

**GROUNDWATER SAMPLING
REPORT OF FINDINGS**

FOR

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

**NCDENR UST INCIDENT NO. 24007
LAND USE CLASSIFICATION: RESIDENTIAL
RISK CLASSIFICATION: LOW**

MAY 10, 2005

**CONTRACT NO. N62470-01-D-3009
DELIVERY ORDER NO. 0127
CATLIN PROJECT NO. 204-079**



PREPARED BY:

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LIST OF ACRONYMS

2001 Guidelines	Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section (Effective July 1, 2001)
2L GWQS	NCAC T15A:02L Groundwater Quality Standards
AMS	Art's Manufacturing and Supply
AST	Aboveground Storage Tank
BQL	Below Quantitation Limit
BLS	Below Land Surface
CATLIN	CATLIN Engineers and Scientists (Formerly RC&A)
CFR	Code of Federal Regulations
CSA	Comprehensive Site Assessment
DEM	Division of Environmental Management
DIPE	Diisopropyl Ether
DOD	Department of Defense
DPT	Direct Push Technology
DWQ	Division of Water Quality
DWM	Division of Waste Management
DTW	Depth to Water
EAD	Environmental Affairs Department
EMD	Environmental Management Division
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
EQB	Environmental Quality Branch
FID	Flame Ionization Detector
FOD	Foreign Object Debris
FT	Feet
GCL	Gross Contaminant Level
GIS	Geographic Information System
GPS	Global Positioning System
I/C	Industrial/Commercial
ID	Identification
I&E	Installations and Environment Department
IGWQS	Interim Groundwater Quality Standards
IPE	Isopropyl Ether
LSA	Limited Site Assessment
LUST	Leaking Underground Storage Tank
MADEP	Massachusetts Department of Environmental Protection
MCALF	Marine Corps Auxiliary Landing Field
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCOLF	Marine Corps Outlying Landing Field
mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Litre

MSCC	Maximum Soil Contaminant Concentration
MTBE	Methyl tertiary butyl ether
ug/Kg	Micrograms per Kilogram
ug/L	Micrograms per Litre
NA	Not Analyzed
N/A	Not Applicable
NAVFAC Atlantic	Naval Facilities Atlantic Division
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NE	None Established
NM	Not Measured
NMT	No Measurable Thickness
NS	Not Sampled
OVA	Organic Vapor Analyzer
PAH	Polynuclear Aromatic Hydrocarbons
PPB	Parts Per Billion
PPM	Parts Per Million
PID	Photo Ionization Detector
PQL	Practical Quantitation Limits
PVC	Polyvinyl chloride
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
Res	Residential
SOW	Scope of Work
STGW	Soil-to-Groundwater
SVOC	Semi Volatile Organic Compound
TDHF	Toxicologically Defined Hydrocarbons Fractions
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
US	United States
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons
WiRO	Wilmington Regional Office

A. SITE IDENTIFICATION

DATE OF REPORT: January 25, 2005
Facility ID: N/A UST Incident Number (if known): 24007
Land Use Classification: Residential Risk Classification: Low
Site Name: PP-3311
Site Location: 3311 Cooper Street, 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

(Refer to Figure 2)

On August 16, 2001, J.A. Jones Environmental Services Company (J.A. Jones) of Charlotte, North Carolina performed 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 a 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 MSCCs, but only 2-methylnaphthalene above the Residential MSCC in one sample

In July 2002, CATLIN conducted field work and sampling required by NCDENR for a Phase I LSA. One soil sample and one groundwater sample were collected for laboratory analysis from a temporary boring/well. The soil sample was collected from beneath the former product line location. The 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 C₉-C₂₂ aromatics above the 2L GWQS but below the GCLs where established. The Phase I LSA Report dated November 29, 2002 concluded the site may be considered for No Further Action.

The site meets the criteria for Low Risk and Residential Land Use. Based on historical soil and groundwater sample results, the site is eligible for “No Further Action” status with issuance of a Notice of Residual Petroleum or Land Use Restriction for the groundwater only.

The purpose of this investigation was to resample the groundwater in order to determine if contaminant concentrations had naturally attenuated below the 2L GWQS. If so, the site would be eligible for No Further Action Status without Land Use Restriction.

C. METHODS

1. Field Methods

(Refer to Figure 2 and Appendices A, B, and C)

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 boring advancement using an AMS PowerProbe™ 9600D (PowerProbe) on November 4, 2004. 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 USCS and organic vapor analysis utilizing a FID. 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 1.25-inch slotted PVC well screen.

The depth to water was measured and a grab groundwater sample was collected. The sample was collected on November 4, 2004 utilizing a peristaltic pump and new polyethylene tubing. The groundwater sample was labeled USTPP3311-DPT01. The sample location is illustrated on Figure 2.

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 procedures. A duplicate sample (USTPP3311-DPT01 Dup) was also collected and submitted to the laboratory for analysis per MADEP EPH and VPH. A copy of the Chain of Custody is provided following the complete laboratory report in Appendix C.

Boreholes were 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 Paradigm Analytical Laboratories, Inc. (NC Certification #481) in Wilmington, North Carolina. At the laboratory, the groundwater sample was analyzed for the presence of benzene, ethylbenzene, and naphthalene per EPA Method 602 and per MADEP EPH and VPH.

D. RESULTS

(Refer to Tables 1, 2A, and 2B and Appendices B and C)

Field observations noted during soil boring advancement indicate site geology comprised of very fine to fine silty sands to 12 feet BLS with trace gravels near the surface and trace medium sands near boring termination. A boring log for the soil boring including organic vapor screening results is included in Appendix B.

The complete laboratory analytical report is included in Appendix C. Ethylbenzene and naphthalene concentrations in the USTPP3311-DPT01 groundwater sample collected on November 4, 2004 were revealed in excess of the corresponding 2L GWQS. Due to the ethylbenzene and naphthalene concentrations (107 ug/L and 356 ug/L, respectively) the laboratory reporting limit for benzene was raised to 10 ug/L. Although the USTPP3311-DPT01 groundwater sample result for benzene is reported as “BQL”, the reporting limit of 10 ug/L is greater than the 1 ug/L 2L GWQS.

Groundwater sample analysis per MADEP EPH and VPH revealed multiple aromatic and aliphatic hydrocarbon fraction concentrations. The USTPP3311-DPT01 groundwater sample and duplicate sample results for the combined hydrocarbon fraction C₉-C₁₈ Aliphatics (9,300 ug/L and 5,500 ug/L respectively) exceed the 4,200 ug/L 2L GWQS. Also the groundwater sample and duplicate sample results for the combined hydrocarbon fraction C₉-C₂₂ Aromatics (9,550 ug/L and 3,970 ug/L respectively) exceed the 210 ug/L 2L GWQS. Summarized groundwater sample analytical results are on Tables 1, 2A, and 2B.

E. CONCLUSIONS AND RECOMMENDATIONS

The naphthalene and C₁₁-C₂₂ aromatic concentrations previously detected in groundwater around the former UST at PP-3311 have not naturally attenuated to below the corresponding groundwater standards. The groundwater contaminant concentrations revealed will prevent “No Further Action” without a Land Use Restriction for groundwater. CATLIN recommends re-sampling in two years.

F. REFERENCES

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

Date: November 2004

Incident Number and Name:
24007 - PP-3311

Facility ID#: N/A

Analytical Method: EPA METHOD 602

Well ID	Contaminant of Concern →		Benzene	Ethylbenzene	Naphthalene
	Sample ID	Date Collected			
USTPP3311-DPT01	USTPP3311-DPT01	11/4/2004	<10*	107	356
2L GWQS GCL			1 5,000	29 29,000	21 15,500

All results in ug/L

Shaded concentrations exceed the 2L GWQS

* = Quantitation limit exceeds the 2L GWQS

TABLE 2A SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: November 2004

Incident Number and Name:

24007 - PP-3311

Facility ID#: N/A

Analytical Methods: MADEP EPH/VPH

Well ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Sample ID	Date Collected						
USTPP3311-DPT01	USTPP3311-DPT01	11/4/2004	8300	1400	8700	<100	1000	850
	USTPP3311-DPT01 Dup.	11/4/2004	4400	490	3000	<100	1100	970

All results in ug/L

TABLE 2B SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: November 2004

Incident Number and Name:
24007 - PP-3311

Facility ID#: N/A

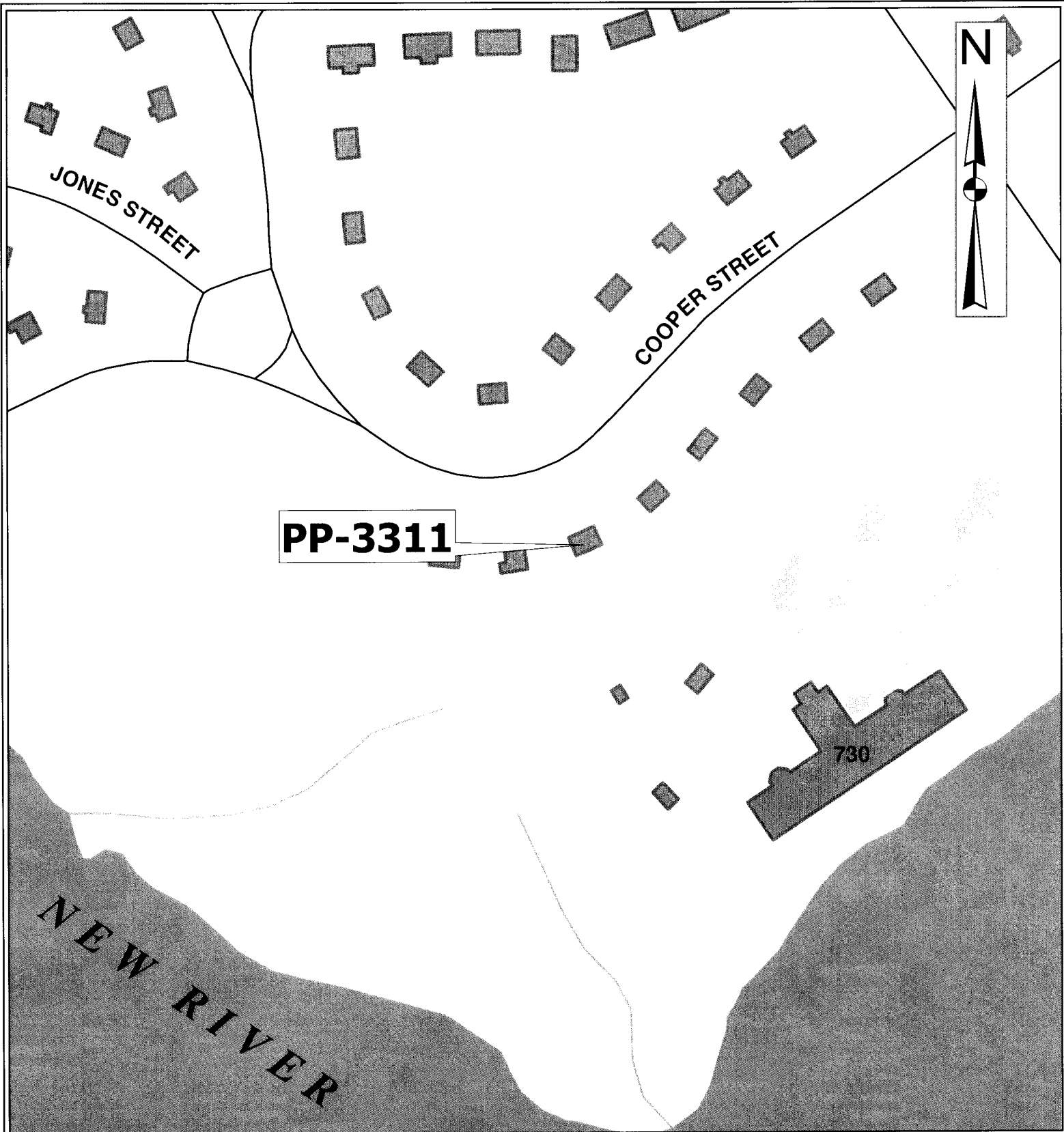
Analytical Methods: MADEP EPH/VPH AS COMPARED TO THE 2L GWQS

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Sample ID	Date Collected				
USTPP3311-DPT01	USTPP3311-DPT01	11/4/2004	<100	9300	1400	9550
	USTPP3311-DPT01 Dup.	11/4/2004	<100	5500	490	3970
2L GWQS			420	4200	42,000	210

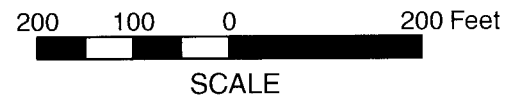
All results in ug/L

Shaded concentrations exceed the 2L GWQS

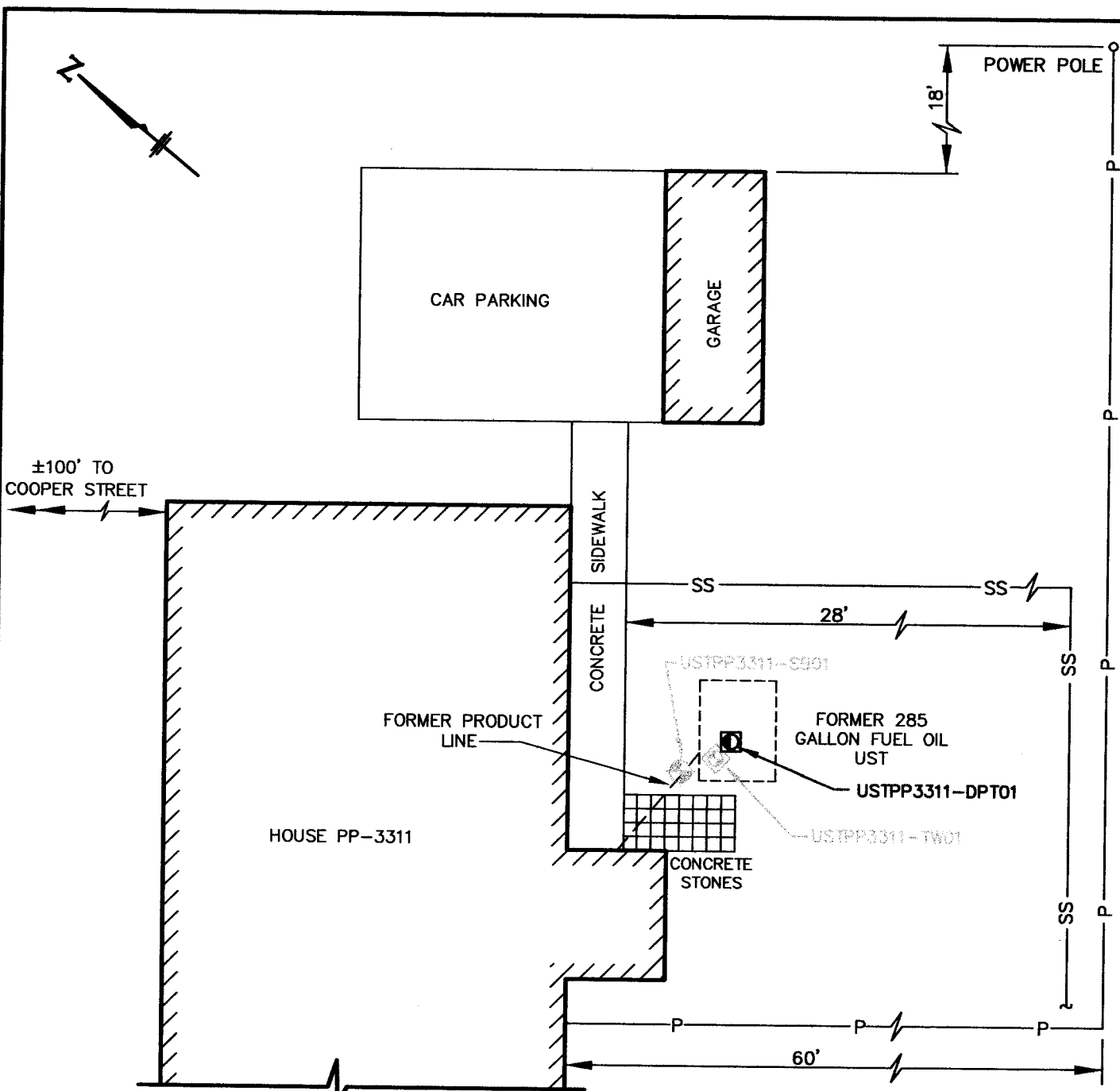
FIGURES



NOTE: All GIS supplied by MCB Camp Lejeune Business and Logistics Support Department

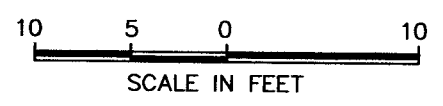


	PROJECT PP-3311 MARINE CORPS BASE CAMP LEJEUNE, NC		TITLE SITE VICINITY MAP		FIGURE 1
	JOB NO. 204-079	DATE JAN 2005	SCALE AS SHOWN	DRAWN BY THW	



LEGEND

PREVIOUS	EXISTING	NEW	DESCRIPTION
			BUILDING
			TEMPORARY WELL
			SOIL BORING (HAND AUGER)
			DPT PROBE AND GROUNDWATER SAMPLE
			POWER LINE
			SANITARY SEWER



NOTE:
1. MAP ADAPTED FROM J.A. JONES

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3311 MARINE CORPS BASE CAMP LEJUNE, N.C.	TITLE PP-3311 SITE PLAN	FIGURE 2
	JOB NO: 204-079 DATE: DEC 2004	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: MEM

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 (FIS).
- 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, 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 alternatives.

APPENDIX B
BORING LOG

BORING LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 204-079	STATE: NC	COUNTY: Onslow	LOCATION: Havelock
PROJECT NAME: Eight Site Closures		LOGGED BY: Tom Stetler	BORING ID: USTPP3311 -DPT01
		DRILLER: Bobbie Fowler	
LATITUDE:	LONGITUDE:	CREW:	
SYSTEM:	BORING LOCATION: PP-3311		LAND ELEV.: NM
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW: NM	BORING DEPTH: 12.0
START DATE: 11/04/04	FINISH DATE: 11/04/04	24 HOUR DTW: NM	ROCK DEPTH: --

DEPTH	BLOW COUNT 0.5 0.5 0.5 0.5	SAMP. TYPE	OVA RESULTS (ppm)					LAB.	U S C S	L O G	SOIL AND ROCK DESCRIPTION	
			0	1000	2000	3000	4000				DEPTH	ELEVATION
0.0										0.0	LAND SURFACE	
										0.0	Topsoil	
										0.6		
	DIRECT PUSH	▲0						SM		1.3	Light tan, SILTY, f. to v.f. SAND. Moist. No hydrocarbon odor.	
2.0												
	DIRECT PUSH	▲0						SM			Light tan to dark brown, banded, SILTY, f. to v.f. SAND. Banding is fairly regularly spaced, up to 1 cm in thickness. Moist to wet at 4' BLS. No hydrocarbon odor. Trace well rounded quartz gravels up to 2 cm in diameter. 2.6' return on 0-4' tube.	
4.0												
	DIRECT PUSH	▲255.6						SM			Same as above, but with dark gray to gray-green to tan banding. Wet. Strong hydrocarbon odor.	
6.0												
	DIRECT PUSH	▲1953						SM				
8.0												
	DIRECT PUSH	▲107.9						SP/SM		7.6	Orange-brown, SILTY, med. to v.f. SAND. Saturated. Strong hydrocarbon odor. 2.75' return on 4-8' tube.	
										8.0		
	DIRECT PUSH	▲138.2						SP/SM			Orange-brown to gray, Same as above. Trace m. grained sand. Saturated. Slight hydrocarbon odor.	
10.0												
	DIRECT PUSH											
12.0												
											Boring Terminated at Depth 12.0 ft Assumes uniform compaction. Set temporary 1" well and abandoned with bentonite following water sample collection.	

CATLIN ENVIRO. LOG 204-079.8 SITES CAMP. LE. IE. LINE GEL. CATLIN.GDT 01/24/05

APPENDIX C

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

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

Report Number: G128-1408

Client Project: PP-3311

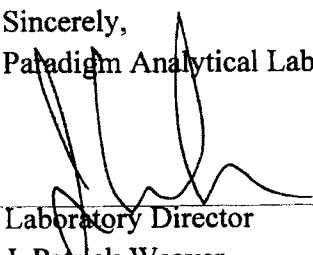
Dear Mr. Ashba:

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 the services performed during this project, please call Paradigm at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using 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,
Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

11/29/04

Date

Results for Volatiles

by GC 602

Client Sample ID: USTPP3311-DPT01

Analyzed By: DCS

Client Project ID: PP-3311

Date Collected: 11/04/2004 10:20

Lab Sample ID: G128-1408-1B

Date Received: 11/4/2004

Lab Project ID: G128-1408

Matrix: Water

Analyte	Result ug/L	RL ug/L	Dilution Factor	Date Analyzed
Benzene	BQL	10.0	10	11/17/2004
Ethylbenzene	107	10.0	10	11/17/2004
Naphthalene	356	10.0	10	11/17/2004
Surrogate Spike Recoveries		Spike Added	Spike Result	Percent Recovery
Trifluorotoluene		40	39.4	98.5

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: PP-3311

Sample Information and Analytical Results	
Sample Identification	USTPP3311-DPT01
Sample Matrix	Water
Date Collected	11/04/04
Date Received	11/04/04
Date Extracted	11/16/04
Date Analyzed	11/23/04
Dry Weight	
Dilution Factor	2:1
C ₉ -C ₁₈ Aliphatics*	8300 (µg/L)
C ₁₉ -C ₃₆ Aliphatics*	1400 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	8700 (µg/L)
Aliphatic Surrogate % Recovery	36
Aromatic Surrogate % Recovery	78
Fractionation Surrogate 1 % Recovery	110

Comments:

- * = Excludes any surrogates or internal standards.
- Low surrogate confirmed by duplicate analysis.

Lab info: G128-1408-1G

Reviewed By: 

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates


Project Name: PP-3311

Sample Information and Analytical Results	
Sample Identification	USTPP3311-DPT01 Dup.
Sample Matrix	Water
Date Collected	11/04/04
Date Received	11/04/04
Date Extracted	11/16/04
Date Analyzed	11/23/04
Dry Weight	
Dilution Factor	2:1
C ₉ -C ₁₈ Aliphatics*	4400 (µg/L)
C ₁₉ -C ₃₈ Aliphatics*	490 (µg/L)
C ₁₁ -C ₂₂ Aromatics*	3000 (µg/L)
Aliphatic Surrogate % Recovery	64
Aromatic Surrogate % Recovery	66
Fractionation Surrogate 1 % Recovery	100

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G128-1408-2E

Reviewed By: 

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 11/18/04

Calibration Ranges and Limits

Range	MDL (2/2004) (µg/L)	ML (µg/L)	RL	
			(µg/L)	(mg/Kg)
C ₉ -C ₁₈ Aliphatics	3.84	12.2	100	10
C ₁₉ -C ₃₆ Aliphatics	0.57	1.8	100	10
C ₁₁ -C ₂₂ Aromatics	4.54	14.4	100	10

Calibration Concentration Levels

Range	Levels (µg/mL)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	2.40	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₆ Aliphatics	8	1.6	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	2	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 11/22/04

Calibration Check

Range	Levels (µg/mL)	RPD
C ₉ -C ₁₈ Aliphatics	120	0.4
C ₁₉ -C ₃₆ Aliphatics	160	-7.8
C ₁₁ -C ₂₂ Aromatics	340	-9.2

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit

RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3311

Sample Information and Analytical Results	
Sample Identification	USTPP3311-DPT01
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	11/04/04
Date Received	11/04/04
Date Extracted	11/16/04
Date Analyzed	11/16/04
Dry Weight	
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	< 100 (µg/L)
C ₉ -C ₁₂ Aliphatics**	1000 (µg/L)
C ₉ -C ₁₀ Aromatics**	850 (µg/L)
Surrogate % Recovery - PID	72
Surrogate % Recovery - FID	75

* = 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.

Lab Info: g128-1408-1a

Reviewed By: 

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3311

Sample Information and Analytical Results	
Sample Identification	USTPP3311-DPT01 Dup.
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	11/04/04
Date Received	11/04/04
Date Extracted	11/16/04
Date Analyzed	11/16/04
Dry Weight	
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	< 100 (µg/L)
C ₉ -C ₁₂ Aliphatics**	1100 (µg/L)
C ₉ -C ₁₀ Aromatics**	970 (µg/L)
Surrogate % Recovery - PID	74
Surrogate % Recovery - FID	76

* = 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.

Lab Info: g128-1408-2a

Reviewed By: 

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 11/16/04 PID Initial Calibration Date: 11/16/04

Calibration Ranges and Limits

Range	MDL (07/15/2004) (µg/L)	ML (µg/L)	RL	
			(µg/L)	(mg/Kg)
C ₅ -C ₈ Aliphatics	4.4	14	100	10
C ₉ -C ₁₂ Aliphatics	3.4	11	100	10
C ₉ -C ₁₀ Aromatics	0.13	0.41	100	10

Calibration Concentration Levels

Range	Levels (µg/L)	%RSD or CCC	Method of Quantitation
C ₅ -C ₈ Aliphatics	40	3.3	Calibration Factor
	1000		
	2000		
	3000		
	4000		
C ₉ -C ₁₂ Aliphatics	10	21.7	Calibration Factor
	250		
	500		
	750		
	1000		
C ₉ -C ₁₀ Aromatics	10	10.6	Calibration Factor
	250		
	500		
	750		
	1000		

Calibration Check Date: 11/16/04

Calibration Check

Range	Levels		RPD
	(µg/L)	(mg/Kg)	
C ₅ -C ₈ Aliphatics	2000	200	-2.2
C ₉ -C ₁₂ Aliphatics	500	50	-2.5
C ₉ -C ₁₀ Aromatics	500	50	-4.9

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit

RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

**List of Reporting Abbreviations
and Data Qualifiers**

B = Compound also detected in batch blank

BQL = Below Quantitation Limit

DF = Dilution Factor

Dup = Duplicate

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.

