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June 18, 2003

Commander
Naval Facilities Engineering Command
Atlantic Division
1510 Gilbert Street
Norfolk, Virginia 23511-6287

Attention: EV23JC, Mr. John D. Conway, P.G.

Re: **FINAL** Soil Assessment Report
PP-3350
Marine Corps Base
Camp Lejeune, North Carolina

Navy Contract No. N62470-01-D-3009
Delivery Order No. 0053
CATLIN Project No. 203-011

Dear Mr. Conway:

CATLIN Engineers and Scientists (CATLIN) is pleased to submit the FINAL Soil Assessment Report document for the above referenced site. We have reviewed the comments to the referenced draft Soil Assessment Report and offer the following responses to the comments/concerns offered by Ms. Hall and Ms. Hakola.

Soil Assessment Report
PP-3350
May 2, 2003

EMD Comments (6/11/2003)

1. **Title Page**
   - **Insert "Box" between PSC and 20004 in address.**

   Revised per comment.

2. **Executive Summary**
   - **1st paragraph, 1st sentence – Delete "the" in front of "MCB".**

   Revised per comment.

   - **1st paragraph – ".... Building PP-3350 is designated as 'base housing'...." Note that this site is located in the Paradise Point Housing Area instead of simply base housing.**

   Revised per comment.

   - **3rd bullet – "Soil contamination was detected in the sidewalls..." This refers to the UST closure report, not the LSA or SAR. Suggest inserting this sentence after the first sentence of the second paragraph and ahead of the last sentence, "The subsequent investigations....". Note that contamination was also detected in the base of the former tank basin.**

   Revised per comment.

   - **3rd paragraph – Mention that this site is classified as "Residential" and "Low Risk".**

   The last sentence of this paragraph has been revised as requested.

3. **Site History, UST Removal/Closure**
   - **2nd bullet – Three (not two) of the sidewalls and the base of the excavation tested "hot". Note presence of 2-Methylnaphthalene.**

   The second bullet has been revised to include this information.

4. **Site History, Phase I LSA**
   - **1st bullet – Mention TICs in groundwater sample.**

   A new sentence has been added to summarize the TICs detected in the groundwater sample.

   - **2nd bullet – After "collected", insert "at the product feed line" and replace "Residential MSCCs" with "BQL".**

   The second bullet has been revised to better describe the analytical results of the LSA soil sample collected.

5. **Receptor Information**
   - **Item 3, 1st sentence – Do you mean west instead of east?**

   Yes. The New River is west and not east of the site. The sentence has been revised accordingly.

6. **Site Geology**
   - **2nd paragraph, 1st sentence – According to boring logs, sands are very fine to medium (not fine) between 5 and 7' (not 6').**

   This sentence has been revised to describe the soils to 4 feet BLS. The next sentence has been revised to also reference the interval from 5 to 7 feet BLS.

   - **Last paragraph, 1st sentence – Insert "during this investigation" after "observed".**

   This sentence refers to groundwater contamination detected during the LSA. Therefore, we have revised the sentence to read "during the Phase I LSA investigation".

7. **Soil Investigation/Historical Soil Sampling – UST Removal**
   - **1st paragraph – Consistent with the following sections, include date and location (i.e. sidewalls and base) of soil sampling activities.**

   Revised per comment.

8. **Soil Investigation/Current Soil Sampling – Soil Assessment Report**
   - **1st paragraph, second sentence – Soil samples should have delineated the horizontal and vertical extent of contamination. Discuss vertical extent.**

   The sentence has been revised to read "…soil samples delineate the horizontal and vertical extent of the petroleum release….".

   - **1st paragraph, third sentence – Consider deleting "The" at beginning of sentence.**

   Revised per comment.

   - **1st paragraph, last sentence – This sentence is essentially repeated at the end of the next paragraph. Consider revising.**

   This sentence has been deleted.

   - **EPA 8270, 1st paragraph, 1st sentence – Note that concentration of 0.3 mg/kg is estimated.**

   Revised per comment.

   - **MADEP VPH/EPH, 2nd paragraph, 1st sentence – Insert "investigation" after "SAR".**

   Revised per comment.

9. Proposed Remedy for Soil Contamination

- **Item 1 – Do we need to address contamination detected at base of excavation?**

The soil sample, CC-3550-1, was collected from the base of the excavation at a depth of 6.5 feet BLS. Although contaminant concentrations were detected above the Residential MSCCs in this sample, because it was collected from below the seasonal high water table it would be considered groundwater contamination and not soil contamination. Therefore, we do not feel it is necessary to further address this contamination.

- **Item 4 – Soil excavation should be completed in six months provided funding is available. Note that the State will be notified regarding any delays or changes.**

Revised per comment.

- **Item 5, last paragraph – Insert comma after MCB and move EMD between I & E and EQB.**

Revised per comment.

10. Table 6

- **Insert "Box" in address.**

Revised per comment.

In preparation of this Final document, we have also incorporated the comments made to the Draft report for Site PP-3326.

CATLIN Engineers and Scientists appreciates the opportunity to continue to provide services to LANTDIV and the MCB on your environmental projects. We look forward to hearing from you soon.

Sincerely,

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

Shane A. Chasteen
Project Scientist

Attachments: Final SAR

cc: Mr. Roger R. Marce, Jr. - Code AQ 135 Contracts (correspondence only)
Commanding General, Attn: Director I&E/EMD/EQB (2 copies)

203011_SAR_final ltr

SOIL ASSESSMENT REPORT

FOR

PP-3350
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

NCDENR UST INCIDENT NO. 24014
RICK CLASSIFICATION: LOW RISK
LAND USE CLASSIFICATION: RESIDENTIAL

JUNE 18, 2003

CONTRACT NO. N62470-01-D-3009
DELIVERY ORDER NO. 0053
CATLIN PROJECT NO. 203-011

PREPARED BY:

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REPRODUCTIONS

This report has been prepared on behalf of and exclusively for the use of LANTDIV. This report and findings contained herein shall not, in whole or in part, be disseminated or conveyed to any parties other than LANTDIV, or be used or relied upon by any other party, in whole or in part, without the prior written consent of LANTDIV and CATLIN Engineers and Scientists.

LIST OF ACRONYMS

2000 Guidelines	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater
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
ARO	Asheville Regional Office
AS	Air Sparge
AST	Aboveground Storage Tank
BDL	Below Detection Limit
BN	Base/Neutral (extractables)
BNA	Base/Neutral/Acid (extractables)
BQL	Below Quantitation Limit
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Corrective Action Plan
CATLIN	CATLIN Engineers and Scientists (Formerly RC&A)
CFR	Code of Federal Regulations
Cr	Chromium
CSA	Comprehensive Site Assessment
CNP	Carbon Nitrogen Phosphorous
CPT	Cone Penetrometer Test
DEM	Division of Environmental Management
DIPE	Diisopropyl Ether
DO	Dissolved Oxygen
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
EDB	Ethylene di-bromide
EMD	Environmental Management Division
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
EQB	Environmental Quality Branch
Fe	Iron
FID	Flame Ionization Detector
FOD	Foreign Object Debris
FRO	Fayetteville Regional Office
FT	Feet
GCL	Gross Contaminant Level
GIS	Geographic Information System
GPS	Global Positioning System

Guidelines Vol. I	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater, Volume I, Sources Other Than Petroleum Underground Storage Tanks (May 1998)
Guidelines Vol. II	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater, Volume II, Petroleum Underground Storage Tanks (January 2, 1998)
HDPE	High Density Polyethylene
I/C	Industrial/Commercial
ID	Identification
I&E	Installations and Environment Department
IGWQS	Interim Groundwater Quality Standards
IPE	Isopropyl Ether
LANTDIV	Atlantic Division
LSA	Limited Site Assessment
LUST	Leaking Underground Storage Tank
m-	meta
m	meter
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
MDL	Method Detection Limit
mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
MRO	Mooresville Regional Office
MSCC	Maximum Soil Contaminant Concentration
MSL	Mean Sea Level
MTBE	Methyl tertiary butyl ether
µg/Kg	Micrograms per Kilogram
µg/L	Micrograms per Litre
NA	Not Analyzed
N/A	Not Applicable
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCDOC	North Carolina Department of Corrections
NCDOT	North Carolina Department of Transportation
NCSP	North Carolina State Plane
NCSPA	North Carolina State Ports Authority
NE	None Established
NM	Not Measured
NMT	No Measurable Thickness
NS	Not Sampled
o-	ortho
OVA	Organic Vapor Analyzer
p-	para
PAH	Polynuclear Aromatic Hydrocarbons
Pb	Lead
PPB	Parts Per Billion
PPM	Parts Per Million

PID	Photo Ionization Detector
PQL	Practical Quantitation Limit
PVC	Polyvinyl chloride
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
Res	Residential
ROI	Radius of Influence
RRO	Raleigh Regional Office
SAR	Soil Assessment Report
SOW	Scope of Work
STGW	Soil-to-Groundwater
SVE	Soil Vapor Extraction
SVOC	Semi Volatile Organic Compound
TDHF	Toxicologically Defined Hydrocarbons Fractions
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
TKN	Total Kjeldahl Nitrogen
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
WaRO	Washington Regional Office
WiRO	Wilmington Regional Office
WSRO	Winston-Salem Regional Office

SOIL ASSESSMENT REPORT

A. TITLE PAGE

DATE OF REPORT: June 18, 2003
Facility ID: N/A UST Incident Number (if known): 24014
Site Name: PP-3350
Site Location: Paradise Point Housing Area, Marine Corps Base, Camp Lejeune
Nearest City/Town: Jacksonville County: Onslow
Risk Classification: Low Land Use Classification: Residential

UST Owner: Commanding General – MCB Camp Lejeune
I&E/EMD/EQB
Address: PSC Box 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: G.J. Schmidt (CW02)
Address: 3350 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 6, 2001
Longitude: 77.3669 W **Latitude:** 34.685 N
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (e.g. Piping/UST):
UST and/or associated piping is suspected

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. EXECUTIVE SUMMARY

The project is located at building PP-3350 aboard MCB Camp Lejeune, North Carolina. Building PP-3350 is located in the Paradise Point Housing Area and was heated using fuel from a 285-gallon UST.

In September 2001, the UST was removed and as part of the closure reporting requirements, soil samples were collected and laboratory analyzed. Laboratory results indicated that the UST system had released hydrocarbons into the subsurface. Soil contamination was detected in the sidewalls and base of the former tank basin at levels in excess of the Residential Maximum Soil Contaminant Concentrations (MSCCs). The subsequent investigations (Phase I LSA and SAR) yielded the following findings:

- Free-product was not encountered in the subsurface of the site.
- Dissolved hydrocarbons were discovered within the groundwater at the site; however, no concentrations were detected in excess of any established Gross Contaminant Levels (GCLs).
- The extent of soil contamination has been delineated and appears to be limited to the immediate vicinity of the former tank basin to a depth of 2 feet below land surface.

Due to the apparent limited extent of soil contamination, soils with contaminant concentrations in excess of Residential MSCCs are proposed for excavation. Approximately 6 cubic yards of soils are expected to require removal and disposal. As the site is classified as Residential and Low Risk, following soil excavation and verification of clean up, this site will meet the requirements for closure and No Further Action Status will be requested as part of a Soil Cleanup Report and Site Closure Request.

C. SITE HISTORY

(Refer to Tables 1 and 2)

The site previously contained one 285-gallon, non-regulated, non-commercial fuel oil UST. The fuel was used strictly for heating a single-family residence. UST history and owner information is included on Tables 1 and 2. The tank and associated product lines were closed by removal by J.A. Jones Environmental Services Company (J.A. Jones) on September 6, 2001. The UST at this site was previously referred to as CC-3350 in the UST closure report, but is referred to as PP-3350 in this investigation.

Previous investigations at the site include the UST removal and tank closure performed by J.A. Jones and a Phase I LSA prepared by CATLIN.

Underground Storage Tank Closure Report Marine Corps Base Building CC-3350, MCB Camp Lejeune, NC, January 24, 2002.	J.A. Jones
Leaking Underground Storage Tank (LUST) Phase I Limited Site Assessment Report for PP-3350, Marine Corps Base, Camp Lejeune, North Carolina, dated November 29, 2002	CATLIN Engineers and Scientists

The results of these investigations indicate the following:

<u>UST Removal/Closure</u>

- The release or discharge from a petroleum underground storage tank (UST) system has impacted soils at the site.
- Laboratory analysis of three of the five soil samples collected during UST Closure indicate concentration levels above applicable Residential MSCCs for the C_9-C_{22} Aromatics. 2-methylnaphthalene was detected in the soil sample collected from 6.5 feet BLS at the base of the former tank basin (CC-3350-1) at a concentration above the applicable Residential MSCC.

Refer to Appendix F for UST closure soil sampling results.

<u>Phase I LSA</u>

- A groundwater sample collected during the LSA activities did not exhibit contaminant concentrations in excess of established GCLs. The C_9-C_{22} Aromatics were detected at a concentration of 750 µg/L which is in excess of the IGWQS of 210 µg/L. There is no established GCL for the C_9-C_{22} Aromatics. Ten TICs were detected in the groundwater sample collected during LSA activities. 2-methylnaphthalene was detected at a concentration of 110 ug/L which is well below the established GCL (12,500 ug/L) for this compound. For the other nine TICs detected there are no established GCLs.
- Laboratory analysis of the soil sample collected at the product feed line during LSA activities indicate all contaminant concentrations were below quantitation limits (BQL).

LSA soil sample results are included on Tables 3A through 3D.

D. RECEPTOR INFORMATION

The receptor information provided with the LSA remains unchanged as of the date of this report.

1. Water Supply Wells

As documented in the LSA, there were no water supply wells located within 1,500 feet of subject site.

2. Public Water Supplies

Public water is provided to buildings within 1,500 feet of the subject site by water mains which carry treated potable water. Potable water is supplied to the site and surrounding areas by the MCB water supply system. Potable water for the Paradise Point housing area is provided by the Hadnot Point Water Treatment Facility. Groundwater obtained from the Castle Hayne Aquifer beneath the MCB is the raw water source for the treatment facilities.

3. Surface Water

The New River lies approximately 300 feet west of the subject site. Two unnamed, intermittent tidal creeks are located approximately 475 feet north and 600 feet south of the site.

4. Wellhead Protection Areas

As documented in the LSA, the site is not located in a proposed wellhead protection area.

5. Deep Aquifers in the Coastal Plain Physiographic Region

As identified in the Geologic Map of North Carolina (North Carolina Department of Natural Resources and Community Development 1985), the subject site lies within the Coastal Plain Physiographic Province. Potential impacts to deeper aquifers are unknown, though; minimal impact to surficial groundwater was revealed.

To some degree seven of the ten aquifers identified to date in the North Carolina Coastal Plain are typically present beneath portions of the MCB. In order of increasing depth, these aquifers include the Surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear aquifers.

Aquifers below the surficial aquifer in the area of Paradise Point typically include the Castle Hayne Aquifer, the Beaufort Aquifer, and the Peedee Aquifer, in order of

increasing depth. Both the Beaufort and Peedee Aquifers contain saltwater in portions of the MCB and are not generally used for water supply. The Castle Hayne Aquifer contains freshwater and is the principal aquifer used in the area for water supply.

6. Subsurface Structures

(Refer to Figure 3)

Municipal sanitary sewer line enters the residence near the northwest corner of the residence, west of the source area. Municipal water enters the residence near the southwestern corner of the structure. Underground power, cable and telephone enter the residence to the east of the source area. Due to the shallow depth of these utilities and the depth and limited nature of known contamination, it is not deemed likely that these utilities would serve as preferential pathways for contaminant migration. Known utilities are illustrated on Figure 3.

7. Property Owners and Occupants

(Refer to Table 6)

Refer to Table 6 for a list of property owners/occupants.

E. SITE GEOLOGY

According to the Geologic Map of North Carolina (North Carolina Department of Natural Resources and Community Development (1985)) the site lies within the Coastal Plain Physiographic Province.

Field observations noted during hand auger soil boring advancement (as part of the Phase I LSA) indicates site geology to be comprised of well sorted, very fine to fine sands to a depth of four feet below ground surface. Split spoons samples collected during temporary monitoring well USTPP-3350-TW01 boring advancement revealed well sorted, very fine to medium sand from 5 to 7 feet below ground surface and a silty clay layer from 10 to 12 feet below ground surface. Boring logs for the soil boring and temporary well are included in Appendix A.

Hand augered borings for this investigation indicate very fine grained, silty sand to boring termination at 2 feet BLS. Boring logs for USTPP3350-SB02 through USTPP3350-SB04 are included in Appendix A. Geologic cross-sections of the study site have been prepared and are shown on Figures 6A through 6C.

The split spoons collected during advancement of the temporary monitoring well boring revealed soils to be saturated at approximately six feet below ground surface. Groundwater depth as measured in the monitoring well in July 2002 was 5.30 feet below top of casing. Groundwater depth was estimated at 2 feet BLS during this investigation (March 2003).

Silty sands and clays, which were noted below six feet BLS in the water bearing zone, typically exhibit low permeability. Based on experience with similar sites, rapid migration of groundwater contamination is not expected.

Due to the low contaminant concentrations observed during the Phase I LSA investigation (only C_9-C_{22} Aromatics were detected above the 2L GWQS), rapid degradation of contamination is not expected. Attenuation may occur mainly due to adsorption and dispersion.

F. SOIL INVESTIGATION

(Refer to Tables 3A-3D, Figures 4A-4C, and Appendices D, E, and F)

Historical Soil Sampling – UST Removal

As described in the Site History section, soil samples were obtained during tank closure activities in November 2001 from the sidewalls and base of the former tank basin. Laboratory analyses of these samples revealed concentrations of C_9-C_{22} Aromatics and 2-methylnaphthalene at concentrations above the Residential MSCC. The C_9-C_{22} Aromatics fraction was detected in three samples at concentrations of 840, 1450, and 1620 mg/Kg, which exceed the Residential MSCC of 469 mg/Kg. The semi-volatile compound 2-methylnaphthalene was detected in one sample at a concentration of 87 mg/kg, which is above the Residential MSCC of 63 mg/Kg. Refer to Appendix F for a summary of historical sampling results.

These results triggered the regulatory requirement for a Phase I LSA.

Historical Soil Sampling – Phase I LSA

CATLIN personnel conducted soil sampling activities on July 22, 2002. Utilizing hand auger techniques, one soil boring (USTPP3350-SB01) was advanced to a depth of four feet BLS. This boring was advanced in the location of the former product feed line. The soil sample (3350) was analyzed per EPA Methods 8260B/5035 (includes DIPE +MTBE), 8270, and MADEP VPH/EPH. The laboratory analytical results indicated that none of the target compounds were above the laboratory practical quantitation limits (PQLs).

It should be noted that a soil sample was not collected for laboratory analysis from the monitoring well boring installed in the former UST basin (USTPP3330-TW01), since the basin was backfilled with clean soil from the surface down into the surficial aquifer. Therefore, an undisturbed, vadose zone soil sample could not be collected within the former UST basin. LSA soil sample results are included on Tables 3A through 3D.

Current Soil Sampling – Soil Assessment Report

On March 24, 2003, CATLIN personnel conducted a soil sampling event at the site as proposed in the Phase I LSA. It was intended that the collected soil samples delineate the horizontal and vertical extent of the petroleum release within the soils of the study area. Three soil borings were advanced to the water table utilizing hand auger technologies at the locations indicated on Figures 4A through 4C. At the time of the sampling event, the water

table was noted at 2.0 feet BLS. Due to the seasonal high water table fluctuation, the soil samples were collected from 0-1 feet BLS for laboratory analysis. The soil samples were identified in the field and labeled on the chain of custody as USTPP3350-SB02 (0-1), USTPP3350-SB03 (0-1), and USTPP3350-SB04 (0-1).

All sampling was conducted in accordance with CATLIN's Standard Procedures included in Appendix D. The soil borings were immediately abandoned with cuttings following the collection of the samples. The soil samples were placed in laboratory glassware, labeled, placed immediately on ice in a cooler, and transported under proper chain of custody protocol to Paradigm Analytical Laboratories, Inc. in Wilmington, North Carolina. The laboratory reports and chain of custody documentation are provided in Appendix E and are summarized as follows:

EPA Method 8260B/5035 (includes DIPE +MTBE)

As indicated in Table 3A and illustrated in Figure 4A, there were no EPA Method 8260B/5035 target compounds detected in the soil samples collected on March 24, 2003 at concentrations above the laboratory PQLs

EPA Method 8270

As indicated in Table 3B and illustrated in Figure 4B, benzoic acid was detected in soil sample USTPP3350-SB03 (0-1) at 1.1 mg/kg and in sample USTPP3350-SB04 (0-1) at an estimated concentration of 0.3 mg/kg. These levels are well below the Residential MSCC of 62,571 mg/kg. No other target compounds were detected in the soil samples collected on March 24, 2003 at concentrations above the laboratory PQLs.

MADEP VPH/EPH

As indicated in Tables 3C and 3D and illustrated in Figure 4C, only the MADEP C_9-C_{22} Aromatic hydrocarbon fraction was detected in soil sample USTPP3350-SB02 (0-1) at <30 mg/kg. This is well below the Residential MSCC of 469 for the C_9-C_{22} Aromatic hydrocarbon fraction. No concentrations were detected in the remaining soil samples collected on March 24, 2003 above the laboratory PQLs.

Based on the results of the soil samples collected during this SAR investigation, it appears that vadose zone soil contamination has been delineated both horizontally and vertically. From the hand augered borings performed as part of this investigation, saturated soils were detected at 2 feet BLS, indicating that the seasonal high water table may be as shallow as 2 feet. Previous "dirty" samples were collected at the tank closure from 4 feet and 6.5 feet BLS, which may not be indicative of vadose zone soils. However, since they are "dirty" at 4 and 6.5 feet BLS, it is reasonable to assume that soil contamination may exist above 4 feet BLS in the vadose zone along the western and southern sidewalls of the former tank basin. Therefore, remediation of contaminated soils to the Residential MSCCs is recommended at this site.

G. CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this Soil Assessment Report, the levels of the hydrocarbons within the soils of the study area have been delineated. Soil contamination is reasonably assumed to exist in limited areas adjacent to the western and southern sidewalls of the former tank basin. It is recommended that these contaminated soils be remediated to the Residential MSCCs. Following soil remediation, the site will meet the requirements for closure and No Further Action Status will be requested as part of a Soil Cleanup Report and Site Closure Request.

H. PROPOSED REMEDY FOR SOIL CONTAMINATION

1. Evaluation of Remediation Alternatives

Based on the limited horizontal and vertical extents of suspected soil contamination at this site, it appears that soil excavation would be the most economical remediation method. Further evaluation of remediation alternatives was not deemed necessary. The soil contamination appears limited to two sidewalls of the former tank basin from the land surface to approximately 2 feet BLS (the tank basin was backfilled with clean fill). Soils are proposed to be cleaned up to the Residential MSCCs.

2. Proposed Remediation

An over-excavation of the western and southern sidewalls of the former tank basin is proposed to eliminate the suspected remaining soil contamination on site. The estimated volume of soil to be removed assumes a 5 foot wide excavation along the two sidewalls to a minimum depth of 2 feet BLS. The final dimensions of the tank excavation were 6 feet long by 4.5 feet wide by 5.5 feet deep. The estimated volume of soils to be removed is 6 cubic yards.

3. Post Remediation Sampling

Confirmatory soil samples will be collected from two walls of the excavation after removal of the contaminated soils. Two samples are proposed (one from each of the excavated sidewalls), each to be laboratory analyzed per the following methods:

Method	Description
8260	Volatile Organics + IPE + MTBE
8270	Base/Neutrals/Acid Extractables + TICS
VPH	MADEP
EPH	MADEP

4. Schedule

The soil excavation is expected to be completed within the next six months provided funding is available. The State will be notified regarding any delays or changes.

5. Public Notice

Public notice is required by the NCDENR if the responsible party proposes cleanup of soil contamination to an alternate standard (other than the lower of the Residential or Soil-to-Groundwater MSCC). As we are proposing cleanup to the Residential MSCC, public notice is required. The following parties are required to be notified:

- the local health director;
- the chief administrative officer of each political jurisdiction in which the contamination occurs; and
- all property owners and occupants contiguous to the area containing the contamination.

Public notification will be provided by the MCB, Camp Lejeune, Installations and Environment Department, Environmental Management Division, Environmental Quality Branch.

I. LIMITATIONS

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

J. REFERENCES

Cardinell, A.P. and Others, 1993, *Hydrogeologic Framework of U.S. Marine Corps Base at Camp Lejeune, North Carolina; U.S. Geological Survey Water-Resources Investigation Report 93-4049:* U.S. Geological Survey, Raleigh, North Carolina.

CATLIN Engineers and Scientists, *Leaking Underground Storage Tank (LUST) Phase I Limited Site Assessment Report for PP-3350, Marine Corps Base, Camp Lejeune, North Carolina,* November 29, 2002.

J.A. Jones Environmental Services Inc., *Underground Storage Tank Closure, UST No. CC-3350 Camp Lejeune, North Carolina,* January 24, 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).

Stuckey, J.L., 1965, *North Carolina- It's Geology and Mineral Resources,* Raleigh, North Carolina: Department of Conservation and Development, 550 p.

Winner, M.D., Jr., and Coble, R.W., 1989, *Hydrogeologic Framework of the North Carolina Coastal Plain Aquifer System: U.S. Geological Survey Open-File Report 87-690,* 155 p.

TABLES

TABLE 1

SITE HISTORY
UST SYSTEM INFORMATION

UST PP-3350

UST ID Number	**Product** (gasoline, diesel, jet fuel, etc.)	**Capacity** (gallons)	**Date Installed** (m/dd/yy)	**Date Permanently Closed (P), or Still in Use* (C)** (m/dd/yy)	**Was Release Associated With UST System?** (Yes / No)
PP-3350	Fuel Oil[+]	285	Unknown	(P) 9/6/01	Yes

[+] UST was used strictly for residential heating purposes

* Still in use means not permanently closed.

TABLE 2

SITE HISTORY
UST OWNER/OPERATOR INFORMATION

UST PP-3350

UST ID Number	Name of Owner or Operator	Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	Owner or Operator?
PP-3350	Commanding General Marine Corps Base Camp Lejeune, NC	Unknown to 9/6/01	Owner and Operator

Address	Telephone Number
I&E/EMD/EQB PSC Box 20004 Marine Corps Base, Camp Lejeune, NC 28542	910-451-5068

TABLE 3A SUMMARY OF SOIL LABORATORY RESULTS

Date: March 24, 2003 Incident Number and Name: 24014 - PP-3350 Facility ID#: N/A

Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern →		All Target Analytes
	Date Collected	Sample Depth (ft. BGS)	
Residential MSCC (mg/kg) **Industrial/Commercial MSCC (mg/kg)** **Soil to Groundwater MSCC (mg/kg)**			Varies Varies Varies
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3350-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB04 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB04D (0-1)	3/24/03	0-1	BQL

All results in mg/kg.

TABLE 3B SUMMARY OF SOIL LABORATORY RESULTS

Date: March 24, 2003 Incident Number and Name: 24014 - PP-3350 Facility ID#: N/A

Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	Benzoic Acid	All Other Target Analytes
Residential MSCC (mg/kg)			62,571	Varies
Industrial/Commercial MSCC (mg/kg)			1,635,200	Varies
Soil to Groundwater MSCC (mg/kg)			112	Varies
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	<0.67	BQL
USTPP3350-SB02 (0-1)	3/24/03	0-1	<0.76	BQL
USTPP3350-SB03 (0-1)	3/24/03	0-1	1.1	BQL
USTPP3350-SB04 (0-1)	3/24/03	0-1	0.3 J	BQL

All results in mg/kg.

J = Detected below the quantitation limit.

TABLE 3C SUMMARY OF SOIL LABORATORY RESULTS

Date: March 24, 2003 Incident Number and Name: 24014 - PP-3350 Facility ID#: N/A

Analytical Method: MADEP EPH/VPH

Sample ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Date Collected	Sample Depth (ft. BGS)						
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	<10	<10	<10	<10	<10	<10
USTPP3350-SB02 (0-1)	3/24/03	0-1	<10	<10	20	<10	<10	<10
USTPP3350-SB03 (0-1)	3/24/03	0-1	<10	<10	<10	<10	<10	<10
USTPP3350-SB04 (0-1)	3/24/03	0-1	<10	<10	<10	<10	<10	<10

All results in mg/kg.

TABLE 3D SUMMARY OF SOIL LABORATORY RESULTS

Date: March 24, 2003 Incident Number and Name: 24014 - PP-3350 Facility ID#: N/A

Analytical Method: MADEP EPH/VPH AS COMPARED TO NCDENR MSCCs

Sample ID	Date Collected	Sample Depth (ft. BGS)	C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
Contaminant of Concern →						
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264
Soil to Groundwater MSCC (mg/kg)			72	3,255	##	34
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	<10	<20	<10	<20
USTPP3350-SB02 (0-1)	3/24/03	0-1	<10	<20	<10	<30
USTPP3350-SB03 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3350-SB04 (0-1)	3/24/03	0-1	<10	<20	<10	<20

Health based level >100%

Considered immobile

All results in mg/kg.

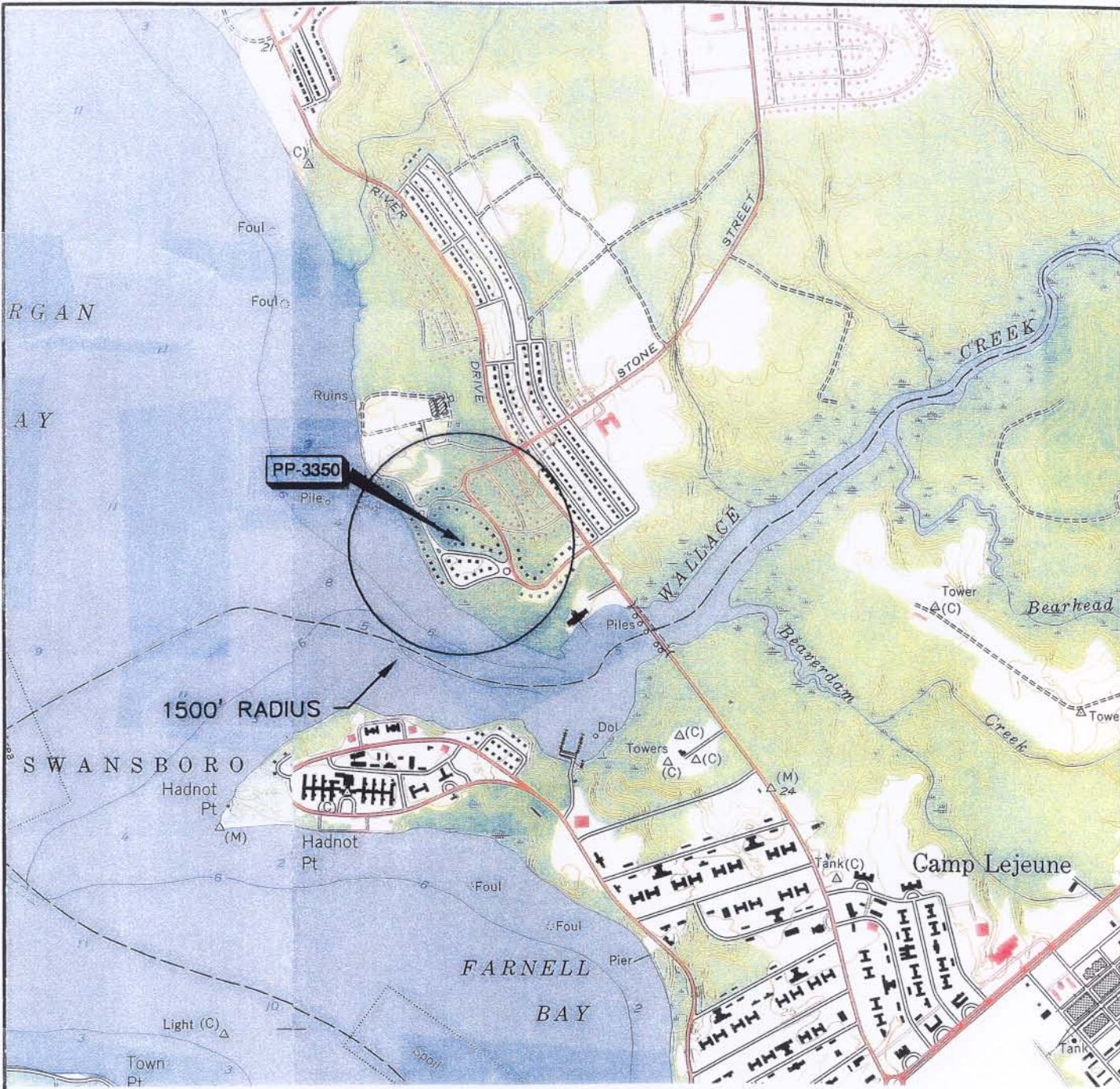
TABLE 6

PROPERTY OWNERS/OCCUPANTS

Date: Mar-03 Incident No. and Name: 24014 - PP-3350 Facility ID#: N/A

Tax Parcel Number/Map ID	Owner/Occupant Name (Last, First MI)	Address
N/A	Owner: Commanding General, MCB Camp Lejeune	I&E/EMD/EQB PSC Box 20004 Marine Corps Base, Camp Lejeune, NC 28542
N/A	Occupant: CW02 G.J. Schmidt	3350 Jones Street Marine Corps Base, Camp Lejeune, NC 28542

FIGURES



SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

MN GN

5½° 98 MILS 1°19' 23 MILS

N.C

QUADRANGLE LOCATION

NOTE:
NO PLACES OF PUBLIC ASSEMBLY IDENTIFIED WITHIN A 1,500' RADIUS OF THE SUBJECT SITE

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT	TITLE	FIGURE
PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	SITE LOCATION WITH PLACES OF PUBLIC ASSEMBLY	2

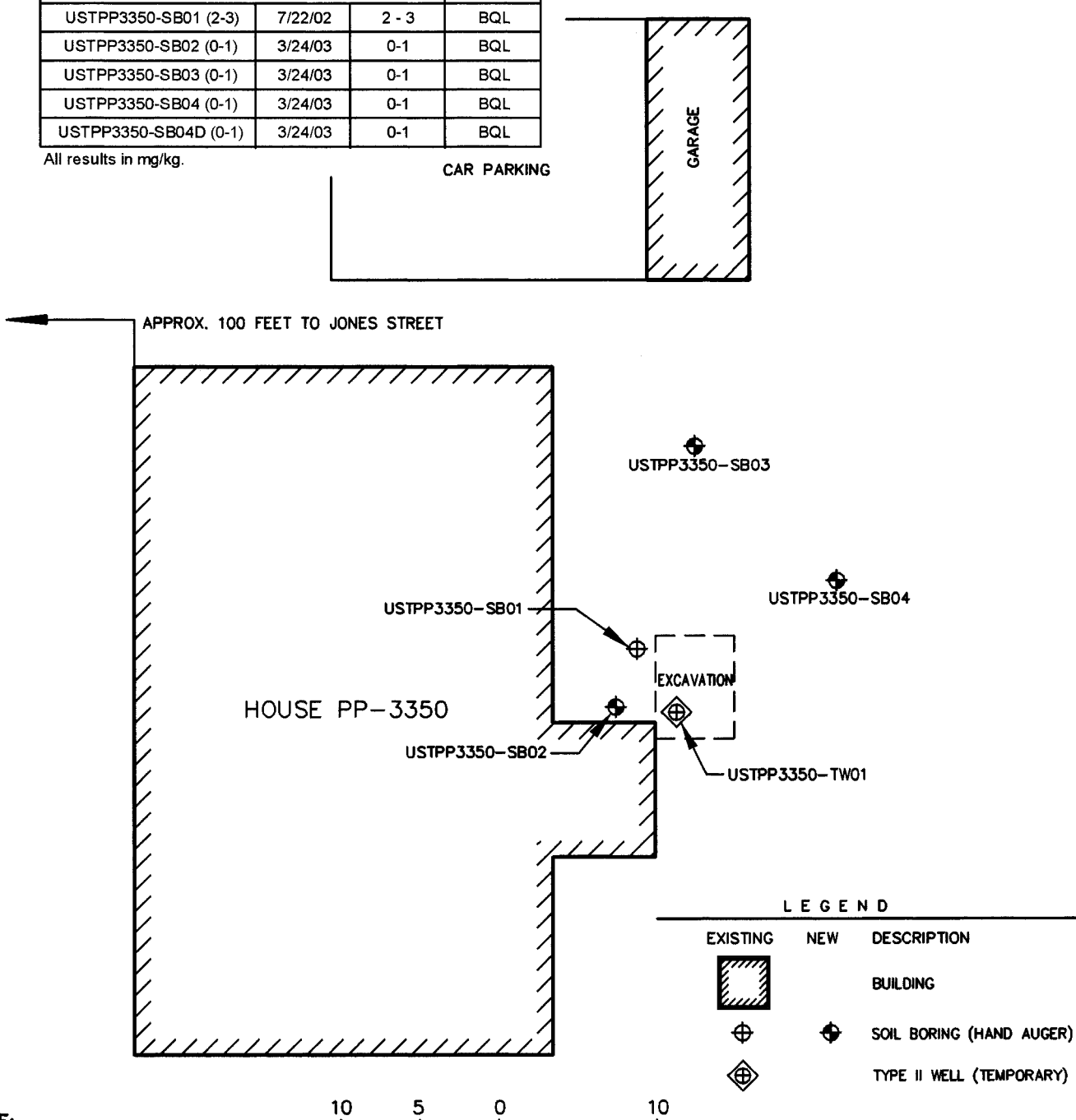
JOB NO:	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
202047-02	AUG 2002	AS SHOWN	HCS	TWL

202047-02-2

Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	All Target Analytes
Residential MSCC (mg/kg) Industrial/Commercial MSCC (mg/kg) Soil to Groundwater MSCC (mg/kg)			Varies Varies Varies
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3350-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB04 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB04D (0-1)	3/24/03	0-1	BQL

All results in mg/kg.



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

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.

TITLE: SITE PLAN WITH SOIL LABORATORY RESULTS – EPA METHOD 8260B/5035

FIGURE 4A

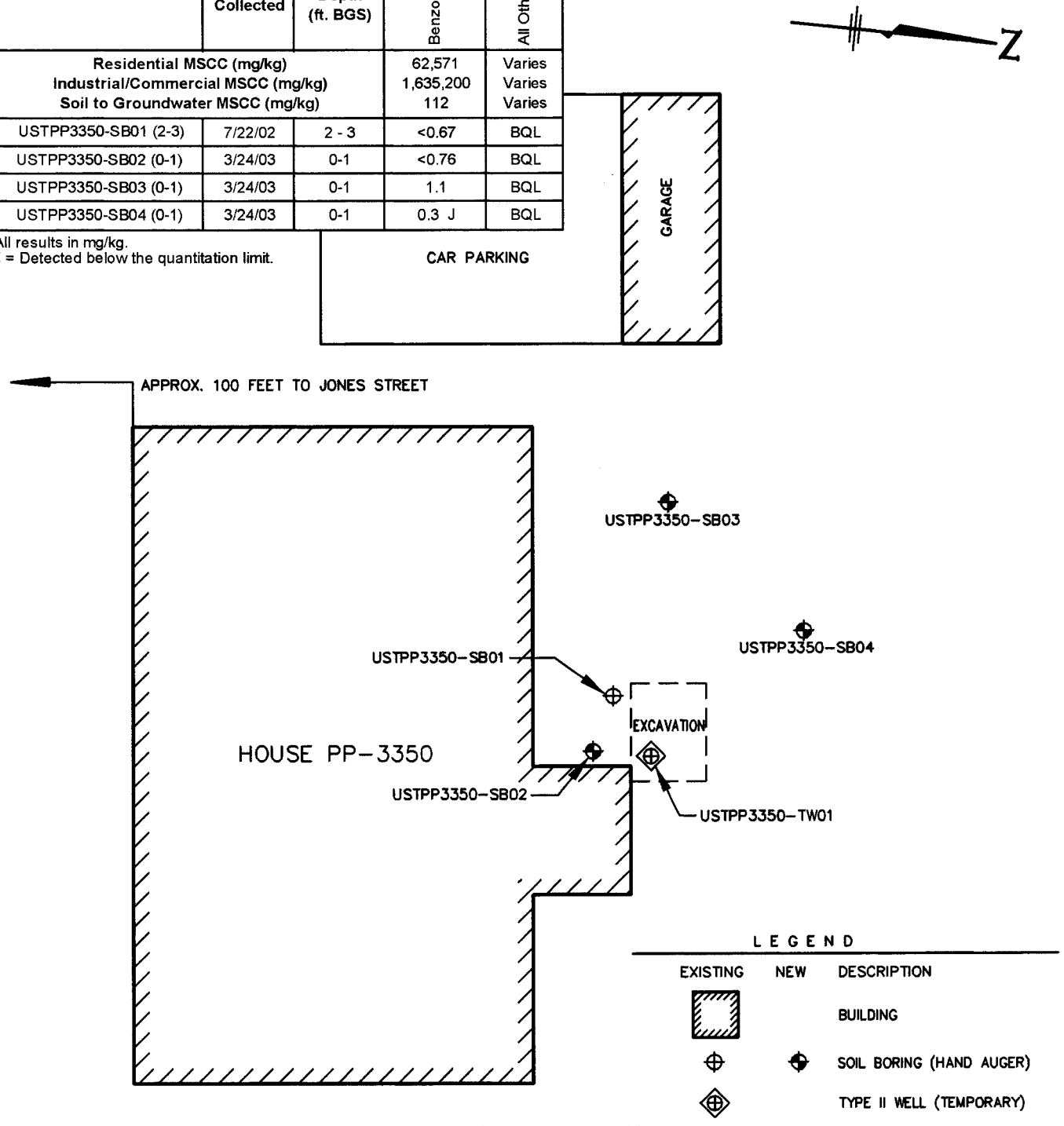
JOB NO: 203011-41 | DATE: MAY 2003 | SCALE: 1"=10' | DRAWN BY: WHW | CHECKED BY: MEM

203011-41-04A

Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	Benzoic Acid	All Other Target Analytes
Residential MSCC (mg/kg) Industrial/Commercial MSCC (mg/kg) Soil to Groundwater MSCC (mg/kg)			62,571 1,635,200 112	Varies Varies Varies
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	<0.67	BQL
USTPP3350-SB02 (0-1)	3/24/03	0-1	<0.76	BQL
USTPP3350-SB03 (0-1)	3/24/03	0-1	1.1	BQL
USTPP3350-SB04 (0-1)	3/24/03	0-1	0.3 J	BQL

All results in mg/kg.
J = Detected below the quantitation limit.



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

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: PP-3350
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE: SITE PLAN WITH
SOIL LABORATORY RESULTS
– EPA METHOD 8270

FIGURE 4B

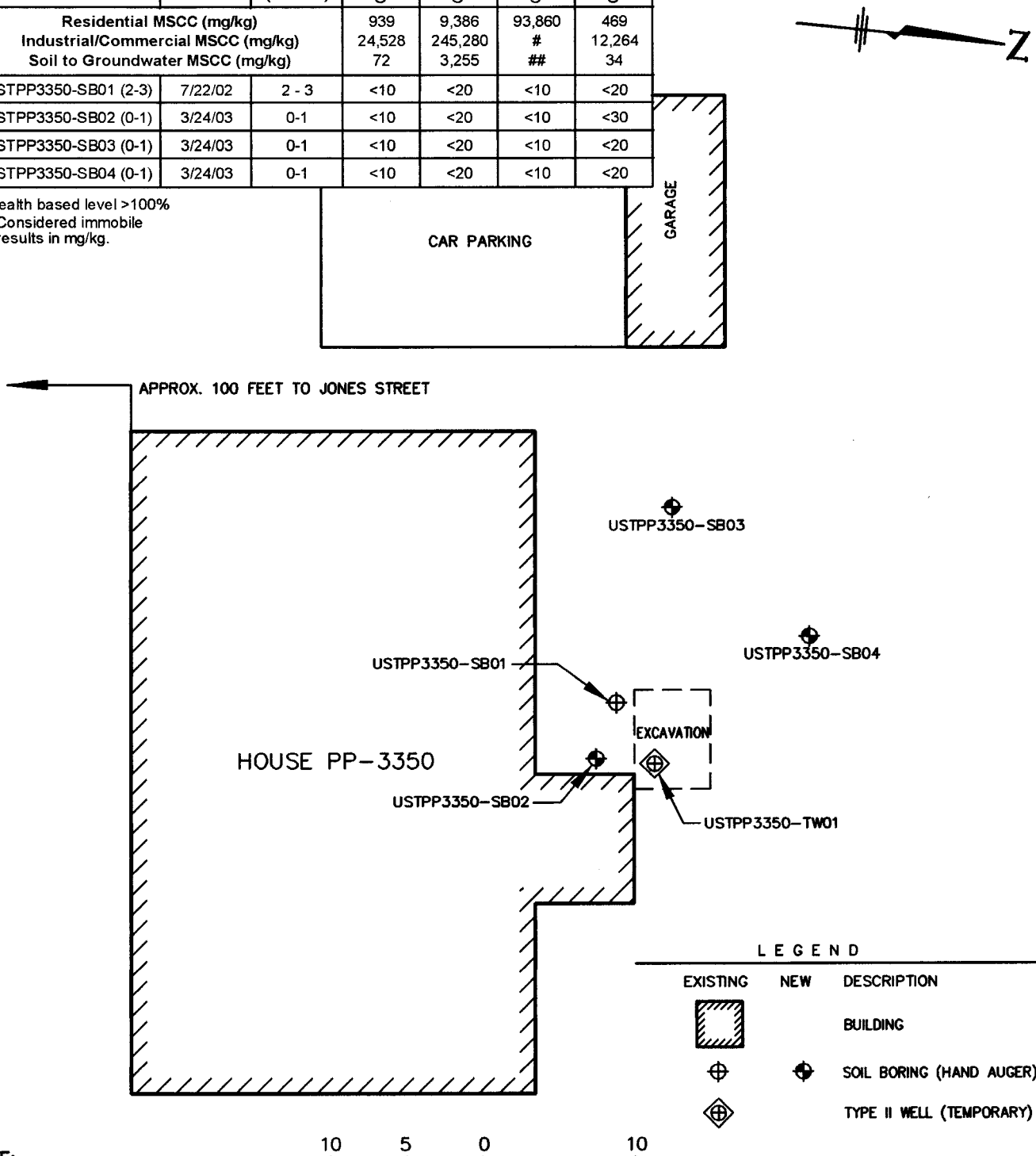
JOB NO: 203011-41 | DATE: MAY 2003 | SCALE: 1"=10' | DRAWN BY: WHW | CHECKED BY: MEM

203011-41-04B

Analytical Method: MADEP EPH/VPH AS COMPARED TO NCDENR MSCCs

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264
Soil to Groundwater MSCC (mg/kg)			72	3,255	##	34
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	<10	<20	<10	<20
USTPP3350-SB02 (0-1)	3/24/03	0-1	<10	<20	<10	<30
USTPP3350-SB03 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3350-SB04 (0-1)	3/24/03	0-1	<10	<20	<10	<20

Health based level >100%
Considered immobile
All results in mg/kg.



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

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

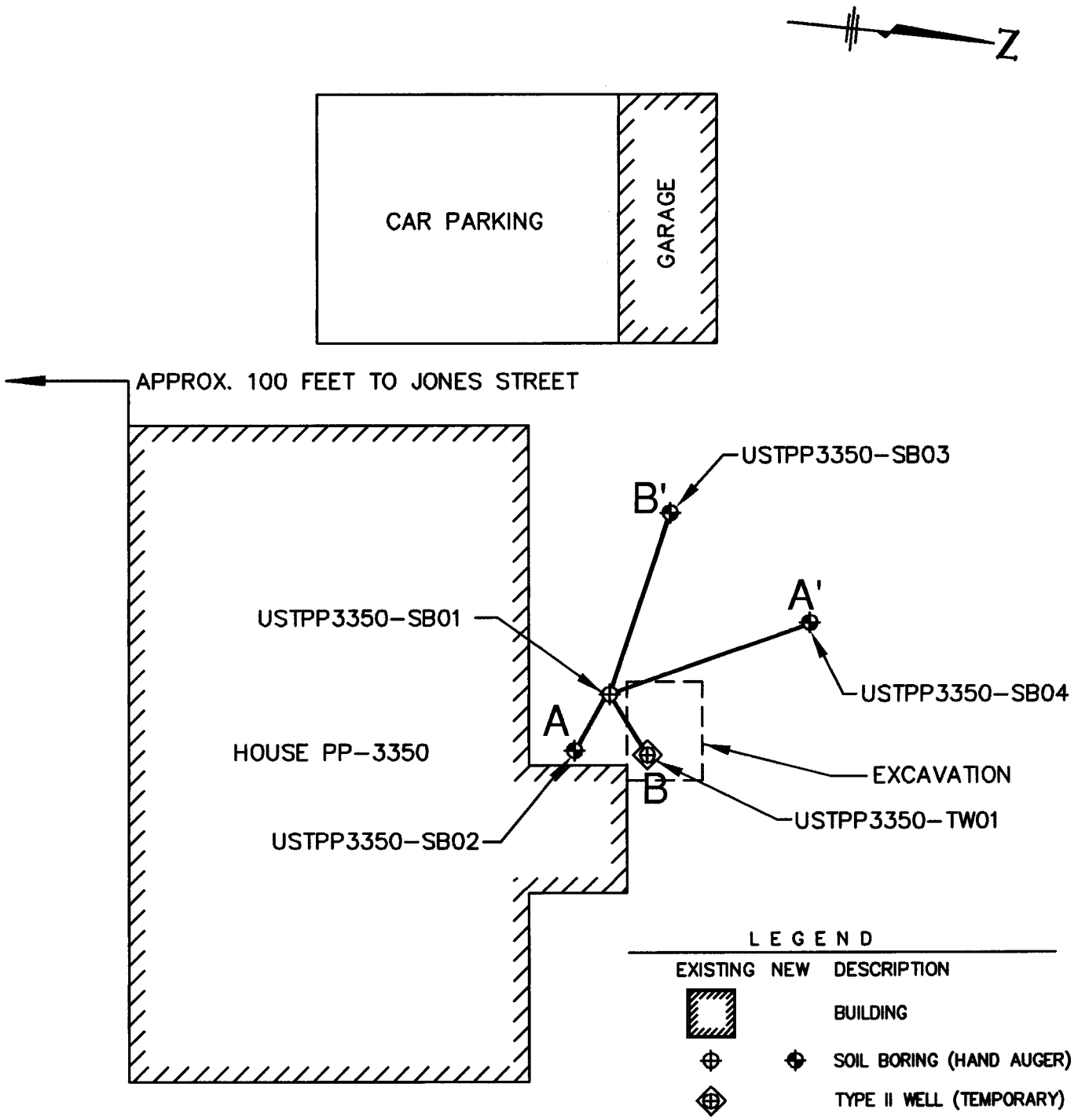
PROJECT: PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.

TITLE: SITE PLAN WITH SOIL LABORATORY RESULTS - MADEP EPH/VPH AS COMPARED TO NCDENR MSCCs

FIGURE: 4C

JOB NO: 203011-41 | DATE: MAY 2003 | SCALE: 1"=10' | DRAWN BY: WHW | CHECKED BY: MEM

203011-41-04C



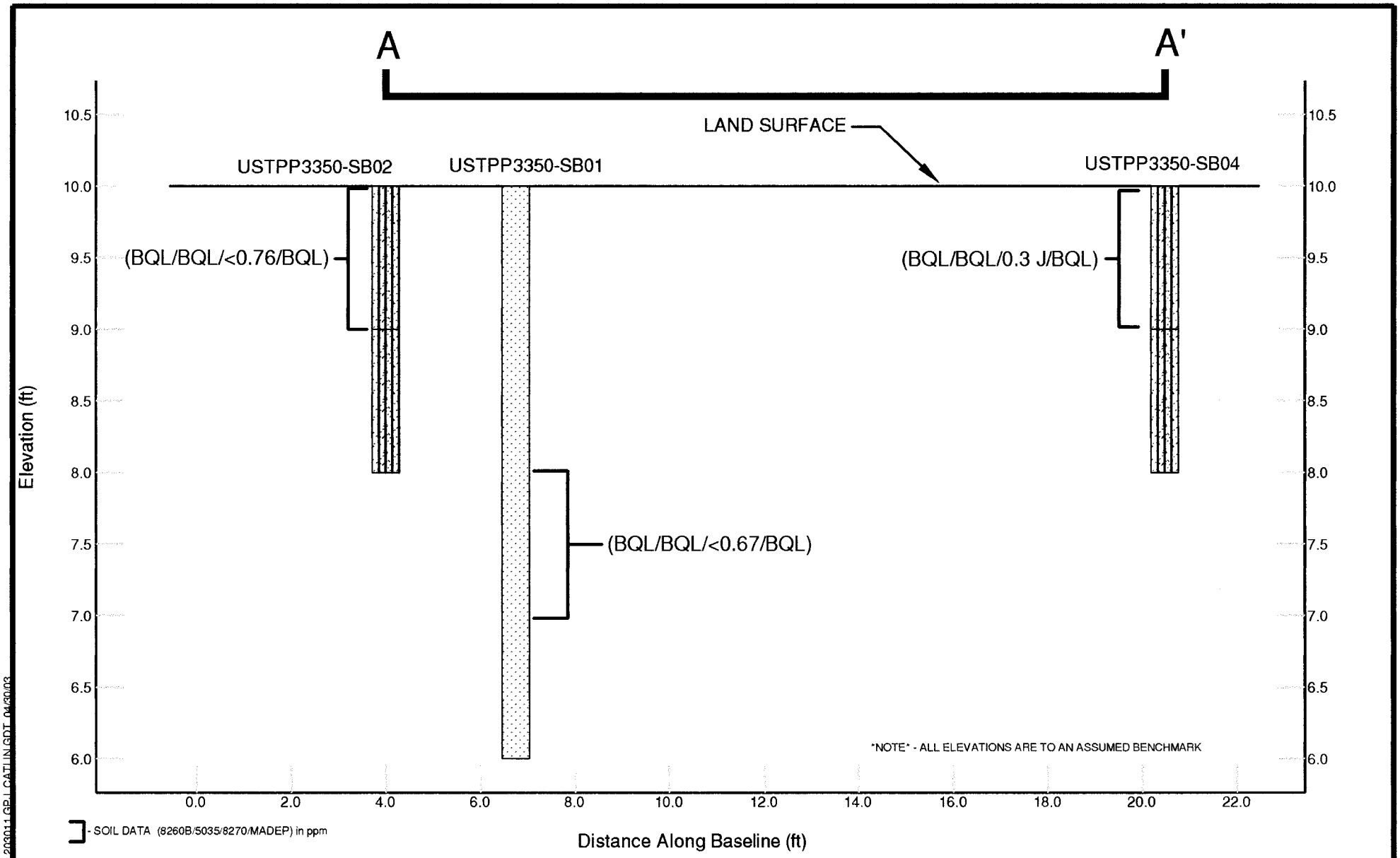
NOTE:
1. MAP ADAPTED FROM J.A. JONES

10 5 0 10
SCALE IN FEET

CAELUM ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT	TITLE	FIGURE
PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	CROSS-SECTION PLAN VIEW	6A

JOB NO: 203011	DATE: 04/30/03	SCALE: 1"=10'	DRAWN BY: GRD	CHECKED BY: MEM



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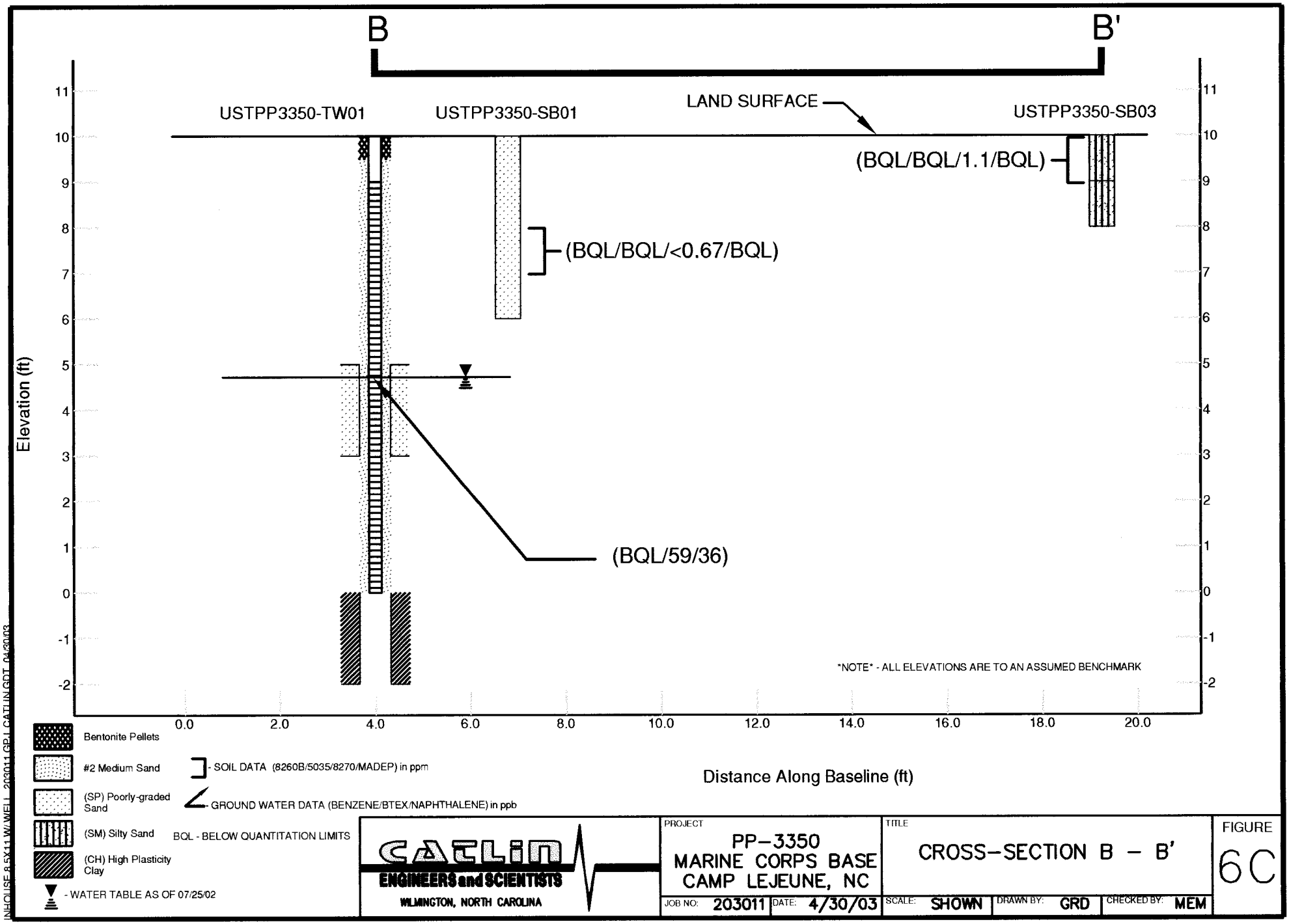
PROJECT	TITLE	FIGURE
PP-3350 MARINE CORPS BASE CAMP LEJEUNE, NC	CROSS-SECTION A - A'	6B

JOB NO:	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
203011	4/30/03	SHOWN	GRD	MEM

INHOUSE 8.5X11 W/WELL 203011.GPJ CATLIN.GDT 04/30/03



CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT	TITLE	FIGURE
PP-3350 MARINE CORPS BASE CAMP LEJEUNE, NC	CROSS-SECTION B - B'	6C

JOB NO:	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
203011	4/30/03	SHOWN	GRD	MEM

INHOUSE 8.5X11 W/WELL 203011 GP1 CATLIN.GDT 04/30/03

APPENDICES

APPENDIX A

BORING LOGS

WELL LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203011	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3350		LOGGED BY: Charles Ray	WELL ID: USTPP 3350-TW01
		DRILLER: Bobbie Fowler	
NORTHING:	EASTING:	CREW: Tom Stetler	
SYSTEM: N/A	BORING LOCATION: Behind house		T.O.C. ELEV.: 10.00
DRILL MACHINE: CME 45B ATV	METHOD: HSA	0 HOUR DTW:	BORING DEPTH: 12.0
START DATE: 07/24/02	FINISH DATE: 07/24/02	24 HOUR DTW: 5.3	WELL DEPTH: 10.0

DEPTH	BLOW COUNT 6in	6in	6in	6in	OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	DEPTH	ELEVATION	WELL DETAIL
									LAND SURFACE	0.0	10.0	0.0
5.0	HP	HP	HP	HP			SP		Gray, well sorted, v.f. to med. SAND. Sat., High HCO.	5.0	5.0	
7.0										7.0	3.0	
10.0	HP	HP	HP	HP			CH		Dark gray/brown, SILTY CLAY with high plasticity and wood fragments. Wet to sat., High HCO.	10.0		
12.0									Boring Terminated at Elevation -2.0 ft Elevation based on assumed land surface elevation of 10 feet.	12.0	-2.0	

WELL DETAIL: 0.0 – 1.0 2" Sch. 40 PVC; 0.5 – 10.0 2" Slot .010 Sch. 40 PVC; 10.0 – 10.0

Bentonite Pellets #2 Medium Sand

CATLIN BORING LOG 203011.GPJ CATLIN.GDT 05/02/03

BORING LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203011	**STATE:** NC	**COUNTY:** Onslow	**LOCATION:** MCB, Camp Lejuene
PROJECT NAME: PP-3350		**LOGGED BY:** Charles Ray	**BORING ID:** USTPP 3350-SB01
		DRILLER: Bobbie Fowler	
NORTHING:	**EASTING:**	**CREW:** Tom Stetler	
SYSTEM: N/A	**BORING LOCATION:** Line from tank to house		**LAND ELEV.:** 10.00
DRILL MACHINE: Hand Auger	**METHOD:** Hand Auger	**0 HOUR DTW:**	**BORING DEPTH:** 4.0
START DATE: 07/22/02	**FINISH DATE:** 07/22/02	**24 HOUR DTW:**	**ROCK DEPTH:** ---

DEPTH	BLOW COUNT 6" 6" 6" 6"	SAMP. TYPE	OVA RESULTS (ppm) 0 200 400 600 800 1000	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	DEPTH	ELEVATION
							LAND SURFACE	0.0	10
0.0		HA	▲0.0						
1.0		HA	▲0.0						
2.0		HA	▲0.0	sampled	SP		Brown, tan, well sorted, v.f.to f. SAND. No odor, Moist.		
3.0		HA	▲0.0						
4.0								4.0	6.0
							Boring Terminated at Elevation 6.0 ft Elevation based on assumed land surface elevation of 10 feet.		

BORING LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203011	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3350		LOGGED BY: J. Carscallen	BORING ID: USTPP 3350-SB02
		DRILLER: J. Carscallen	
NORTHING:	EASTING:	CREW:	
SYSTEM: N/A	BORING LOCATION:		LAND ELEV.: 10.00
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW:	BORING DEPTH: 2.0
START DATE: 03/24/03	FINISH DATE: 03/24/03	24 HOUR DTW:	ROCK DEPTH: ---

DEPTH	BLOW COUNT 6" 6" 6" 6"	SAMP. TYPE	OVA RESULTS (ppm) 0 200 400 600 800 1000	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
							0.0	LAND SURFACE	10
0.0			▲0.0	Sampled	SM			Silty Sand, Black Organics/Gray; Very Fine Grained; Moist.	
1.0			▲1.0		SM		1.0	Silty Sand, Black Organics/Gray; Very Fine Grained; Wet at 2.0'.	9.0
2.0							2.0	Boring Terminated at Elevation 8.0 ft Elevation based on assumed land surface elevation of 10 feet.	8.0

BORING LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203011	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3350	LOGGED BY: J. Carscallen		BORING ID: USTPP 3350-SB03
	DRILLER: J. Carscallen		
NORTHING:	EASTING:	CREW:	
SYSTEM: N/A	BORING LOCATION:		LAND ELEV.: 10.00
DRILL MACHINE: Hand Auger	METHOD: Hand Auger	0 HOUR DTW:	BORING DEPTH: 2.0
START DATE: 03/24/03	FINISH DATE: 03/24/03	24 HOUR DTW:	ROCK DEPTH: ---

DEPTH	BLOW COUNT 6" 6" 6" 6"	SAMP. TYPE	OVA RESULTS (ppm) 0 200 400 600 800 1000	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	DEPTH	ELEVATION
							LAND SURFACE	0.0	10
0.0				Sampled	SM		Silty Sand, Black Organics; Very Fine Grains; Moist	1.0	9.0
1.0					SM		Silty Sand, Black Organics; Very Fine Grains; Wet at 2.0'.	2.0	8.0
2.0							Boring Terminated at Elevation 8.0 ft Elevation based on assumed land surface elevation of 10 feet.		

CATLIN ENVIRO_LOG_203011.GPJ CATLIN.GDT 05/02/03

BORING LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203011	**STATE:** NC	**COUNTY:** Onslow	**LOCATION:** MCB, Camp Lejuene
PROJECT NAME: PP-3350		**LOGGED BY:** J. Carscallen	**BORING ID:** USTPP 3350-SB04
		DRILLER: J. Carscallen	
NORTHING:	**EASTING:**	**CREW:**	
SYSTEM: N/A	**BORING LOCATION:**		**LAND ELEV.:** 10.00
DRILL MACHINE: Hand Auger	**METHOD:** Hand Auger	**0 HOUR DTW:**	**BORING DEPTH:** 2.0
START DATE: 03/24/03	**FINISH DATE:** 03/24/03	**24 HOUR DTW:**	**ROCK DEPTH:** ---

DEPTH	BLOW COUNT 6" 6" 6" 6"	SAMP. TYPE	OVA RESULTS (ppm) 0 200 400 600 800 1000	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
							0.0	LAND SURFACE	10
0.0			▲0.0	Sampled	SM			Silty Sand, Black Organics; Very Fine Grains; Moist	
1.0							1.0		9.0
			▲0.0		SM			Silty Sand, Black Organics; Very Fine Grains; Wet at 2.0'.	
2.0							2.0		8.0
								Boring Terminated at Elevation 8.0 ft Elevation based on assumed land surface elevation of 10 feet.	

APPENDIX B

NORTH CAROLINA WELL CONSTRUCTION RECORDS

(NOT USED)

APPENDIX C

FIELD MEASUREMENTS

(NOT USED)

APPENDIX D

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 E

LABORATORY REPORTS
AND
CHAIN-OF-CUSTODY DOCUMENTATION

205-011

FILE COPY

PARADIGM ANALYTICAL LABORATORIES, INC.
2627 Northchase Parkway S.E.
Wilmington, North Carolina 28405
(910) 350-1903
Fax (910) 350-1557

Mr. Mike E. Mason
Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

April 8, 2003

Report Number: G128-1081

Client Project ID: PP-3350

Dear Mr. Mason,

Enclosed are the results of the analytical services performed under the referenced project. 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 for assistance. 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

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB02 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66350
Lab Project ID: G128-1081
Matrix: Soil %Solids: 81.7

Date Analyzed: 3/31/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.061	BQL
Acrolein	0.12	BQL
Acrylonitrile	0.12	BQL
Benzene	0.0061	BQL
Bromobenzene	0.0061	BQL
Bromochloromethane	0.0061	BQL
Bromodichloromethane	0.0061	BQL
Bromoform	0.0061	BQL
Bromomethane	0.0061	BQL
2-Butanone	0.031	BQL
n-Butylbenzene	0.0061	BQL
sec-Butylbenzene	0.0061	BQL
tert-Butylbenzene	0.0061	BQL
Carbon disulfide	0.0061	BQL
Carbon tetrachloride	0.0061	BQL
Chlorobenzene	0.0061	BQL
Chloroethane	0.0061	BQL
2-Chloroethyl vinyl ether	0.0061	BQL
Chloroform	0.0061	BQL
Chloromethane	0.0061	BQL
2-Chlorotoluene	0.0061	BQL
4-Chlorotoluene	0.0061	BQL
Dibromochloromethane	0.0061	BQL
1,2-Dibromo-3-chloropropane	0.0061	BQL
Dibromomethane	0.0061	BQL
1,2-Dibromoethane (EDB)	0.0061	BQL
1,2-Dichlorobenzene	0.0061	BQL
1,3-Dichlorobenzene	0.0061	BQL
1,4-Dichlorobenzene	0.0061	BQL
trans-1,4-Dichloro-2-butene	0.0061	BQL
1,1-Dichloroethane	0.0061	BQL
1,1-Dichloroethene	0.0061	BQL
1,2-Dichloroethane	0.0061	BQL
cis-1,2-Dichloroethene	0.0061	BQL
trans-1,2-dichloroethene	0.0061	BQL
1,2-Dichloropropane	0.0061	BQL
1,3-Dichloropropane	0.0061	BQL
2,2-Dichloropropane	0.0061	BQL
1,1-Dichloropropene	0.0061	BQL
cis-1,3-Dichloropropene	0.0061	BQL
trans-1,3-Dichloropropene	0.0061	BQL
Dichlorodifluoromethane	0.0061	BQL
Diisopropyl ether (DIPE)	0.0061	BQL
Ethylbenzene	0.0061	BQL
Hexachlorobutadiene	0.0061	BQL

Reviewed by: MRC

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB02 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66350
Lab Project ID: G128-1081
Matrix: Soil %Solids: 81.7

Date Analyzed: 3/31/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0061	BQL
Iodomethane	0.0061	BQL
Isopropylbenzene	0.0061	BQL
4-Isopropyltoluene	0.0061	BQL
Methylene chloride	0.024	BQL
4-Methyl-2-pentanone	0.0061	BQL
Methyl-tert-butyl ether (MTBE)	0.0061	BQL
Naphthalene	0.0061	BQL
n-Propyl benzene	0.0061	BQL
Styrene	0.0061	BQL
1,1,1,2-Tetrachloroethane	0.0061	BQL
1,1,2,2-Tetrachloroethane	0.0061	BQL
Tetrachloroethene	0.0061	BQL
Toluene	0.0061	BQL
1,2,3-Trichlorobenzene	0.0061	BQL
1,2,4-Trichlorobenzene	0.0061	BQL
Trichloroethene	0.0061	BQL
1,1,1-Trichloroethane	0.0061	BQL
1,1,2-Trichloroethane	0.0061	BQL
Trichlorofluoromethane	0.0061	BQL
1,2,3-Trichloropropane	0.0061	BQL
1,2,4-Trimethylbenzene	0.0061	BQL
1,3,5-Trimethylbenzene	0.0061	BQL
Vinyl chloride	0.0061	BQL
m-,p-Xylene	0.012	BQL
o-Xylene	0.0061	BQL

Surrogate Spike Recoveries Compound	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Bromofluorobenzene	0.0500	0.0478	96
1,2-Dichloroethane-d4	0.0500	0.0531	106
Toluene-d8	0.0500	0.0504	101

Comments:

All results are corrected for dilution.

Reviewed by: MK

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB03 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66351
Lab Project ID: G128-1081
Matrix: Soil %Solids: 77.6

Date Analyzed: 4/1/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.064	BQL
Acrolein	0.13	BQL
Acrylonitrile	0.13	BQL
Benzene	0.0064	BQL
Bromobenzene	0.0064	BQL
Bromochloromethane	0.0064	BQL
Bromodichloromethane	0.0064	BQL
Bromoform	0.0064	BQL
Bromomethane	0.0064	BQL
2-Butanone	0.032	BQL
n-Butylbenzene	0.0064	BQL
sec-Butylbenzene	0.0064	BQL
tert-Butylbenzene	0.0064	BQL
Carbon disulfide	0.0064	BQL
Carbon tetrachloride	0.0064	BQL
Chlorobenzene	0.0064	BQL
Chloroethane	0.0064	BQL
2-Chloroethyl vinyl ether	0.0064	BQL
Chloroform	0.0064	BQL
Chloromethane	0.0064	BQL
2-Chlorotoluene	0.0064	BQL
4-Chlorotoluene	0.0064	BQL
Dibromochloromethane	0.0064	BQL
1,2-Dibromo-3-chloropropane	0.0064	BQL
Dibromomethane	0.0064	BQL
1,2-Dibromoethane (EDB)	0.0064	BQL
1,2-Dichlorobenzene	0.0064	BQL
1,3-Dichlorobenzene	0.0064	BQL
1,4-Dichlorobenzene	0.0064	BQL
trans-1,4-Dichloro-2-butene	0.0064	BQL
1,1-Dichloroethane	0.0064	BQL
1,1-Dichloroethene	0.0064	BQL
1,2-Dichloroethane	0.0064	BQL
cis-1,2-Dichloroethene	0.0064	BQL
trans-1,2-dichloroethene	0.0064	BQL
1,2-Dichloropropane	0.0064	BQL
1,3-Dichloropropane	0.0064	BQL
2,2-Dichloropropane	0.0064	BQL
1,1-Dichloropropene	0.0064	BQL
cis-1,3-Dichloropropene	0.0064	BQL
trans-1,3-Dichloropropene	0.0064	BQL
Dichlorodifluoromethane	0.0064	BQL
Diisopropyl ether (DIPE)	0.0064	BQL
Ethylbenzene	0.0064	BQL
Hexachlorobutadiene	0.0064	BQL

Reviewed by: _____

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB03 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66351
Lab Project ID: G128-1081
Matrix: Soil %Solids: 77.6

Date Analyzed: 4/1/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0064	BQL
Iodomethane	0.0064	BQL
Isopropylbenzene	0.0064	BQL
4-Isopropyltoluene	0.0064	BQL
Methylene chloride	0.026	BQL
4-Methyl-2-pentanone	0.0064	BQL
Methyl-tert-butyl ether (MTBE)	0.0064	BQL
Naphthalene	0.0064	BQL
n-Propyl benzene	0.0064	BQL
Styrene	0.0064	BQL
1,1,1,2-Tetrachloroethane	0.0064	BQL
1,1,2,2-Tetrachloroethane	0.0064	BQL
Tetrachloroethene	0.0064	BQL
Toluene	0.0064	BQL
1,2,3-Trichlorobenzene	0.0064	BQL
1,2,4-Trichlorobenzene	0.0064	BQL
Trichloroethene	0.0064	BQL
1,1,1-Trichloroethane	0.0064	BQL
1,1,2-Trichloroethane	0.0064	BQL
Trichlorofluoromethane	0.0064	BQL
1,2,3-Trichloropropane	0.0064	BQL
1,2,4-Trimethylbenzene	0.0064	BQL
1,3,5-Trimethylbenzene	0.0064	BQL
Vinyl chloride	0.0064	BQL
m-,p-Xylene	0.013	BQL
o-Xylene	0.0064	BQL

Surrogate Spike Recoveries Compound	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Bromofluorobenzene	0.0500	0.0480	96
1,2-Dichloroethane-d4	0.0500	0.0550	110
Toluene-d8	0.0500	0.0510	102

Comments:

All results are corrected for dilution.

Reviewed by: _____

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB04 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66352
Lab Project ID: G128-1081
Matrix: Soil %Solids: 85.0

Date Analyzed: 3/31/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.059	BQL
Acrolein	0.12	BQL
Acrylonitrile	0.12	BQL
Benzene	0.0059	BQL
Bromobenzene	0.0059	BQL
Bromochloromethane	0.0059	BQL
Bromodichloromethane	0.0059	BQL
Bromoform	0.0059	BQL
Bromomethane	0.0059	BQL
2-Butanone	0.029	BQL
n-Butylbenzene	0.0059	BQL
sec-Butylbenzene	0.0059	BQL
tert-Butylbenzene	0.0059	BQL
Carbon disulfide	0.0059	BQL
Carbon tetrachloride	0.0059	BQL
Chlorobenzene	0.0059	BQL
Chloroethane	0.0059	BQL
2-Chloroethyl vinyl ether	0.0059	BQL
Chloroform	0.0059	BQL
Chloromethane	0.0059	BQL
2-Chlorotoluene	0.0059	BQL
4-Chlorotoluene	0.0059	BQL
Dibromochloromethane	0.0059	BQL
1,2-Dibromo-3-chloropropane	0.0059	BQL
Dibromomethane	0.0059	BQL
1,2-Dibromoethane (EDB)	0.0059	BQL
1,2-Dichlorobenzene	0.0059	BQL
1,3-Dichlorobenzene	0.0059	BQL
1,4-Dichlorobenzene	0.0059	BQL
trans-1,4-Dichloro-2-butene	0.0059	BQL
1,1-Dichloroethane	0.0059	BQL
1,1-Dichloroethene	0.0059	BQL
1,2-Dichloroethane	0.0059	BQL
cis-1,2-Dichloroethene	0.0059	BQL
trans-1,2-dichloroethene	0.0059	BQL
1,2-Dichloropropane	0.0059	BQL
1,3-Dichloropropane	0.0059	BQL
2,2-Dichloropropane	0.0059	BQL
1,1-Dichloropropene	0.0059	BQL
cis-1,3-Dichloropropene	0.0059	BQL
trans-1,3-Dichloropropene	0.0059	BQL
Dichlorodifluoromethane	0.0059	BQL
Diisopropyl ether (DIPE)	0.0059	BQL
Ethylbenzene	0.0059	BQL
Hexachlorobutadiene	0.0059	BQL

Reviewed by: _____

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB04 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66352
Lab Project ID: G128-1081
Matrix: Soil %Solids: 85.0

Date Analyzed: 3/31/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0059	BQL
Iodomethane	0.0059	BQL
Isopropylbenzene	0.0059	BQL
4-Isopropyltoluene	0.0059	BQL
Methylene chloride	0.024	BQL
4-Methyl-2-pentanone	0.0059	BQL
Methyl-tert-butyl ether (MTBE)	0.0059	BQL
Naphthalene	0.0059	BQL
n-Propyl benzene	0.0059	BQL
Styrene	0.0059	BQL
1,1,1,2-Tetrachloroethane	0.0059	BQL
1,1,2,2-Tetrachloroethane	0.0059	BQL
Tetrachloroethene	0.0059	BQL
Toluene	0.0059	BQL
1,2,3-Trichlorobenzene	0.0059	BQL
1,2,4-Trichlorobenzene	0.0059	BQL
Trichloroethene	0.0059	BQL
1,1,1-Trichloroethane	0.0059	BQL
1,1,2-Trichloroethane	0.0059	BQL
Trichlorofluoromethane	0.0059	BQL
1,2,3-Trichloropropane	0.0059	BQL
1,2,4-Trimethylbenzene	0.0059	BQL
1,3,5-Trimethylbenzene	0.0059	BQL
Vinyl chloride	0.0059	BQL
m-,p-Xylene	0.012	BQL
o-Xylene	0.0059	BQL

Surrogate Spike Recoveries Compound	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Bromofluorobenzene	0.0500	0.0482	96
1,2-Dichloroethane-d4	0.0500	0.0543	109
Toluene-d8	0.0500	0.0506	101

Comments:

All results are corrected for dilution.

Reviewed by: MK

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB04D (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66353
Lab Project ID: G128-1081
Matrix: Soil %Solids: 85.0

Date Analyzed: 3/31/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.059	BQL
Acrolein	0.12	BQL
Acrylonitrile	0.12	BQL
Benzene	0.0059	BQL
Bromobenzene	0.0059	BQL
Bromochloromethane	0.0059	BQL
Bromodichloromethane	0.0059	BQL
Bromoform	0.0059	BQL
Bromomethane	0.0059	BQL
2-Butanone	0.029	BQL
n-Butylbenzene	0.0059	BQL
sec-Butylbenzene	0.0059	BQL
tert-Butylbenzene	0.0059	BQL
Carbon disulfide	0.0059	BQL
Carbon tetrachloride	0.0059	BQL
Chlorobenzene	0.0059	BQL
Chloroethane	0.0059	BQL
2-Chloroethyl vinyl ether	0.0059	BQL
Chloroform	0.0059	BQL
Chloromethane	0.0059	BQL
2-Chlorotoluene	0.0059	BQL
4-Chlorotoluene	0.0059	BQL
Dibromochloromethane	0.0059	BQL
1,2-Dibromo-3-chloropropane	0.0059	BQL
Dibromomethane	0.0059	BQL
1,2-Dibromoethane (EDB)	0.0059	BQL
1,2-Dichlorobenzene	0.0059	BQL
1,3-Dichlorobenzene	0.0059	BQL
1,4-Dichlorobenzene	0.0059	BQL
trans-1,4-Dichloro-2-butene	0.0059	BQL
1,1-Dichloroethane	0.0059	BQL
1,1-Dichloroethene	0.0059	BQL
1,2-Dichloroethane	0.0059	BQL
cis-1,2-Dichloroethene	0.0059	BQL
trans-1,2-dichloroethene	0.0059	BQL
1,2-Dichloropropane	0.0059	BQL
1,3-Dichloropropane	0.0059	BQL
2,2-Dichloropropane	0.0059	BQL
1,1-Dichloropropene	0.0059	BQL
cis-1,3-Dichloropropene	0.0059	BQL
trans-1,3-Dichloropropene	0.0059	BQL
Dichlorodifluoromethane	0.0059	BQL
Diisopropyl ether (DIPE)	0.0059	BQL
Ethylbenzene	0.0059	BQL
Hexachlorobutadiene	0.0059	BQL

Reviewed by: MMC

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3350-SB04D (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66353
Lab Project ID: G128-1081
Matrix: Soil %Solids: 85.0

Date Analyzed: 3/31/03
Analyzed By: EKR
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0059	BQL
Iodomethane	0.0059	BQL
Isopropylbenzene	0.0059	BQL
4-Isopropyltoluene	0.0059	BQL
Methylene chloride	0.024	BQL
4-Methyl-2-pentanone	0.0059	BQL
Methyl-tert-butyl ether (MTBE)	0.0059	BQL
Naphthalene	0.0059	BQL
n-Propyl benzene	0.0059	BQL
Styrene	0.0059	BQL
1,1,1,2-Tetrachloroethane	0.0059	BQL
1,1,2,2-Tetrachloroethane	0.0059	BQL
Tetrachloroethene	0.0059	BQL
Toluene	0.0059	BQL
1,2,3-Trichlorobenzene	0.0059	BQL
1,2,4-Trichlorobenzene	0.0059	BQL
Trichloroethene	0.0059	BQL
1,1,1-Trichloroethane	0.0059	BQL
1,1,2-Trichloroethane	0.0059	BQL
Trichlorofluoromethane	0.0059	BQL
1,2,3-Trichloropropane	0.0059	BQL
1,2,4-Trimethylbenzene	0.0059	BQL
1,3,5-Trimethylbenzene	0.0059	BQL
Vinyl chloride	0.0059	BQL
m-,p-Xylene	0.012	BQL
o-Xylene	0.0059	BQL

Surrogate Spike Recoveries Compound	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Bromofluorobenzene	0.0500	0.0487	97
1,2-Dichloroethane-d4	0.0500	0.0547	109
Toluene-d8	0.0500	0.0502	100

Comments:

All results are corrected for dilution.

Reviewed by: MAC

Flags: BQL = Below Quantitation Limit

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3350

Sample Information and Analytical Results	
Sample Identification	USTPP3350-SB02 (0-1)
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/25/03
Date Analyzed	03/29/03
Dry Weight	82
Dilution Factor	1
C_5-C_8 Aliphatics**	< 10 (mg/Kg)
C_9-C_{12} Aliphatics**	< 10 (mg/Kg)
C_9-C_{10} Aromatics**	< 10 (mg/Kg)
Surrogate % Recovery - PID	93
Surrogate % Recovery - FID	120

* = 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: G128-1081-66350

Reviewed By: MC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3350

Sample Information and Analytical Results	
Sample Identification	USTPP3350-SB03 (0-1)
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/25/03
Date Analyzed	03/29/03
Dry Weight	78
Dilution Factor	1
C_5-C_8 Aliphatics**	< 10 (mg/Kg)
C_9-C_{12} Aliphatics**	< 10 (mg/Kg)
C_9-C_{10} Aromatics**	< 10 (mg/Kg)
Surrogate % Recovery - PID	92
Surrogate % Recovery - FID	120

* = 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: G128-1081-66351

Reviewed By: MAC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3350

Sample Information and Analytical Results	
Sample Identification	USTPP3350-SB04 (0-1)
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/25/03
Date Analyzed	03/29/03
Dry Weight	85
Dilution Factor	1
C_5-C_8 Aliphatics**	< 10 (mg/Kg)
C_9-C_{12} Aliphatics**	< 10 (mg/Kg)
C_9-C_{10} Aromatics**	< 10 (mg/Kg)
Surrogate % Recovery - PID	94
Surrogate % Recovery - FID	110

* = 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: G128-1081-66352

Reviewed By: mrc

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 12/26/02 PID Initial Calibration Date: 12/26/02

Calibration Ranges and Limits

Range	MDL (µg/L)	MDL (mg/Kg)	ML (µg/L)	ML (mg/Kg)	RL (µg/L)	RL (mg/Kg)
C_5-C_8 Aliphatics	9.3	0.41	29.4	1.3	100	10
C_9-C_{12} Aliphatics	7.9	0.3	25.2	0.97	100	10
C_9-C_{10} Aromatics	0.5	0.04	1.5	0.14	100	10

Calibration Concentration Levels

Range	Levels (µg/L)	Levels (mg/Kg)	%RSD or CCC	Method of Quantitation
C_5-C_8 Aliphatics	20	2	4.0	Calibration Factor
	80	8		
	200	20		
	800	80		
	2000	200		
C_9-C_{12} Aliphatics	15	1.5	12.3	Calibration Factor
	60	6		
	150	15		
	600	60		
	1500	150		
C_9-C_{10} Aromatics	32.5	3.25	11.3	Calibration Factor
	130	13		
	325	32.5		
	1300	130		
	3250	325		

Calibration Check Date: 03/28/03

Calibration Check

Range	Levels (µg/L)	Levels (mg/Kg)	RPD
C_5-C_8 Aliphatics	200	20	-0.7
C_9-C_{12} Aliphatics	150	15	11.5
C_9-C_{10} Aromatics	325	32.5	-1.4

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

Reviewed By: _____

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTPP3350-SB02 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66350
Lab Project ID: G128-1081
Matrix: Soil %Solids: 81.7

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acenaphthene	0.38	BQL
Acenaphthylene	0.38	BQL
Anthracene	0.38	BQL
Benzo[a]anthracene	0.38	BQL
Benzo[a]pyrene	0.38	BQL
Benzo[b]fluoranthene	0.38	BQL
Benzo[g,h,i]perylene	0.38	BQL
Benzo[k]fluoranthene	0.38	BQL
Benzoic Acid	0.76	BQL
Bis(2-chloroethoxy)methane	0.38	BQL
Bis(2-chloroethyl)ether	0.38	BQL
Bis(2-chloroisopropyl)ether	0.38	BQL
Bis(2-ethylhexyl)phthalate	0.38	BQL
4-bromophenyl phenyl ether	0.38	BQL
Butylbenzylphthalate	0.38	BQL
4-Chloroaniline	1.9	BQL
4-Chloro-3-methylphenol	0.38	BQL
2-Chloronaphthalene	0.38	BQL
2-Chlorophenol	0.38	BQL
4-Chlorophenyl phenyl ether	0.38	BQL
Chrysene	0.38	BQL
Di-n-Butylphthalate	0.38	BQL
Di-n-octylphthalate	0.38	BQL
Dibenzo[a,h]anthracene	0.38	BQL
Dibenzofuran	0.38	BQL
1,2-Dichlorobenzene	0.38	BQL
1,3-Dichlorobenzene	0.38	BQL
1,4-Dichlorobenzene	0.38	BQL
3,3'-Dichlorobenzidine	0.76	BQL
2,4-Dichlorophenol	0.38	BQL
Diethylphthalate	0.38	BQL
2,4-Dimethylphenol	0.38	BQL
Dimethylphthalate	0.38	BQL
4,6-Dinitro-2-methylphenol	1.9	BQL
2,4-Dinitrophenol	1.9	BQL
2,4-Dinitrotoluene	0.38	BQL
2,6-Dinitrotoluene	0.38	BQL
Fluoranthene	0.38	BQL
Fluorene	0.38	BQL
Hexachlorobenzene	0.38	BQL

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTPP3350-SB02 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66350
Lab Project ID: G128-1081
Matrix: Soil %Solids: 81.7

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Hexachlorobutadiene	0.38	BQL
Hexachlorocyclopentadiene	0.76	BQL
Hexachloroethane	0.38	BQL
Indeno(1,2,3-c,d)pyrene	0.38	BQL
Isophorone	0.38	BQL
2-Methylnaphthalene	0.38	BQL
2-Methylphenol	0.38	BQL
3- & 4-Methylphenol	0.38	BQL
N-Nitrosodi-n-propylamine	0.38	BQL
N-Nitrosodiphenylamine	0.38	BQL
Naphthalene	0.38	BQL
2-Nitroaniline	0.38	BQL
3-Nitroaniline	1.9	BQL
4-Nitroaniline	1.9	BQL
Nitrobenzene	0.38	BQL
2-Nitrophenol	0.38	BQL
4-Nitrophenol	1.9	BQL
Pentachlorophenol	1.9	BQL
Phenanthrene	0.38	BQL
Phenol	0.38	BQL
Pyrene	0.38	BQL
1,2,4-Trichlorobenzene	0.38	BQL
2,4,5-Trichlorophenol	0.38	BQL
2,4,6-Trichlorophenol	0.38	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	10.1	101
2-Fluorophenol	10	8.9	89
Nitrobenzene-d5	10	9.7	97
Phenol-d6	10	9.2	92
2,4,6-Tribromophenol	10	11.7	117
4-Terphenyl-d14	10	10.3	103

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: _____

PARADIGM ANALYTICAL LABORATORIES, INC.

Results of Library Search for Semivolatile Compounds

by GCMS

Client Sample ID: USTPP3350-SB02 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66350
Lab Project ID: G128-1081
Matrix: Soil
% SOLIDS: 81.7

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/KG)
1	DDT, Isomer of	18.21			1.2
2	Unknown	11.74			0.78
3	DDD, Isomer of	17.77			0.61
4	Vanillin	11.42	000121-33-5	96	0.35
5	Benzoic Acid	9.05	000065-85-0	94	0.34
6	Unknown	9.74			0.33
7	Unknown	22.79			0.31
8	Unknown	14.18			0.29
9	Unknown	21.12			0.28
10	Unknown	11.05			0.18

Comment:

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

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

Reviewed by: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTPP3350-SB03 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66351
Lab Project ID: G128-1081
Matrix: Soil %Solids: 77.6

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acenaphthene	0.4	BQL
Acenaphthylene	0.4	BQL
Anthracene	0.4	BQL
Benzo[a]anthracene	0.4	BQL
Benzo[a]pyrene	0.4	BQL
Benzo[b]fluoranthene	0.4	BQL
Benzo[g,h,i]perylene	0.4	BQL
Benzo[k]fluoranthene	0.4	BQL
Benzoic Acid	0.8	**1.1**
Bis(2-chloroethoxy)methane	0.4	BQL
Bis(2-chloroethyl)ether	0.4	BQL
Bis(2-chloroisopropyl)ether	0.4	BQL
Bis(2-ethylhexyl)phthalate	0.4	BQL
4-bromophenyl phenyl ether	0.4	BQL
Butylbenzylphthalate	0.4	BQL
4-Chloroaniline	2	BQL
4-Chloro-3-methylphenol	0.4	BQL
2-Chloronaphthalene	0.4	BQL
2-Chlorophenol	0.4	BQL
4-Chlorophenyl phenyl ether	0.4	BQL
Chrysene	0.4	BQL
Di-n-Butylphthalate	0.4	BQL
Di-n-octylphthalate	0.4	BQL
Dibenzo[a,h]anthracene	0.4	BQL
Dibenzofuran	0.4	BQL
1,2-Dichlorobenzene	0.4	BQL
1,3-Dichlorobenzene	0.4	BQL
1,4-Dichlorobenzene	0.4	BQL
3,3'-Dichlorobenzidine	0.8	BQL
2,4-Dichlorophenol	0.4	BQL
Diethylphthalate	0.4	BQL
2,4-Dimethylphenol	0.4	BQL
Dimethylphthalate	0.4	BQL
4,6-Dinitro-2-methylphenol	2	BQL
2,4-Dinitrophenol	2	BQL
2,4-Dinitrotoluene	0.4	BQL
2,6-Dinitrotoluene	0.4	BQL
Fluoranthene	0.4	BQL
Fluorene	0.4	BQL
Hexachlorobenzene	0.4	BQL

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTPP3350-SB03 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66351
Lab Project ID: G128-1081
Matrix: Soil %Solids: 77.6

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Hexachlorobutadiene	0.4	BQL
Hexachlorocyclopentadiene	0.8	BQL
Hexachloroethane	0.4	BQL
Indeno(1,2,3-c,d)pyrene	0.4	BQL
Isophorone	0.4	BQL
2-Methylnaphthalene	0.4	BQL
2-Methylphenol	0.4	BQL
3- & 4-Methylphenol	0.4	BQL
N-Nitrosodi-n-propylamine	0.4	BQL
N-Nitrosodiphenylamine	0.4	BQL
Naphthalene	0.4	BQL
2-Nitroaniline	0.4	BQL
3-Nitroaniline	2	BQL
4-Nitroaniline	2	BQL
Nitrobenzene	0.4	BQL
2-Nitrophenol	0.4	BQL
4-Nitrophenol	2	BQL
Pentachlorophenol	2	BQL
Phenanthrene	0.4	BQL
Phenol	0.4	BQL
Pyrene	0.4	BQL
1,2,4-Trichlorobenzene	0.4	BQL
2,4,5-Trichlorophenol	0.4	BQL
2,4,6-Trichlorophenol	0.4	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	9.5	95
2-Fluorophenol	10	8.3	83
Nitrobenzene-d5	10	9.4	94
Phenol-d6	10	8.7	87
2,4,6-Tribromophenol	10	11.9	119
4-Terphenyl-d14	10	9.9	99

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTPP3350-SB03 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66351
Lab Project ID: G128-1081
Matrix: Soil
% SOLIDS: 77.6

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/KG)
1	Unknown	14.18			2.5
2	Unknown	23.64			2.2
3	Vanillin	11.43	000121-33-5	97	1.9
4	Unknown	26.52			1.5
5	Aldehyde, Unknown	6.83			1.1
6	Unknown	26.36			0.97
7	Ketone, Unknown	12.98			0.86
8	Ketone, Unknown	12.18			0.72
9	Unknown	15.87			0.57
10	Alcohol, Unknown	19.89			0.47

Comment:

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

Reviewed by: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTPP3350-SB04 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66352
Lab Project ID: G128-1081
Matrix: Soil %Solids: 85.0

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)	
Acenaphthene	0.37	BQL	
Acenaphthylene	0.37	BQL	
Anthracene	0.37	BQL	
Benzo[a]anthracene	0.37	BQL	
Benzo[a]pyrene	0.37	BQL	
Benzo[b]fluoranthene	0.37	BQL	
Benzo[g,h,i]perylene	0.37	BQL	
Benzo[k]fluoranthene	0.37	BQL	
Benzoic Acid	0.73	**0.3**	J
Bis(2-chloroethoxy)methane	0.37	BQL	
Bis(2-chloroethyl)ether	0.37	BQL	
Bis(2-chloroisopropyl)ether	0.37	BQL	
Bis(2-ethylhexyl)phthalate	0.37	BQL	
4-bromophenyl phenyl ether	0.37	BQL	
Butylbenzylphthalate	0.37	BQL	
4-Chloroaniline	1.8	BQL	
4-Chloro-3-methylphenol	0.37	BQL	
2-Chloronaphthalene	0.37	BQL	
2-Chlorophenol	0.37	BQL	
4-Chlorophenyl phenyl ether	0.37	BQL	
Chrysene	0.37	BQL	
Di-n-Butylphthalate	0.37	BQL	
Di-n-octylphthalate	0.37	BQL	
Dibenzo[a,h]anthracene	0.37	BQL	
Dibenzofuran	0.37	BQL	
1,2-Dichlorobenzene	0.37	BQL	
1,3-Dichlorobenzene	0.37	BQL	
1,4-Dichlorobenzene	0.37	BQL	
3,3'-Dichlorobenzidine	0.73	BQL	
2,4-Dichlorophenol	0.37	BQL	
Diethylphthalate	0.37	BQL	
2,4-Dimethylphenol	0.37	BQL	
Dimethylphthalate	0.37	BQL	
4,6-Dinitro-2-methylphenol	1.8	BQL	
2,4-Dinitrophenol	1.8	BQL	
2,4-Dinitrotoluene	0.37	BQL	
2,6-Dinitrotoluene	0.37	BQL	
Fluoranthene	0.37	BQL	
Fluorene	0.37	BQL	
Hexachlorobenzene	0.37	BQL	

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTPP3350-SB04 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66352
Lab Project ID: G128-1081
Matrix: Soil %Solids: 85.0

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Hexachlorobutadiene	0.37	BQL
Hexachlorocyclopentadiene	0.73	BQL
Hexachloroethane	0.37	BQL
Indeno(1,2,3-c,d)pyrene	0.37	BQL
Isophorone	0.37	BQL
2-Methylnaphthalene	0.37	BQL
2-Methylphenol	0.37	BQL
3- & 4-Methylphenol	0.37	BQL
N-Nitrosodi-n-propylamine	0.37	BQL
N-Nitrosodiphenylamine	0.37	BQL
Naphthalene	0.37	BQL
2-Nitroaniline	0.37	BQL
3-Nitroaniline	1.8	BQL
4-Nitroaniline	1.8	BQL
Nitrobenzene	0.37	BQL
2-Nitrophenol	0.37	BQL
4-Nitrophenol	1.8	BQL
Pentachlorophenol	1.8	BQL
Phenanthrene	0.37	BQL
Phenol	0.37	BQL
Pyrene	0.37	BQL
1,2,4-Trichlorobenzene	0.37	BQL
2,4,5-Trichlorophenol	0.37	BQL
2,4,6-Trichlorophenol	0.37	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	9.6	96
2-Fluorophenol	10	8.5	85
Nitrobenzene-d5	10	9.0	90
Phenol-d6	10	8.6	86
2,4,6-Tribromophenol	10	11.7	117
4-Terphenyl-d14	10	10.6	106

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

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

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results of Library Search for Semivolatile Compounds

by GCMS

Client Sample ID: USTPP3350-SB04 (0-1)
Client Project ID: PP-3350
Lab Sample ID: 66352
Lab Project ID: G128-1081
Matrix: Soil
% SOLIDS: 85.0

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/KG)
1	Unknown	20.18			34
2	Unknown	26.02			6.3
3	Unknown	19.51			1.1
4	Unknown	24.75			0.81
5	Unknown	19.98			0.8
6	Alcohol, Unknown	19.89			0.68
7	Aldehyde, Unknown	9.74			0.36
8	Alkane, Unknown	18.82			0.36
9					
10					

Comment:

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

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

Reviewed by: MRC

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: PP-3350

Sample Information and Analytical Results	
Sample Identification	USTPP3350-SB02 (0-1)
Sample Matrix	Soil
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/27/03
Date Analyzed	03/31/03
Dry Weight	81.7
Dilution Factor	1
C_9-C_{18} Aliphatics*	< 10 (mg/Kg)
C_{19}-C_{36} Aliphatics*	< 10 (mg/Kg)
C_{11}-C_{22} Aromatics*	20 (mg/Kg)
Aliphatic Surrogate % Recovery	43
Aromatic Surrogate % Recovery	60
Fractionation Surrogate 1 % Recovery	83

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G128-1081-66350

Reviewed By: MAC

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: PP-3350

Sample Information and Analytical Results	
Sample Identification	USTPP3350-SB03 (0-1)
Sample Matrix	Soil
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/27/03
Date Analyzed	03/28/03
Dry Weight	77.6
Dilution Factor	1
C_9-C_{18} Aliphatics*	< 10 (mg/Kg)
C_{19}-C_{36} Aliphatics*	< 10 (mg/Kg)
C_{11}-C_{22} Aromatics*	< 10 (mg/Kg)
Aliphatic Surrogate % Recovery	64
Aromatic Surrogate % Recovery	63

Comments:

* = Excludes any surrogates or internal standards.
Sample did not require fractionation.

Lab info: G128-1081-66351

Reviewed By: mjl

PARADIGM ANALYTICAL LABORATORIES, INC.

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: PP-3350

Sample Information and Analytical Results	
Sample Identification	USTPP3350-SB04 (0-1)
Sample Matrix	Soil
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/27/03
Date Analyzed	03/28/03
Dry Weight	85
Dilution Factor	1
C_9-C_{18} Aliphatics*	< 10 (mg/Kg)
C_{19}-C_{36} Aliphatics*	< 10 (mg/Kg)
C_{11}-C_{22} Aromatics*	< 10 (mg/Kg)
Aliphatic Surrogate % Recovery	88
Aromatic Surrogate % Recovery	88

Comments:

* = Excludes any surrogates or internal standards.
Sample did not require fractionation.

Lab info: G128-1081-66352

Reviewed By: MJC

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 03/19/03

Calibration Ranges and Limits

Range	MDL (µg/L)	MDL (mg/Kg)	ML (µg/L)	ML (mg/Kg)	RL (µg/L)	RL (mg/Kg)
C_9-C_{18} Aliphatics	0.1	0.8	0.3	2.6	100	10
C_{19}-C_{36} Aliphatics	0.1	1.6	0.3	5	100	10
C_{11}-C_{22} Aromatics	0.2	2.1	0.6	6.7	100	10

Calibration Concentration Levels

Range	Levels (µg/L)	Levels (mg/Kg)	%RSD or CCC	Method of Quantitation
C_9-C_{18} Aliphatics	0.06	1	5.00	Calibration Factor
	0.15	2.5		
	0.3	5		
	0.6	10		
	1.2	20		
C_{19}-C_{36} Aliphatics	0.08	1.33	2.4	Calibration Factor
	0.2	3.33		
	0.4	6.67		
	0.8	13.3		
	1.6	26.7		
C_{11}-C_{22} Aromatics	0.17	2.83	1.3	Calibration Factor
	0.425	7.08		
	0.85	14.2		
	1.7	28.3		
	3.4	56.7		

Calibration Check Date: 03/28/03

Calibration Check

Range	Levels (µg/mL)	Levels (mg/Kg)	RPD
C_9-C_{18} Aliphatics	0.6	10	3.7
C_{19}-C_{36} Aliphatics	0.8	13.3	2.0
C_{11}-C_{22} Aromatics	1.7	28.3	-2.6

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 03/19/03

Calibration Ranges and Limits

Range	MDL (µg/L)	MDL (mg/Kg)	ML (µg/L)	ML (mg/Kg)	RL (µg/L)	RL (mg/Kg)
C_9-C_{18} Aliphatics	0.1	0.8	0.3	2.6	100	10
C_{19}-C_{36} Aliphatics	0.1	1.6	0.3	5	100	10
C_{11}-C_{22} Aromatics	0.2	2.1	0.6	6.7	100	10

Calibration Concentration Levels

Range	Levels (µg/L)	Levels (mg/Kg)	%RSD or CCC	Method of Quantitation
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	0.8	13.3		
	1.6	26.7		
C_{11}-C_{22} Aromatics	0.17	2.83	1.3	Calibration Factor
	0.425	7.08		
	0.85	14.2		
	1.7	28.3		
	3.4	56.7		

Calibration Check Date: 03/31/03

Calibration Check

Range	Levels (µg/mL)	Levels (mg/Kg)	RPD
C_9-C_{18} Aliphatics	0.6	10	3.1
C_{19}-C_{36} Aliphatics	0.8	13.3	3.3
C_{11}-C_{22} Aromatics	1.7	28.3	-1.6

MDL = Method Detection Limit
ML = Minimum Limit
RL = Reportable Limit
RPD = Relative Percent Difference
%RSD = Percent Relative Standard Deviation
CCC = Correlation Coefficient of Curve

ARADIGM ANALYTICAL LABORATORIES, INC.
527 Northchase Parkway SE, Wilmington, NC 28405
Phone: (910)-350-1903 FAX: (910)-350-1557

Chain-of Custody Record & Analytical Request

COC# 19464

Page 1 of 1

Client: CATLIN | Project ID: PP-3350 | Date: 3/25/03 | Report To: MIKE E MASON @ CATLIN
Address: 220 OLD DAIRY ROAD | Contact: MIKE E. MASON | Turnaround: STANDARD
Address: WILMINGTON, NC 28405 | Phone: 452-5863 | Job Number: 203-011
Quote #: DOD 101 | Fax: 452-7563 | P.O. Number: 230130-8 | Invoice To: SHIELA @ CATLIN

Sample ID	Date	Time	Matrix	Preservatives: ICE	Preservatives: Methanol / Sodium Bisulfate	Analyses: BTEX + MTBE	Analyses: VPH	Analyses: BTEX + 10 largest peaks EPH	Analyses: EPH
1STPP3350-SB02 (0-1)	3/25/03 29	0715	Soil	+	+	+	+	+	+
1STPP 3350-SB03 (0-1)	3/25/03 29	0730	Soil	+	+	+	+	+	+
1STPP 3350-SB04 (0-1)	3/25/03 29	0745	Soil	+	+	+	+	+	+
1STPP 3350-SB04D (0-1)	3/25/03 29 (JC)	0745	Soil	+	+	+			

Comments: Please specify any special reporting requirements
* SUMMARY EDD FORMAT
G128-1081

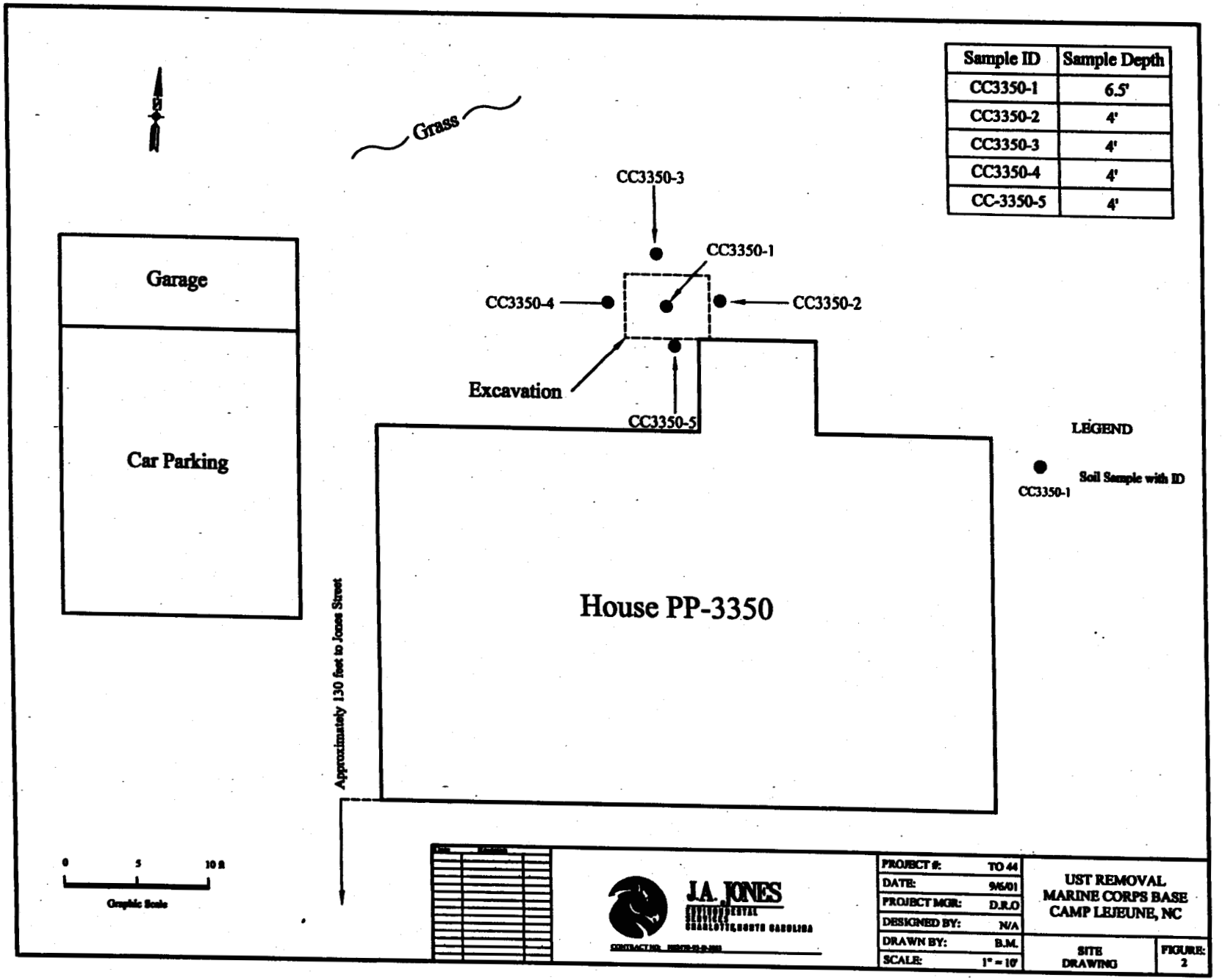
Relinquished By	Date	Time	Received By	Date	Time	Temperature
John Cascalla	3/25/03	0940		3/25/03	0940	ON ICE 4 yrc

State Certification Requested: NC X SC ____ Other ____

SEE REVERSE FOR TERMS AND CONDITIONS

APPENDIX F

UST CLOSURE SAMPLING RESULTS



Sample ID	Sample Depth
CC3350-1	6.5'
CC3350-2	4'
CC3350-3	4'
CC3350-4	4'
CC-3350-5	4'

Table SOIL SAMPLES ANALYTICAL RESULTS

SAMPLE ID	DATE	SAMPLE DEPTH	C9-C22 Aromatics	C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	Fluorene	Sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Naphthalene	N-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Toluene	Benzoic Acid	Dibenzofuran	Pyrene	Acenaphthene	Total Xylenes
CC-3350-1	11/6/01	6.5'	**840**	110	1920	220	7.1	5.1		2.2	4	11	5.5	39	12	43	**87**	13						
CC-3350-2	11/6/01	4'	15																0.0061	0.79				
CC-3350-3	11/6/01	4'																						
CC-3350-4	11/6/01	4'	**1620**	130	1460	42	3	4.7	1.4	1.7	3.5	12	3.7	25	7.1	16	27	5.3			1.1	0.75	1.1	1.7
CC-3350-5	11/6/01	4'	**1450**	84	1250	37	0.91	2.6	1.1		4.1	7.4	1.5	17	10	4.9	4.2	1.6				0.61	0.62	6
Residential Soil Cleanup Level	--		469	939	9386	93860	620	156	1560	1564	n/e	63	156	782	782	n/e	63	469	3200	62571	62	469	940	32000
Soil-to-Water Maximum Soil Contaminant Concentration	--		34	72	3255		44	3	0.24	2	n/e	0.58	2	8	7	n/e	3	60	7	112	4.7	286		5

Note:
1. Only those compounds whose concentration is above Method Detection Limit are listed
2. A no-entry-cell indicates compound concentration Below Method Detection Limit
3. n/e —— Not established yet by NCDENR
4. Bold indicates compound concentration above Residential Soil Cleanup Level