

**GROUNDWATER SAMPLING  
REPORT OF FINDINGS**

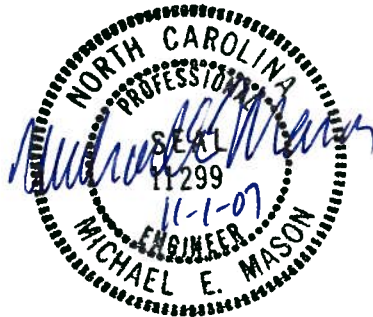
**FOR**

***PP-3311***  
**MARINE CORPS BASE  
CAMP LEJEUNE, NORTH CAROLINA**

**FACILITY ID#: E-002740  
NCDENR UST INCIDENT NO. 24007  
LAND USE CLASSIFICATION: RESIDENTIAL  
RISK CLASSIFICATION: LOW**

**OCTOBER 31, 2007**

**CONTRACT NO. N62470-05-D-6200  
DELIVERY ORDER NO. 0016  
CATLIN PROJECT NO. 205-077**



**PREPARED BY:**

**CATLIN ENGINEERS AND SCIENTISTS  
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**A. SITE IDENTIFICATION**

DATE OF REPORT: October 31, 2007  
Facility ID: E-002740 UST Incident Number (if known): 24007  
Land Use Classification: Residential Risk Classification: Low  
Site Name: PP-3311  
Site Location: 3311 Cooper Street, Marine Corps Base (MCB), Camp Lejeune (See Figure 1)  
Nearest City/Town: Jacksonville County: Onslow

UST Owner: Commanding General – MCB Camp Lejeune  
I&E/EMD/EQB  
Address: PSC 20004  
MCB Camp Lejeune, NC 28542 Phone: (910) 451-5068

UST 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: Military personnel and family  
Address: 3311 Cooper Street Phone: Unknown

Consultant/Contractor: CATLIN Engineers and Scientists  
Address: 220 Old Dairy Road, Wilmington, North Carolina 28405 Phone: (910) 452-5861

**Release Information**

Date Discovered: August 16, 2001  
Longitude: 77.3633 W Latitude: 34.6832 N

Estimated Quantity of Release: Unknown

Cause of Release: Unknown

Source of Release (e.g. Piping/UST):  
Possible leaking UST and/or associated piping

**Sizes and contents of UST system(s) from which the release occurred:**

Non-regulated, non-commercial, 285-gallon fuel oil UST used for heating a single-family residence

I, Michael E. Mason a Professional Engineer Licensed Geologist (circle one) for CATLIN Engineers and Scientists, 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. BACKGROUND AND PURPOSE**

On August 16, 2001, J.A. Jones Environmental Services Company (J.A. Jones) of Charlotte, North Carolina performed underground storage tank (UST) excavation operations and removed one 285-gallon, non-regulated, non-commercial fuel oil UST from the site (see Figure 2). The fuel oil tank was utilized strictly for heating purposes of the single family residence. A soil sample obtained at the base of the tank basin during tank removal was indicative of a release. Consequently, an over-excavation was performed and subsequent sidewall sampling revealed multiple compound concentrations in excess of the Soil-to-Groundwater (STGW) Maximum Soil Contaminant Concentrations (MSCCs), but only 2-Methylnaphthalene above the Residential MSCC in one sample (CC-3311-3).

In July 2002, CATLIN Engineers and Scientists (CATLIN) conducted field work and sampling required by the North Carolina Department of Environment and Natural Resources (NCDENR) for a Phase I Limited Site Assessment (LSA). One soil sample and one groundwater sample were collected for laboratory analysis. The soil sample was collected from beneath the former product line location. Soil sample results did not reveal any concentrations above the Residential MSCCs. A groundwater sample collected from the former UST basin area revealed Naphthalene, Benzene, Ethylbenzene, and C<sub>9</sub>-C<sub>22</sub> Aromatics above the 2L Groundwater Quality Standards (GWQSs), but below the Gross Contaminant Levels (GCLs), where established. The Phase I LSA Report, dated November 29, 2002 concluded the site met the criteria to be classified as Low Risk with Residential Land Use and could be considered for No Further Action (NFA). Email correspondence from NCDENR to the MCB Environmental Management Division, dated January 3, 2003, indicated the site was eligible for NFA with a LUR, based upon review of the LSA.

MCB Camp Lejeune monitors groundwater at the site periodically to assess attenuation of contaminant concentrations. CATLIN personnel conducted groundwater sampling at the site in November 2004. Results of the investigation were submitted in the *Groundwater Sampling Report of Findings for PP-3311, Marine Corps Base, Camp Lejeune, North Carolina, May 10, 2005*. Groundwater contaminants at the site were still detected above the 2L GWQSs, so NFA without a LUR was not achievable at the time.

The purpose of the current investigation was to resample the groundwater in order to assess current groundwater conditions.

## **C. METHODS**

### **1. Field Methods**

All field work was conducted in general accordance with CATLIN's Standard Procedures provided in Appendix A. CATLIN personnel gathered subsurface soil data by Direct Push Technology (DPT) boring advancement using an AMS PowerProbe™ 9600D (PowerProbe) on July 24, 2007. When using the

PowerProbe, the borings are advanced to depth by static force and a 90-pound hydraulic percussion hammer. Two and one-quarter inch diameter by four-foot length steel is used as casing. Soil samples are continuously collected in one and one-half inch clear liners. Liners are removed from the casing and then cut in half longitudinally to allow for visual/manual classification by the Unified Soil Classification System (USCS) and organic vapor analysis utilizing a Photo Ionization Detector (PID). A boring log for the USTPP3311-DPT01 boring is provided in Appendix B. The boring location is illustrated on Figure 2.

Well materials were installed in an attempt to determine accurate water table measurements and facilitate groundwater sampling. The well was constructed with one inch slotted PVC well screen.

A depth to water (DTW) measurement was recorded and a grab groundwater sample was collected. The sample was collected on July 24, 2007 utilizing a peristaltic pump and new polyethylene tubing. The groundwater sample was labeled USTPP3311-DPT01.

New disposable nitrile gloves were worn during sampling activities. All samples were placed into the appropriately labeled glassware and packed on ice in an insulated cooler for transportation to the laboratory. Sample integrity was maintained by following proper Chain-of-Custody (COC) procedures. A copy of the COC is provided following the laboratory report in Appendix C.

The borehole was abandoned to the surface using three-eighth inch bentonite chips. Bentonite and water were poured into the borehole simultaneously to facilitate hydration.

## **2. Analytical Methods**

Samples were transported to SGS Environmental Services, Inc. (NC Certification #481) in Wilmington, North Carolina. At the laboratory, the groundwater sample was analyzed per EPA Method 602 and MADEP VPH/EPH.

## **D. RESULTS**

Field observations noted during boring advancement indicate site geology is comprised of fine sand from the ground surface to boring termination at 9.5 feet below land surface (BLS), with the exception of a clayey sand from three to four feet BLS. A boring log for the soil boring including organic vapor screening results is included in Appendix B.

Groundwater depth as measured in the temporary monitoring well USTPP-3311-DPT01 on July 24, 2007 was approximately 5.6 feet BLS.

Analytical results for the groundwater sample collected are included in Appendix C (Please note the sample from this site was included on the COC with additional sites. As a result, only the applicable pages from the lab report are included. Page numbers are not consecutive, as multiple sites were sampled during the same event.). The analytical results are summarized as follows.

#### EPA Method 602

As indicated in Table 1 and illustrated on Figure 2, three EPA Method 602 target analytes were detected in the groundwater sample USTPP3311-DPT01. Ethylbenzene and Total Xylenes were detected at concentrations of 18.5 µg/L and 39.7 µg/L, respectively. These concentrations are well below their applicable 2L GWQSs of 550 µg/L and 530 µg/L, respectively. A noncompliant Naphthalene concentration, however, was detected in the groundwater sample. Laboratory analysis detected Naphthalene at a concentration of 90.7 µg/L, as compared to the 2L GWQS of 21 µg/L. The current detection has decreased an order of magnitude since the last sampling event (2004, Naphthalene concentration of 356 µg/L). All other EPA Method 602 compounds were reported as below Method Detection Limits (MDL).

#### MADEP VPH/EPH

As indicated in Table 2 and illustrated on Figure 2, the C<sub>9</sub>-C<sub>22</sub> Aromatics were detected at a concentration of 1,281 µg/L, which is above the 2L GWQS of 210 µg/L. This concentration has decreased from 9,550 µg/L in 2004. In addition, the 2004 sampling event detected C<sub>9</sub>-C<sub>18</sub> Aliphatics above the 2L GWQS at a concentration of 9,300 µg/L. The same MADEP fraction, however, attenuated to below the 2L GWQS to a concentration of 2,583 µg/L based upon the current event. All other MADEP fractions were either below MDL or detected at concentrations less than the applicable 2L GWQS.

### **E. CONCLUSIONS AND RECOMMENDATIONS**

The Naphthalene and C<sub>9</sub>-C<sub>22</sub> Aromatic concentrations previously detected in groundwater around the former UST at PP-3311 have not naturally attenuated to below the corresponding groundwater standards. Also, the previous detection of 2-Methylnaphthalene above the Residential MSCC in sample, CC-3311-3, needs to be addressed. Current soil and groundwater contaminant concentrations continue to prevent the site from qualifying for NFA without a LUR. CATLIN recommends resampling the soil at the previous location of CC-3311-3 and groundwater in two years.

## **F. REFERENCES**

CATLIN Engineers and Scientists, *Groundwater Sampling Report of Findings for PP-3311, Marine Corps Base Camp Lejeune, North Carolina*, May 10, 2005.

CATLIN Engineers and Scientists. *LUST Phase I Limited Site Assessment Report UST PP-3311, MCB Camp Lejeune, NC*, November 29, 2002.

J.A. Jones Environmental Services Company. *Underground Storage Tank Closure Report Marine Corps Base Building CC-3311, MCB Camp Lejeune, NC*, January 23, 2002.

North Carolina Department of Environment and Natural Resources, *Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section* (Effective July 1, 2001).

## TABLES

**TABLE 1  
SUMMARY OF GROUNDWATER LABORATORY RESULTS  
EPA METHOD 602**

PP-3311, MCB Camp Lejeune

Well ID	Contaminant of Concern →		Ethylbenzene	Naphthalene	Total Xylenes	All Other EPA Method 602 Compounds
	Sample ID	Date Collected				
GCL (µg/L)			84,500	15,500	87,500	Varies
2L GWQS (µg/L)			550	21	530	Varies
USTPP3311-DPT01	USTPP3311-DPT01	7/24/2007	18.5	<b>90.7</b>	39.7	BMDL

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

BMDL = Below Method Detection Limit

**Bold** results indicate concentrations above 2L GWQS or GCL

GCL = Gross Contaminant Level

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

**TABLE 2  
SUMMARY OF GROUNDWATER LABORATORY RESULTS  
MADEP VPH/EPH**

PP-3311, MCB Camp Lejeune

Well ID	Contaminant of Concern →		C <sub>5</sub> -C <sub>8</sub> Aliphatics	C <sub>9</sub> -C <sub>18</sub> Aliphatics	C <sub>19</sub> -C <sub>36</sub> Aliphatics	C <sub>9</sub> -C <sub>22</sub> Aromatics
	Sample ID	Date Collected				
GCL (µg/L)			NE	NE	NE	NE
2L GWQS (µg/L)			420	4,200	42,000	210
USTPP3311-DPT01	USTPP3311-DPT01	7/24/2007	<100	2,583	160	<b>1,281</b>

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

NE = None Established

J = Estimated concentration, below calibration range and above Method Detection Limit (MDL)

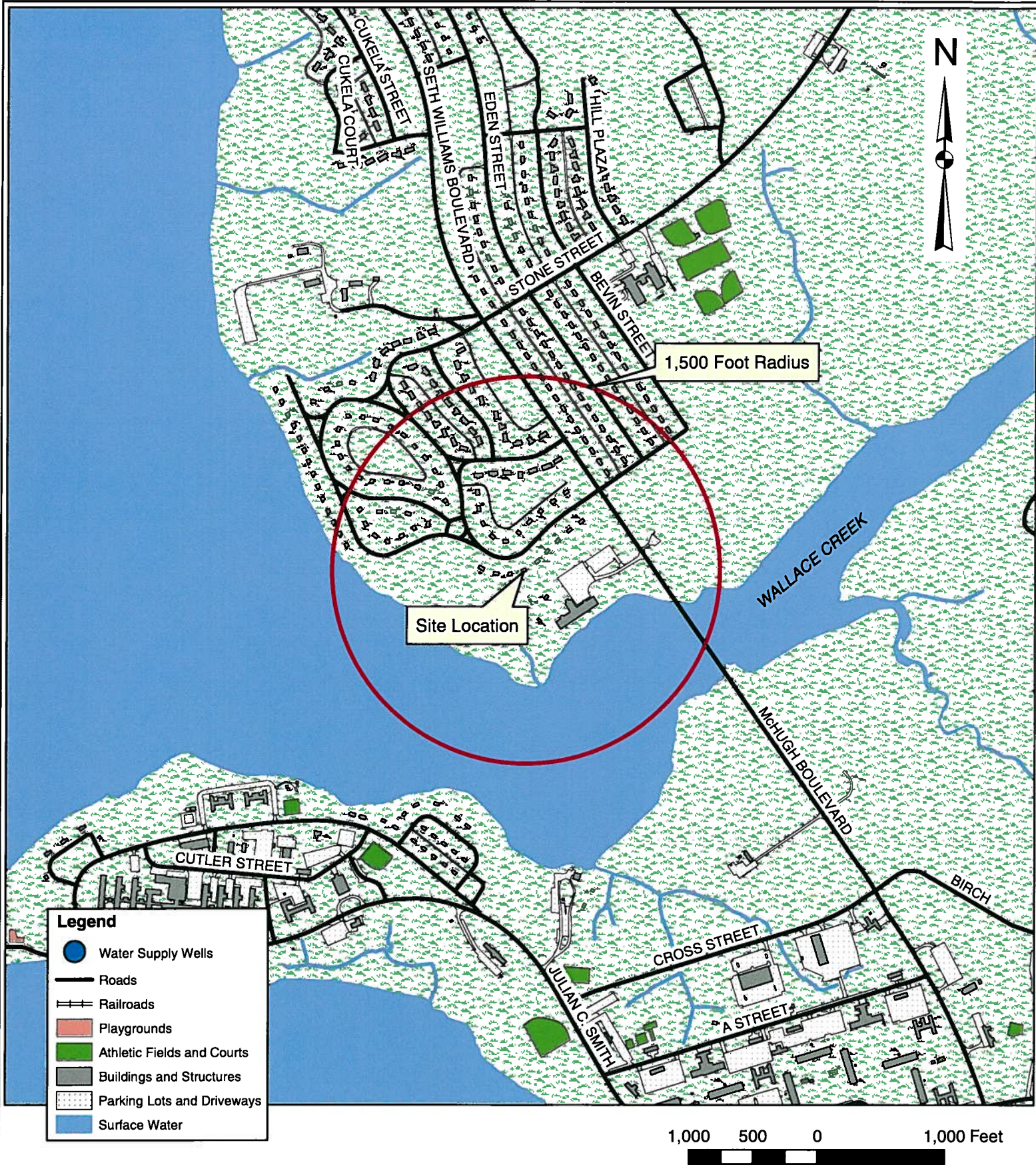
< = Less than MDL

**Bold** results indicate concentrations above 2L GWQS or GCL

GCL = Gross Contaminant Level

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

## FIGURES



Data Sources: Data Layers provided by MCB Camp Lejeune GIS Office.

	PROJECT GROUNDWATER SAMPLING REPORT OF FINDINGS SITE PP-3311 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE <b>SITE LOCATION MAP</b>		<b>FIGURE</b>  <b>1</b>
	JOB NO. 205-077	DATE OCT 2007	SCALE AS SHOWN	DRAWN BY SAC	

**GROUNDWATER SAMPLING  
REPORT OF FINDINGS  
SITE PP-3311  
MCB CAMP LEJEUNE, NC**



**LEGEND**

- Proposed DPT Well
- Water Supply Wells
- Above Ground Storage Tank
- Underground Storage Tank
- Railroad Tracks
- Walls and Fences
- FENCE
- GATE
- WALL
- Buildings and Structures
- Demolished Structures
- Oil/Water Separators
- Slabs
- Roads
- Driveways
- Parking Lots
- Surface Water Bodies
- Creeks and Streams
- Vegetation Cover
- Forestland
- Scrubland
- Wetland
- Airfield Pavement
- HELIPAD
- RAMP
- RUNWAY
- SHLDR\_OVERRUN
- TAXIWAY

**NOTES**

GIS data layers provided by the MCB Camp Lejeune GIS Department.

All results in micrograms per liter (ug/L)

NE = None Established

< = Less than MDL

**Bold results indicate concentration above 2L GWQS or GCL**

GCL = Gross Contaminant Level

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

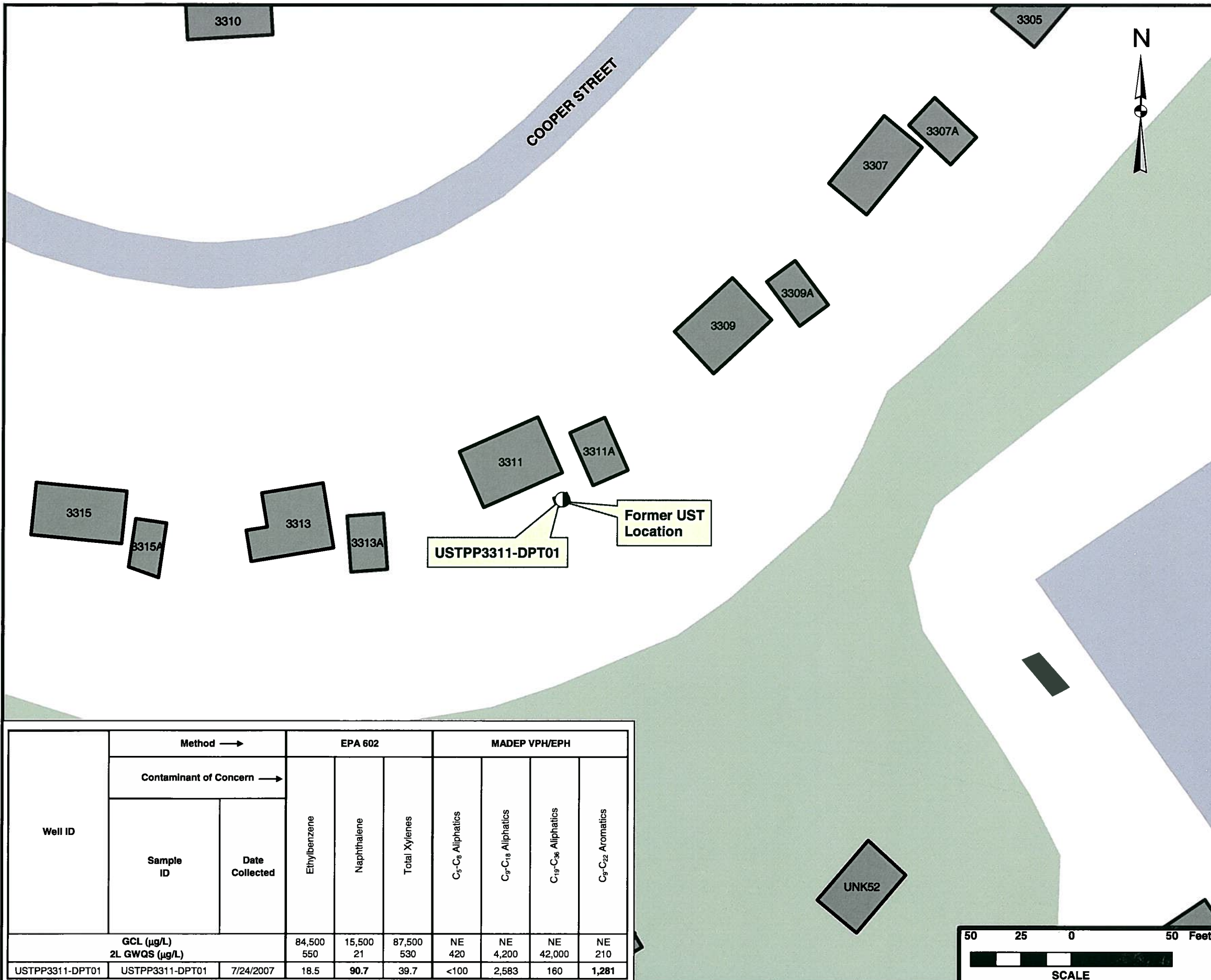


**SITE MAP WITH SUMMARY OF  
GROUNDWATER LABORATORY  
RESULTS**

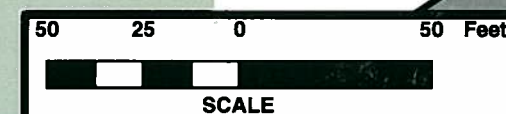
FIGURE

**2**

Job No.: 205-077    Date: OCT 2007    Scale: AS SHOWN    Drawn By: SAC    Checked By: MEM



Well ID	Method →		EPA 602			MADEP VP/EPH			
	Contaminant of Concern →		Ethylbenzene	Naphthalene	Total Xylenes	C <sub>5</sub> -C <sub>8</sub> Aliphatics	C <sub>9</sub> -C <sub>18</sub> Aliphatics	C <sub>19</sub> -C <sub>36</sub> Aliphatics	C <sub>9</sub> -C <sub>22</sub> Aromatics
	Sample ID	Date Collected							
	GCL (µg/L)		84,500	15,500	87,500	NE	NE	NE	NE
	2L GWQS (µg/L)		550	21	530	420	4,200	42,000	210
USTPP3311-DPT01	USTPP3311-DPT01	7/24/2007	18.5	<b>90.7</b>	39.7	<100	2,583	160	<b>1,281</b>



## **APPENDICES**

**APPENDIX A**  
**STANDARD PROCEDURES**

# 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 are generated using either accepted general field surveying techniques, or existing survey maps; or by using a combination of existing data and field generated information. The survey area generally extends to a point at least 50 feet beyond suspected plume boundaries. A receptor scale survey of a larger area surrounding a site will be made if appropriate and necessary.

#### 1.2.2 Vertical Survey

A vertical survey is conducted at the site typically within an accuracy of 0.01 foot. The datum plane is generally assumed unless otherwise noted. Assumed temporary benchmarks (TBM) are selected near ground level. 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 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 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.

### ***Vapor Samples***

PID/FID readings are measured from soil sample headspace using containerized samples that have been brought to ambient temperature.

Carbon tubes are utilized in conjunction with a laboratory-calibrated vacuum pump to obtain vapor samples. The carbon tubes are sealed and refrigerated for shipment to the analytical laboratory (This method is known as the Carbon Adsorption Method).

### ***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 as a result 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, isopaths, 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 alternatives.

**APPENDIX B**  
**BORING LOG**

# WELL LOG


**CATLIN**  
ENGINEERS and SCIENTISTS  
205-077  
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 205-077	STATE: NC	COUNTY: Onslow	LOCATION: Jacksonville
PROJECT NAME: Lejuene LUR Sites		LOGGED BY: J Heter	WELL ID: USTPP3311-DPT01
DRILLER: Bobbie D. Fowler		CREW: T Stetler	
NORTHING: 3840447.6	EASTING: 283499.9		
SYSTEM: UTM NAD83 (m)		BORING LOCATION: House #3311 backyard	T.O.C. ELEV.:
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW: 5.6	TOTAL DEPTH: 9.5
START DATE: 7/24/07	FINISH DATE: 7/24/07	24 HOUR DTW: NM	WELL DEPTH: 9.5

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
	6in	6in	6in	6in							
0.0									0.0	LAND SURFACE	0.0
2.0					0.0		SP		2.0	Grass/organics. Dark brown fine SAND, good topsoil grading into light brown fine SAND. Moist.	1" Sch. 40 PVC
4.0					0.0		SC		4.0	@ 3' BLS Reddish brown CLAYEY SAND. Medium dense. Moist.	
6.0					705.0		SP		6.0	Dark brown fine SAND. Loose. Strong HCO odor. Moist.	4.5
8.0					NM		SP		8.0	S.A.A. Wet @ 7.0'	1" Slot .010 Sch. 40 PVC
					77.9		SP			Brown fine SAND. Uniform. Loose. Saturated @ 8.0'	9.5
									10.0	Boring Terminated at Depth 9.5 ft Fine SAND.	9.5

CATLIN BORING LOG - 205-077 LEJUENE LUR SITES.GPJ TEST.GDT 8/20/07

 Bentonite Pellets

**APPENDIX C**

**LABORATORY ANALYTICAL REPORT AND  
CHAIN-OF-CUSTODY DOCUMENTATION**



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

Report Number: G128-1993

Client Project: Lejuene LUR Sites

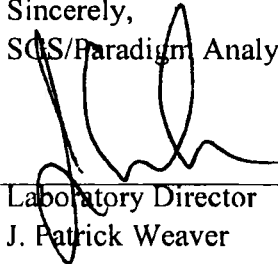
Dear Mr. Chasteen:

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/Paradigm at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS/Paradigm Analytical Labs for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,  
SGS/Paradigm Analytical Laboratories, Inc.

  
\_\_\_\_\_  
Laboratory Director  
J. Patrick Weaver

  
\_\_\_\_\_  
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 = Reporting 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 Volatiles**

by GC 602

Client Sample ID: USTPP3311-DPT01

Analyzed By: RSB

Client Project ID: Lejuene LUR Sites

Date Collected: 7/24/2007 14:30

Lab Sample ID: G128-1993-2F

Date Received: 7/27/2007

Lab Project ID: G128-1993

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	5.00	0.915	5	8/6/2007	
Diisopropyl ether (DIPE)	BQL	5.00	1.15	5	8/6/2007	
Ethylbenzene	18.5	5.00	0.905	5	8/6/2007	
Methyl-tert butyl ether (MTBE)	BQL	10.0	1.8	5	8/6/2007	
Naphthalene	90.7	5.00	2.17	5	8/6/2007	
Toluene	BQL	5.00	0.785	5	8/6/2007	
m/p-Xylene	39.7	10.0	2.41	5	8/6/2007	
o-Xylene	BQL	10.0	2.92	5	8/6/2007	

**Surrogate Spike Recoveries**

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.0	100

**Comments:**

All values corrected for dilution.  
BQL = Below quantitation limit.

**EPH (Aliphatics/Aromatics) Results**

by MDEP-EPH

Client Name: Richard Catlin & AssociatesProject Name: Lejuene LUR Sites

Sample Information and Analytical Results	
Sample Identification	USTPP3311-DPT01
Sample Matrix	Water
Date Collected	07/24/07
Date Received	07/27/07
Date Extracted	07/31/07
Date Analyzed	08/02/07
Dry Weight	
Dilution Factor	1:1
C <sub>9</sub> -C <sub>18</sub> Aliphatics*	2100 (ug/L)
C <sub>19</sub> -C <sub>38</sub> Aliphatics*	160 (ug/L)
C <sub>11</sub> -C <sub>22</sub> Aromatics*	700 (ug/L)
Aliphatic Surrogate % Recovery	57
Aromatic Surrogate % Recovery	76
Fractionation Surrogate 1 % Recovery	43

**Comments:**

\* = Excludes any surrogates or internal standards.

Lab info: G128-1993-2G

Reviewed By: 



**VPH (Aliphatics/Aromatics) Laboratory Reporting Form**

Client Name: Richard Catlin & Associates

Project Name: Lejuene LUR Sites

Sample Information	
Sample Identification	USTPP3311-DPT01
Sample Matrix	Water
Collection Option (for Soil)*	NA
Date Collected	07/24/07
Date Received	07/27/07
Date Extracted	08/02/07 16:55 - 08/02/07 16:55
Date Analyzed	08/02/07 16:55 - 08/02/07 16:55
Dry Weight	NA
Dilution Factor	1 - 1

Analytical Results				
Analyte	Result µg/L	Report Limit µg/L	Flags	
C <sub>5</sub> -C <sub>8</sub> Aliphatics**	BQL	100		
C <sub>9</sub> -C <sub>12</sub> Aliphatics**	483	100		
C <sub>9</sub> -C <sub>10</sub> Aromatics**	581	100		
	Percent Recovery	Flags	Limits Lower   Upper	
Surrogate % Recovery - PID	117		70	130
Surrogate % Recovery - FID	109		70	130

\* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.  
 \*\* = Excludes any surrogates or internal standards and are unadjusted for individual analytes.

Lab Info: g128-1993-2b	Lab Info: g128-1993-2b
FID Info: VP080207/017F0101.D	PID Info: VP080207/017R0101.D

Reviewed By: lw



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CLIENT: **Catlin**

CONTACT: **Shane Chasteen** PHONE NO.: (910) 452-5801

PROJECT: **Lejuene LUR sites** SITE/PWSID#: **205-077**

REPORTS TO: **Shane Chasteen** E-MAIL:

INVOICE TO: **Sheila Smith** QUOTE # **DOD ic1**

FAX NO.:( )

P.O. NUMBER **270726-1**

SGS Reference: **G 128-1993**

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LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No CONTAINERS	SAMPLE TYPE	Preservatives Used	HCl	-	-	HCl	HCl	REMARKS
	USTFC46-3-DPT01	7/27/07	1300	W	3	G							* Results in
	USTPP3311-DPT01	7/24/07	1430		5		3						Summary + Lejuene
	USTPP3322-DPT01	7/27/07	1015		5		3						EDD format
	USTPP3326-DPT01	7/26/07	1045		3								
	USTPP3330-DPT01	7/26/07	1145		3								
	USTPP3332-DPT01	7/26/07	1225		3								
	USTPP3340-DPT01	7/27/07	1100		2								
	USTPP3343-DPT01	7/24/07	1330		2								
	USTPP3350-DPT01	7/26/07	1406		3								
	USTPP3354-DPT01	7/26/07	1445		5		3						

3

602 (all impurities)  
 625 (all impurities + TICs)  
 610  
 EPH  
 VPH

5

Collected/Relinquished By: (1) <i>Justin Peters</i>	Date 7/27/07	Time 1600	Received By: <i>Justin Peters</i>	Date 7/27/07	Time 1600
Relinquished By: (2)	Date	Time	Received By:	Date	Time
Relinquished By: (3)	Date	Time	Received By:	Date	Time
Relinquished By: (4)	Date	Time	Received By:	Date	Time

4

Shipping Carrier:

Shipping Ticket No:

Special Deliverable Requirements:

Requested Turnaround Time:  
 RUSH \_\_\_\_\_  STD

Samples Received Cold? (Circle) YES NO

Temperature (C): *on ice 5.8, 5.6, 5.8*

Chain of Custody Seal: (Circle)  
 INTACT BROKEN **ABSENT**

Date Needed

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<b>1</b> CLIENT: <u>Cattin</u>					SGS Reference:					PAGE <u>2</u> OF <u>2</u>				
CONTACT: <u>Shane Chasteen</u> PHONE NO: <u>(910) 452-5861</u>					<b>CONTAINERS</b> No SAMPLE TYPE Preservatives Used: <u>ACI</u> - <u>MetH</u> <u>ACI</u> Analysis Required: <u>3</u> <u>602 (add up Hubs)</u> <u>EPH</u> <u>VPH</u> <u>VPH</u>					REMARKS <u>* Results in summary &amp; Lejuene EDD format</u>				
PROJECT: <u>Lejuene LUR sites</u> SITE/PWSID#: <u>205-077</u>														
REPORTS TO: <u>Shane Chasteen</u> E-MAIL: _____ FAX NO.: ( ) _____														
INVOICE TO: <u>Sheila Smith</u> QUOTE # <u>D0D101</u> P.O. NUMBER <u>270726-1</u>														
LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	1	2	3	4	5	6	7	8	9	10
	<u>USTPP3354-DPTC2</u>	<u>7/24/07</u>	<u>1230</u>	<u>S</u>	<u>3</u>	<u>6</u>	<u>1</u>	<u>2</u>	<u>2</u>					
	<u>Duplicate</u>	<u>7/27/07</u>	<u>1100</u>	<u>W</u>	<u>5</u>	<u>6</u>	<u>3</u>							
<b>5</b> Collected/Relinquished By: (1) <u>[Signature]</u> Date <u>7/27/07</u> Time <u>1600</u>					<b>4</b> Shipping Carrier: _____ Samples Received Cold? (Circle) <u>YES</u> NO					Shipping Ticket No: _____ Temperature (C): <u>air 58.5, 56.5, 54.0</u>				
Relinquished By: (2) _____ Date _____ Time _____					Received By: _____ Date <u>7/27/07</u> Time <u>1600</u>					Special Deliverable Requirements: _____ Chain of Custody Seal: (Circle) <u>INTACT</u> <u>BROKEN</u> <u>ABSENT</u>				
Relinquished By: (3) _____ Date _____ Time _____					Received By: _____ Date _____ Time _____					Special Instructions: _____				
Relinquished By: (4) _____ Date _____ Time _____					Received By: _____ Date _____ Time _____					Requested Turnaround Time: _____ <input type="checkbox"/> RUSH _____ <input checked="" type="checkbox"/> STD _____ Date Needed _____				

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