# GROUNDWATER SAMPLING
# REPORT OF FINDINGS

## FOR

## *PP-3340*
## MARINE CORPS BASE
## CAMP LEJEUNE, NORTH CAROLINA

**NCDENR UST INCIDENT NO. 24012**
**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:**

**CATLIN ENGINEERS AND SCIENTISTS**
**P. O. BOX 10279**
**WILMINGTON, NORTH CAROLINA 28404-0279**
**(910) 452-5861**

## TABLE OF CONTENTS

# 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): 24012
Site Name: PP-3340
Land Use Classification: Residential Risk Classification: Low
Site Location: 3340 Jones 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: 3340 Jones 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:** September 14, 2001
**Longitude:** 77.3661 W **Latitude:** 34.6843 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.

NORTH CAROLINA PROFESSIONAL SEAL 11299 ENGINEER MICHAEL E. MASON 5-18-05

(Please Affix Seal and Signature)

## B. BACKGROUND AND PURPOSE

*(Refer to Figure 2)*

On September 14, 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 was obtained from the base of the tank basin during tank removal. Laboratory analytical results revealed TPH concentrations above the NCDENR Action Levels (10 mg/Kg). On October 15, 2001 J.A. Jones collected four sidewall soil samples (one from each former UST basin sidewall, and one soil sample near the previous soil sample location at the base of the tank basin. Soil samples were analyzed per EPA Methods 8260, 8270, and MADEP EPH and VPH. Laboratory analytical results did not reveal any contaminant concentrations in excess of the Residential MSCCs.

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 method quantitation limits except minor toluene concentrations. The groundwater sample collected from the former UST basin area revealed $C_9$-$C_{22}$ Aromatic hydrocarbon fraction above the corresponding 2L GWQS. 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 on 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 USTPP3340-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 USTPP3340-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 procedures. 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 per MADEP EPH and VPH.

## D. RESULTS

*(Refer to Tables 1A and 1B and Appendices B and C)*

Field observations noted during soil boring advancement indicate site geology comprised of very fine sands to eight feet BLS with some silts and hydrocarbon odor from six to eight 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 USTPP3340-DPT01 on November 4, 2004 was approximately 6.3 feet BLS.

The complete laboratory analytical report is included in Appendix C. The USTPP3340-DPT01 groundwater sample collected on November 4, 2004 and analyzed per MADEP EPH and VPH revealed detectable concentrations of all the EPH fractions. However, only the MADEP EPH fraction $C_{11}$-$C_{22}$ Aromatics result (1,900 ug/L) exceeds the 210 ug/L 2L GWQS. No MADEP VPH fractions were detected above the laboratory PQLs. Groundwater sample analytical results are summarized on Tables 1A and 1B.

## E. CONCLUSIONS AND RECOMMENDATIONS

The $C_{11}$-$C_{22}$ aromatic concentrations previously detected in groundwater around the former UST at PP-3340 have not naturally attenuated to below the corresponding 2L GWQS. 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-3340, MCB Camp Lejeune, NC,* November 29, 2002.

J.A. Jones Environmental Services Company. *Underground Storage Tank Closure Report Marine Corps Base Building CC-3340, 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 1A SUMMARY OF GROUNDWATER LABORATORY RESULTS**

Date: November 2004 | Incident Number and Name: 24012 - PP-3340 | Facility ID#: N/A

**Analytical Method: 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 | | | | | | |
| USTPP3340-DPT01 | USTPP3340-DPT01 | 11/4/2004 | 3700 | 650 | 1900 | <100 | <100 | <100 |

All results in ug/L

**TABLE 1B SUMMARY OF GROUNDWATER LABORATORY RESULTS**

Date: November 2004 | Incident Number and Name: 24012 - PP-3340 | Facility ID#: N/A

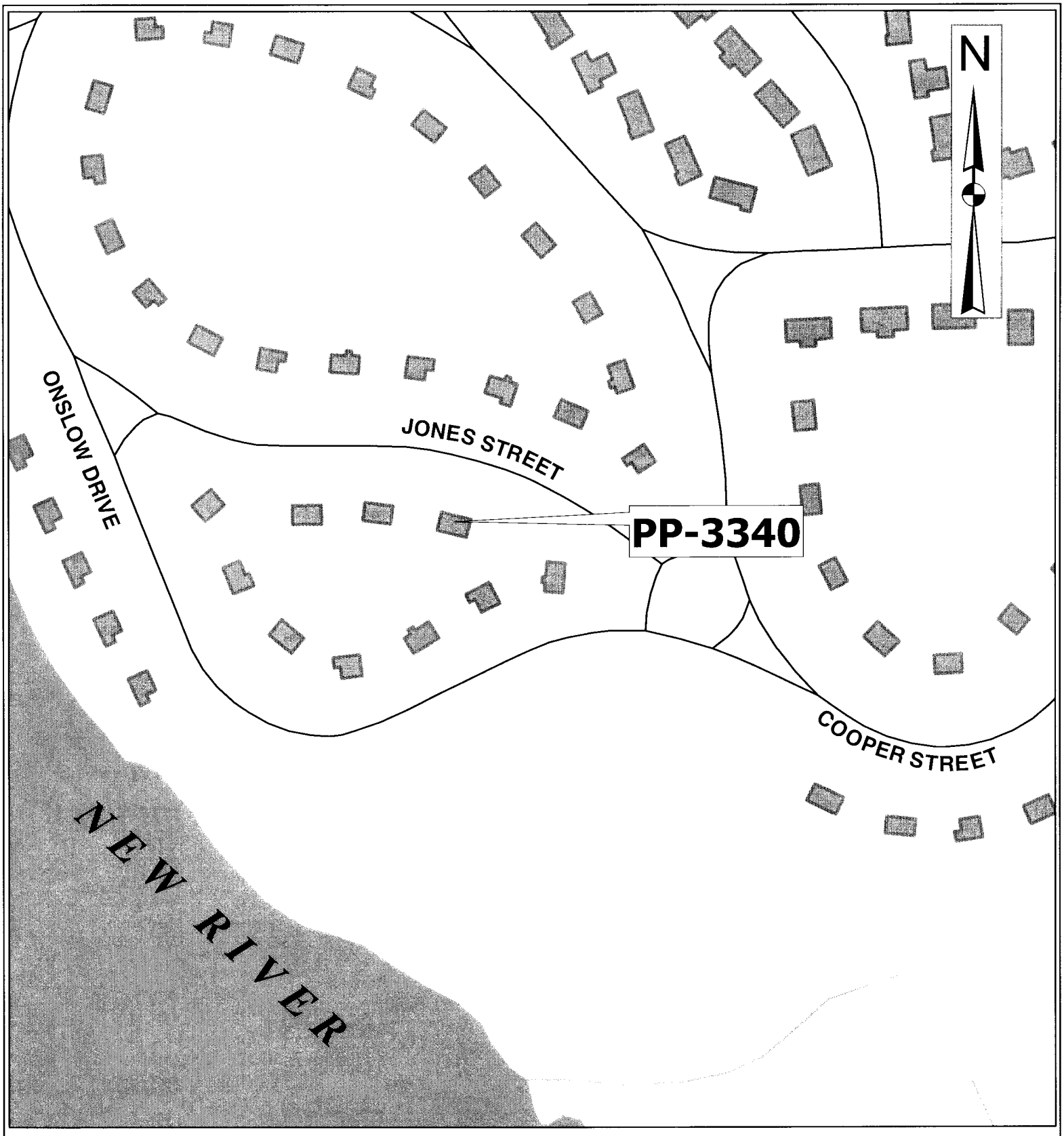
**Analytical Method: MADEP EPH/ VPH AS COMPARED TO THE 2L GWQS**

| Well ID | Contaminant of Concern → | | C5-C8 Aliphatics | C9-C18 Aliphatics | C19-C36 Aliphatics | C9-C22 Aromatics |
|---|---|---|---|---|---|---|
| | Sample ID | Date Collected | | | | |
| USTPP3340-DPT01 | USTPP3340-DPT01 | 11/4/2004 | <100 | <3800 | 650 | <2000 |
| **2L GWQS** | | | **420** | **4200** | **42,000** | **210** |

All results in ug/L

Shaded concentration exceeds the 2L GWQS

# FIGURES




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

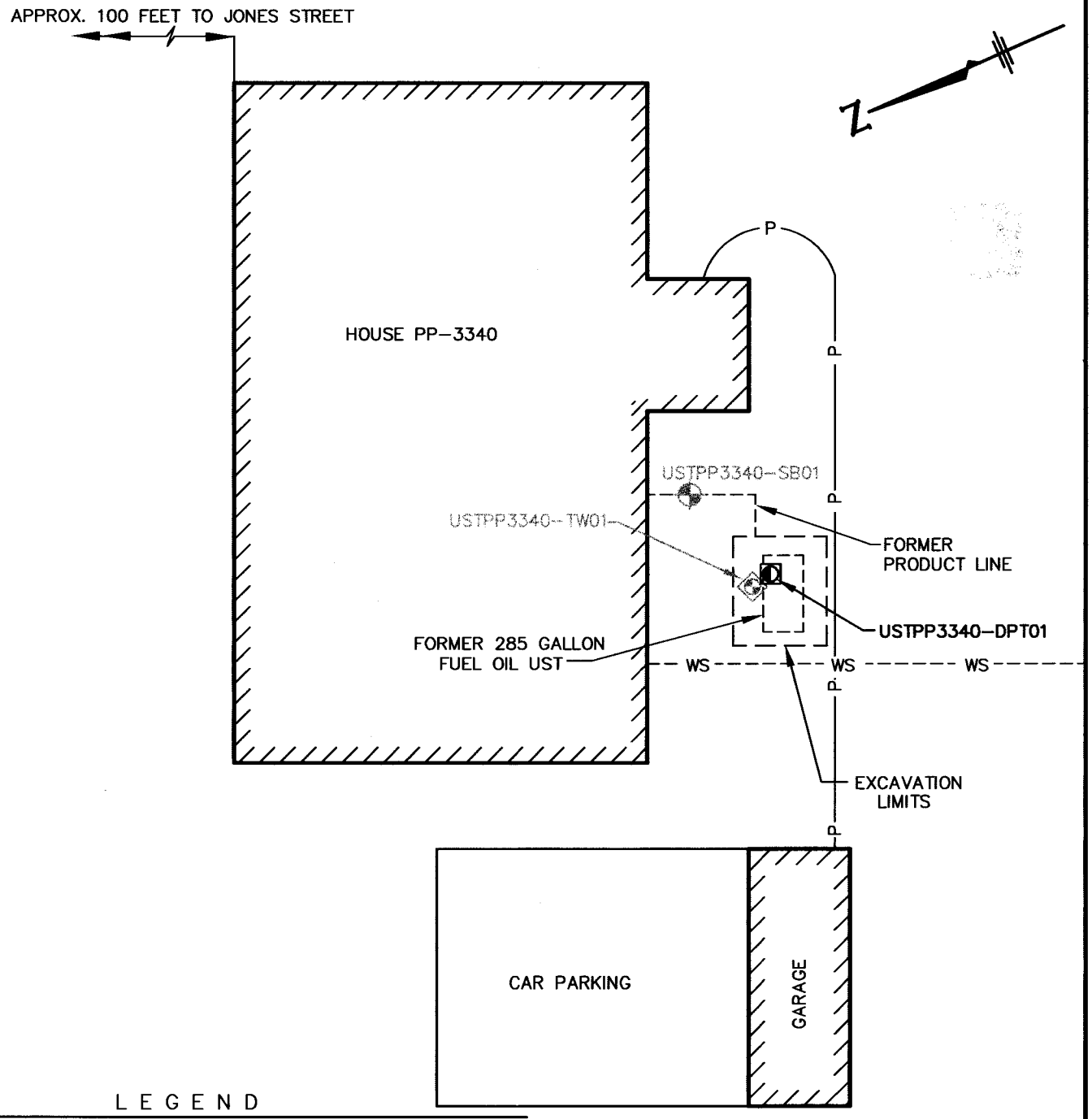
200 100 0 200 Feet

SCALE

CATLIN ENGINEERS and SCIENTISTS

| PROJECT | TITLE | FIGURE |
|---|---|---|
| PP-3340<br>MARINE CORPS BASE<br>CAMP LEJEUNE, NC | SITE VICINITY MAP | 1 |

| JOB NO. | DATE | SCALE | DRAWN BY | CHECKED BY |
|---|---|---|---|---|
| 204-079 | JAN 2005 | AS SHOWN | THW | BA |




LEGEND

| PREVIOUS | EXISTING | NEW | DESCRIPTION |
|---|---|---|---|
| | ▨ | | BUILDING |
| | ◈ | | TEMPORARY WELL |
| | ◔ | | SOIL BORING (HAND AUGER) |
| | ◐ | | DPT PROBE AND GROUNDWATER SAMPLE |
| | --WS-- | | WATER AND SEWER LINES |
| | —P— | | POWER LINE |

10 5 0 10

SCALE IN FEET

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

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: PP-3340
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE: PP-3340
SITE PLAN

FIGURE 2

JOB NO: 204-079 | DATE: DEC 2004 | SCALE: 1"=10' | DRAWN BY: WHW | CHECKED BY: MEM

204079-PP-3340-02

# 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
ENGLISH
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:** USTPP3340 -DPT01 |
| | **DRILLER:** Bobbie Fowler | | |
| **LATITUDE:** | **LONGITUDE:** | **CREW:** | |
| **SYSTEM:** | **BORING LOCATION:** PP-3340 | | **LAND ELEV.:** NM |
| **DRILL MACHINE:** Hand Auger | **METHOD:** Hand Auger | **0 HOUR DTW:** 6.3 | **BORING DEPTH:** 8.0 |
| **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) 0 1000 2000 3000 4000 | LAB. | USCS | LOG | DEPTH | SOIL AND ROCK DESCRIPTION | ELEVATION |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.0 | LAND SURFACE | |
| 0.0 | | | | | | | 0.0 | TOPSOIL | |
| | | | | | | | 0.3 | | |
| | | | | | SP | | 1.0 | Dark brown to light brown, vf. SAND. Well sorted. Moist. No hydrocarbon odor. Minor roots | |
| | | | ▲0 | | | | | | |
| 2.0 | | | | | | | | | |
| | | | ▲0 | | SP | | | Light brown, vf. SAND. Well sorted. Moist. No hydrocarbon odor. | |
| 4.0 | | | | | | | | | |
| | | | ▲905.1 | | | | 5.0 | | |
| 6.0 | | | | | SM | | | Same as above, but darker brown color and higher silt component. Brown, silty, vf. SAND. Mod to well sorted. Saturated. Strong hydrocarbon odor between 6 and 8' BLS. | |
| | | | ▲2957 | | | | 8.0 | | |
| 8.0 | | | | | | | | Boring Terminated at Depth 8.0 ft<br>Set temporary 1" well and then abandoned with benseal following water sample collection. | |

CATLIN ENVIRO_LOG 204-079 8 SITES CAMP LEJEUNE.GPJ CATLIN.GDT 01/04/05

# 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: G128-1409

Client Project: PP-3340

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 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.

11/30/04

Laboratory Director — Date
J. Patrick Weaver

# EPH (Aliphatics/Aromatics) Results

*by MDEP-EPH*

Client Name: Richard Catlin & Associates

Project Name: PP-3340

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | USTPP3340-DPT01 |
| Sample Matrix | Water |
| Date Collected | 11/04/04 |
| Date Received | 11/04/04 |
| Date Extracted | 11/16/04 |
| Date Analyzed | 11/22/04 |
| Dry Weight | |
| Dilution Factor | 1:1 |
| $C_9$-$C_{18}$ Aliphatics* | 3700 (µg/L) |
| $C_{19}$-$C_{36}$ Aliphatics* | 650 (µg/L) |
| $C_{11}$-$C_{22}$ Aromatics* | 1900 (µg/L) |
| Aliphatic Surrogate % Recovery | 20 |
| Aromatic Surrogate % Recovery | 29 |
| Fractionation Surrogate 1 % Recovery | 100 |

**Comments:**

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

Lab info: G128-1409-1D

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) | RL (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-3340

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | USTPP3340-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** | < 100 (µg/L) |
| $C_9$-$C_{10}$ Aromatics** | < 100 (µg/L) |
| Surrogate % Recovery - PID | 71 |
| 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: g128-1409-1a

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) | RL (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 (µg/L) | Levels (mg/Kg) | RPD |
|---|---|---|---|
| $C_5$-$C_8$ 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

% soilds = Percent Solids

Special Notes:

1) Metals and mercury samples are digested with a hot block, see the standard operating procedure document for details.

2) Uncertainty for all reported data is less than or equal to 30 percent.

MI34.011404.1

**PARADIGM ANALYTICAL LABORATORIES, INC.**
5500 Business Drive, Wilmington, NC 28405
Phone: (910)-350-1903 FAX: (910)-350-1557

Chain-of Custody Record & Analytical Request

COC# 40353
Page 1 of 1

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Client: Catlin
Address: 220 Old Dairy Rd.
Address: Wilmington NC 28405
Quote #: DOD 101

Project ID: PP-3340
Contact: Ben Ashba
Phone: 910-452-5861
Fax: 910-452-7563

Date: 11-4-04
Turnaround: standard
Job Number: 204-079
P.O. Number: 241029-6

Report To: Ben Ashba @ Catlin
Invoice To: Sheila @ Catlin

| Sample ID | Date | Time | Matrix | Preservatives: Ice | Preservatives: HCl | Analyses: MADEP EPH | Analyses: MADEP VPH | Comments: Please specify any special reporting requirements |
|---|---|---|---|---|---|---|---|---|
| VSTPP 3340-DPT01 | 11-4-04 | 11:00a | GW | ✓ | ✓ | ✓ | ✓ | -Summary and Lotus EDD format |
| | | | | | | | | G128-1409 |

PARADIGM ANALYTICAL LABORATORIES, INC
N.C. CERTIFICATION #481

| Relinquished By | Date | Time | Received By | Date | Time | Temperature |
|---|---|---|---|---|---|---|
| Tom Stitt | 11-4 | 14:30 | Julie Johnson | 11/4/04 | 1430 | cooler |
| | | | | | | 4.2°C |

State Certification Requested
NC ✓ SC ____ Other ____

SEE REVERSE FOR TERMS AND CONDITIONS

ORIGINAL