons
by GC/FID 8015


Client Sample ID: ASTLCH4015-SB50 (1-2) Date Collected: 1/8/2009 12:00
Client Project ID: LCH-4015 Additional Soil Assessment Date Received: 1/9/2009
Lab Sample ID: G128-2300-2D Matrix: Soil
Lab Project ID: G128-2300 Solids 76.51
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	33.3	7.82	mg/Kg	1	01/13/09 18:19
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	27.2	68

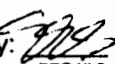
Comments:

Batch Information

Analytical Batch: EP011309 Prep batch: 13417
Analytical Method: 8015 Prep Method: 3541
Instrument: GC6 Prep Date: 01/12/09
Analyst: DTF Initial Prep Wt/Vol: 33.41 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: ASTLCH4015-SB50 (1-2) DUP Date Collected: 1/8/2009 12:00
Client Project ID: LCH-4015 Additional Soil Assessment Date Received: 1/9/2009
Lab Sample ID: G128-2300-3D Matrix: Soil
Lab Project ID: G128-2300 Solids 77.42
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	16.1	7.67	mg/Kg	1	01/13/09 18:48

Surrogate Spike Results

	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	27.6	68.9

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: 33.67 G
Prep Final Vol: 10 mL

Analyst:

NC Certification #481

Reviewed By:
DRO.XLS

