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May 28, 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-3330
Marine Corps Base
Camp Lejeune, North Carolina

Navy Contract No. N62470-01-D-3009
Delivery Order No. 0062
CATLIN Project No. 203-010

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-3330
May 2, 2003

EMD Comments (5/22/2003)

1. **Reproductions**
 - **Does this statement allow us to submit this report to NC DENR?**

Yes.

2. Executive Summary

- 1st paragraph – “Building PP-3330 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, “Subsequently, a Phase I...”.

Revised per comment.

- 3rd paragraph – Swap the second sentence, “Approximately 26 cubic yards...”, with the third sentence, “Soils with contaminant concentrations.. ..”.

Revised per comment.

- 3rd paragraph – Mention that this site is classified as “Low Risk”.

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

3. Site History, UST Removal/Closure

- “Refer to Appendix F for Closure soil sampling results.” Closure should not be capitalized.

Revised per comment.

4. Site History, Phase I LSA

- 1st bullet, third sentence – Use subscripts for C9-C18.

Revised per comment.

- 2nd bullet – Insert (UST PP3330-SB01) after “soil sample”.

Revised per comment.

- Mention groundwater levels and correlate with soil samples.

This section has been rewritten per the comment.

- Do you want to include the LSA groundwater sampling results in an Appendix?

We feel this information is not essential since this is a Soil Assessment Report.

5. Receptor Information

- Item 6, second sentence – Do you mean an overhead (rather than underground) power line runs to the garage across the tank basin?

We concur; this sentence has been revised accordingly.

- Item 7 – Why is this Table 6 instead of Table 3?

Table 6 refers to the “Property” owners/occupants. Table 2 refers to the “UST” owner/operator.

6. Soil Investigation/Historical Soil Sampling – Phase I LSA

- 1st paragraph, fourth sentence – Which soil sample is 3330?

Reference to 3330 has been eliminated and the sentence re-written.

- Discuss observed ground water levels here.

Paragraph revised per comment.

7. 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, fourth sentence – “...the water table was noted at 3.0 BLS. ..”
Note that this was an increase compared to the water table observed during the LSA, which was at __ feet.

The sentence has been revised to read “...the water table was noted at 3.0 feet BLS which is approximately two feet higher than during the Phase I LSA investigation.”

- MADEP VPH/EPH, second paragraph – Insert “both horizontally and vertically” at end of first sentence. Delete second sentence since it disagrees with 5th sentence. Revise 5th sentence to read, “While fluctuating water tables introduce some inconsistency, it is reasonable to assume that soil contamination exists in the vadose zone along the sidewalls of the former tank basin”.

Revised per comment. Revised per comment. The 5th sentence has been re-written.

8. Conclusions and Recommendations

- Recent soil sampling results do not indicate contaminated soils. Explain why you believe that contaminated soils are present and should be remediated?

The explanation is included in the preceding paragraph. Without going out and re-sampling the sidewall soils above four feet BLS we cannot prove that soil contamination is not present. We feel that these “new” samples would be “dirty” and we still would have to excavate these soils.

9. Proposed Remedy for Soil Contamination

- Item 2, second sentence – You state that excavation should be a minimum of 3 feet deep; however, previous soil samples indicate contamination at 4 feet bls.

The previous soil samples, since they were taken below the seasonal high water table would be considered groundwater contamination. We are recommending excavation to a minimum of three feet BLS in case the Navy wanted to try and remove as much contamination as possible and extend the excavation into the water table.

- 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. Figures

- Where is Figure 1?

Figure I will be added in the Final report.

11. Appendices B and C

- There is nothing here, why even include them?

We include the empty Appendices in order to follow the report formats in the 2001 Guidelines.

12. General

- As Nikki told you, I was concerned about (1) the shallow depth of samples and whether the State would accept these results and (2) your conclusion regarding overexcavation because we haven't encountered contaminated soils since the JA Jones closure work (you mention that these samples may have been inaccurate due to a high water table).

We are also concerned about the shallow depth of the samples; however, we cannot ignore the fact that the soils were saturated at 3.0 feet BLS. We could go back out and take more soil samples or we could just dig up some more soils. By recommending excavation we feel that we are demonstrating a willingness to comply with state regulations. Based on our experience with the local state regulators an aggressive remedial approach may be beneficial.

As requested by Nikki Hall with the Camp Lejeune Environmental Quality Branch we are hand delivering a copy of the Final report to the Wilmington Regional Office of the North Carolina Department of Environment and Natural Resources. A copy of the cover letter is attached.

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

Attachments: Final SAR
Copy of Cover Letter to NC ENR WiRO

cc: Mr. Roger R. Marce, Jr. - Code AQ 135 Contracts (correspondence only)
Commanding General, **Attn:** Director I&E/EMD/EQB (1 copy)

203010_SAR_final ltr

SOIL ASSESSMENT REPORT

FOR

PP-3330

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

**NC DENR UST INCIDENT NO. 24010
RICK CLASSIFICATION: LOW RISK
LAND USE CLASSIFICATION: RESIDENTIAL**

MAY 28, 2003

**CONTRACT NO. N62470-01-D-3009
DELIVERY ORDER NO. 0062
CATLIN PROJECT NO. 203-010**



PREPARED BY:

**CATLIN ENGINEERS AND SCIENTISTS
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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
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 (SAR)

A. TITLEPAGE

DATE OF REPORT: May 28, 2003
Facility ID: N/A UST Incident Number (if known): 24010
Site Name: PP-3330
Site Location: 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 20004 Phone: (910) 451-5068
MCB Camp Lejeune, NC 28542

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: Unknown
Address: 3330 Onslow Drive 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: 9/13/01
Longitude: 77.3672 N Latitude: 34.6838 W
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (e.g. Piping/UST):
Possible leaking UST and/or associated piping

Sizes and contents of UST system(s) from which the release occurred:
Non-regulated, non-commercial, 285-gallon fuel oil UST used for heating a single-family residence

I, Michael E. Mason 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-3330 aboard the MCB Camp Lejeune, North Carolina. Building PP-3330 is located in the Paradise Point Housing Area and was heated using a 285-gallon fuel oil UST.

In September 2001, the UST was removed and as part of the closure reporting requirements, laboratory results indicated that the UST system had released hydrocarbons into the subsurface. Soil contamination was detected in the sidewalls of the former tank basin at levels in excess of the Residential Maximum Soil Contaminant Concentrations (MSCCs). Subsequently, a Phase I Limited Site Assessment (LSA) and this Soil Assessment Report (SAR) have been prepared. Findings from these investigations indicate:

- 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 3 feet below land surface.

Excavation of the contaminated soil is recommended based on the apparent limited extent of soil contamination. Soils with contaminant concentrations in excess of the Residential MSCCs are proposed for excavation. Approximately 26 cubic yards of soils are expected to require removal and disposal. As the site is classified as 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. The tank and associated product lines were closed by removal by J.A. Jones Environmental Services Company (J.A. Jones). UST history and owner information is included on Tables 1 and 2. The UST at this site was previously referred to as CC-3330 in the UST closure report, but is referred to as PP-3330 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.

<i>Underground Storage Tank Closure Report, Marine Corps Base Building CC-3330, MCB Camp Lejeune, North Carolina, dated January 23, 2002</i>	J.A. Jones
<i>Leaking Underground Storage Tank (LUST) Phase I Limited Site Assessment Report for PP-3330, Marine Corps Base, Camp Lejeune, North Carolina, dated November 29, 2002</i>	CATLIN Engineers and Scientists

The results of these investigations indicate the following:

UST Removal/Closure

- The release or discharge from a petroleum UST system has impacted soils at the site.
- Laboratory analysis of the four sidewall soil samples collected at 4 feet BLS during UST closure indicates concentration levels were found to be above Residential MSCCs for two parameters, the C₉-C₂₂ Aromatics and 1-Methylnaphthalene.

Refer to Appendix F for UST closure soil sampling results.

Phase I LSA

- Groundwater samples collected during the LSA activities did not exhibit contaminant concentrations in excess of established GCLs. The C₉-C₂₂ Aromatics were detected at a concentration of 3,730 µg/L, in excess of the IGWQS of 210 µg/L. The C₉-C₁₈ Aliphatics were detected at 6,910 µg/L, in excess of the IGWQS of 4,200 µg/L. There are no established GCLs for the MADEP fractions.
- Laboratory analysis of the soil sample (USTPP3330-SB01) collected along the former fuel line (at a depth of 2-3 feet BLS) during LSA activities indicate concentration levels were below the Residential MSCCs. Groundwater was measured approximately 5 feet BLS at the time of this investigation.

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 is provided to Paradise Point housing 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 250 feet west and south of the subject site. Two unnamed, intermittent tidal creeks are located approximately 675 feet north and 425 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 on the east side of the residence, north of the source area. Aboveground power enters the residence to the southeast of the source area and an aboveground power line runs to the garage. An underground telephone line also enters the residence on the east side, just south 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) indicate site geology to be comprised of very fine grained, well sorted, silty sands to a depth of four feet below ground surface. Split spoon samples collected during temporary monitoring well USTPP3330-TW01 boring advancement revealed a very fine to fine silty sand from 5 ft to 7 feet and a very fine to fine grained, well sorted sand 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 3 feet BLS. Boring logs for borings USTPP3330-SB02 through USTPP3330-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 5 feet below ground surface. Groundwater depth as measured in the monitoring well in July 2002 was 5.27 feet below top of casing. Groundwater depth was estimated at 3 feet BLS during this investigation (March 2003).

Subsurface soils in the water bearing zone were described as silty sands, which 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, 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

During UST Removal procedures a soil sample from the tank basin floor exhibited a FID reading of 513 ppm. Consequently, an over excavation was conducted and a confirmatory soil sample (CC-3330-1) was collected at the excavation floor. This soil sample was analyzed per EPA Methods 8260 and 8270 and MADEP EPHNPH. Laboratory results indicated concentrations of C₉-C₂₂ Aromatics at 66,420 mg/Kg, C₉-C₁₈ Aliphatics at 30,000 mg/Kg, and C₁₉-C₃₆ Aliphatics at 128,200mg/Kg. Also, 2-Methylnaphthalene was detected at a concentration of 190 mg/Kg. This sample was obtained at a depth of nine feet BLS which is most likely below the groundwater table and therefore is not indicative of vadose zone soil contamination.

Subsequent to over excavation activities, four additional sidewall soil samples were obtained from 4 feet BLS. Laboratory analysis of samples CC-3330-2 through CC-3330-5 revealed concentrations of C₉-C₂₂ Aromatics above the Residential MSCC. The C₉-C₂₂ Aromatics fraction was detected in all soil samples at concentrations ranging from 1,780 mg/Kg to 4,400 mg/Kg. The Residential MSCC for this fraction is 469 mg/Kg. All samples except CC-3330-3 also contained 2-Methylnaphthalene at concentrations ranging from 64 to 150 mg/Kg, which are above the Residential MSCC of 63 mg/Kg. Refer to Appendix F for historical soil sampling results.

These results triggered the regulatory requirement for a Phase ILSA.

Historical Soil Sampling;– Phase ILSA

CATLIN personnel conducted soil sampling activities on July 22, 2002. Utilizing hand auger techniques, one soil boring (USTPP3330-SB01) was advanced to a depth of four feet BLS. This boring was advanced in the location of the former product feed line. One soil sample (USTPP3330-SB01) was collected from 2-3 feet BLS and 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). Groundwater was measured approximately 5 feet BLS.

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.

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. The 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 3.0 feet BLS which is approximately 2 feet higher than during the Phase I LSA investigation. 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 USTPP3330-SB02 (0-1), USTPP3330-SB03 (0-1), and USTPP3330-SB04 (0-1). The laboratory reports and chain of custody documentation are provided in Appendix E.

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. Analytical results are included 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, there were no EPA Method 8270 target compounds 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, there were no MADEP Aliphatic or Aromatic hydrocarbon fractions detected in the soil samples collected on March 24, 2003 above the laboratory PQLs.

Based on the results of the soil samples collected during this SAR, 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 3 feet BLS, indicating that the seasonal high water table may be as shallow as 3 feet. Previous "dirty" samples were collected at the tank closure from 4 feet BLS, which may not be indicative of vadose zone soils. However, since they are "dirty" at 4 feet BLS, it is reasonable to assume that soil contamination may exist above 4 feet BLS in the vadose zone along the 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 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 the sidewalls of the former tank basin from the land surface to approximately 3 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 walls 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 around the former tank basin to a minimum depth of 3 feet BLS. The final dimensions of the tank excavation were 7 feet long by 6 feet wide by 9 feet deep. The estimated volume of soils to be removed is 26 cubic yards. The soils are proposed to be disposed off-Base at a State approved disposal site.

3. Post Remediation Sampling

Confirmatory soil samples will be collected from the four walls of the excavation after removal of the contaminated soils. Four samples are proposed (one from each sidewall) each to be laboratory analyzed per the following methods:

<u>Method</u>	<u>Description</u>
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-3330, Marine Corps Base, Camp Lejeune, North Carolina*, November 29, 2002.
- J.A. Jones Environmental Services Company. *Underground Storage Tank Closure Report Marine Corps Base Building CC-3330, MCB Camp Lejeune, NC*, January 23, 2002.
- North Carolina Department of Environment and Natural Resources, *Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section* (Effective July 1, 2001).
- 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

PP-3330

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-3330	Fuel Oil ⁺	285	Unknown	(P) 9/13/01	Yes

* UST was used strictly for residential heating purposes

* Still in use means not permanently closed.

TABLE 2
SITE HISTORY
UST OWNER/OPERATOR INFORMATION

PP-3330

UST ID Number	Name of Owner or Operator	Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	Owner or Operator?
PP-3330	Commanding General Marine Corps Base Camp Lejeune, NC	Unknown to 9/13/01	Owner and Operator
Address		Telephone Number	
I&E/EMD/EQB PSC 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: 24010 - PP-3330

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
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3330-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB04 (0-1)	3/24/03	0-1	BQL
USTPP3330-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: 24010 - PP-3330

Facility ID#: N/A

Analytical Method: EPA Method 8270

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
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3330-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB04 (0-1)	3/24/03	0-1	BQL

All results in mg/kg.

TABLE 3C SUMMARY OF SOIL LABORATORY RESULTS

Date: March 24, 2003

Incident Number and Name: 24010 - PP-3330

Facility ID#: N/A

Analytical Method: MADEP VPH/EPH

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)						
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	<10	<10	<10	<10	<10	<10
USTPP3330-SB02 (0-1)	3/24/03	0-1	<10	<10	<10	<10	<10	<10
USTPP3330-SB03 (0-1)	3/24/03	0-1	<10	<10	<10	<10	<10	<10
USTPP3330-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: 24010 - PP-3330

Facility ID#: N/A

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

Sample ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Date Collected	Sample Depth (ft. BGS)				
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
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	<10	<20	<10	<20
USTPP3330-SB02 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3330-SB03 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3330-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: March 2003

Incident No. and Name: 24010 - PP-3330

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 20004 Marine Corps Base, Camp Lejeune, NC 28542
N/A	Occupant: Unknown	3330 Onslow Drive Marine Corps Base, Camp Lejeune, NC 28542

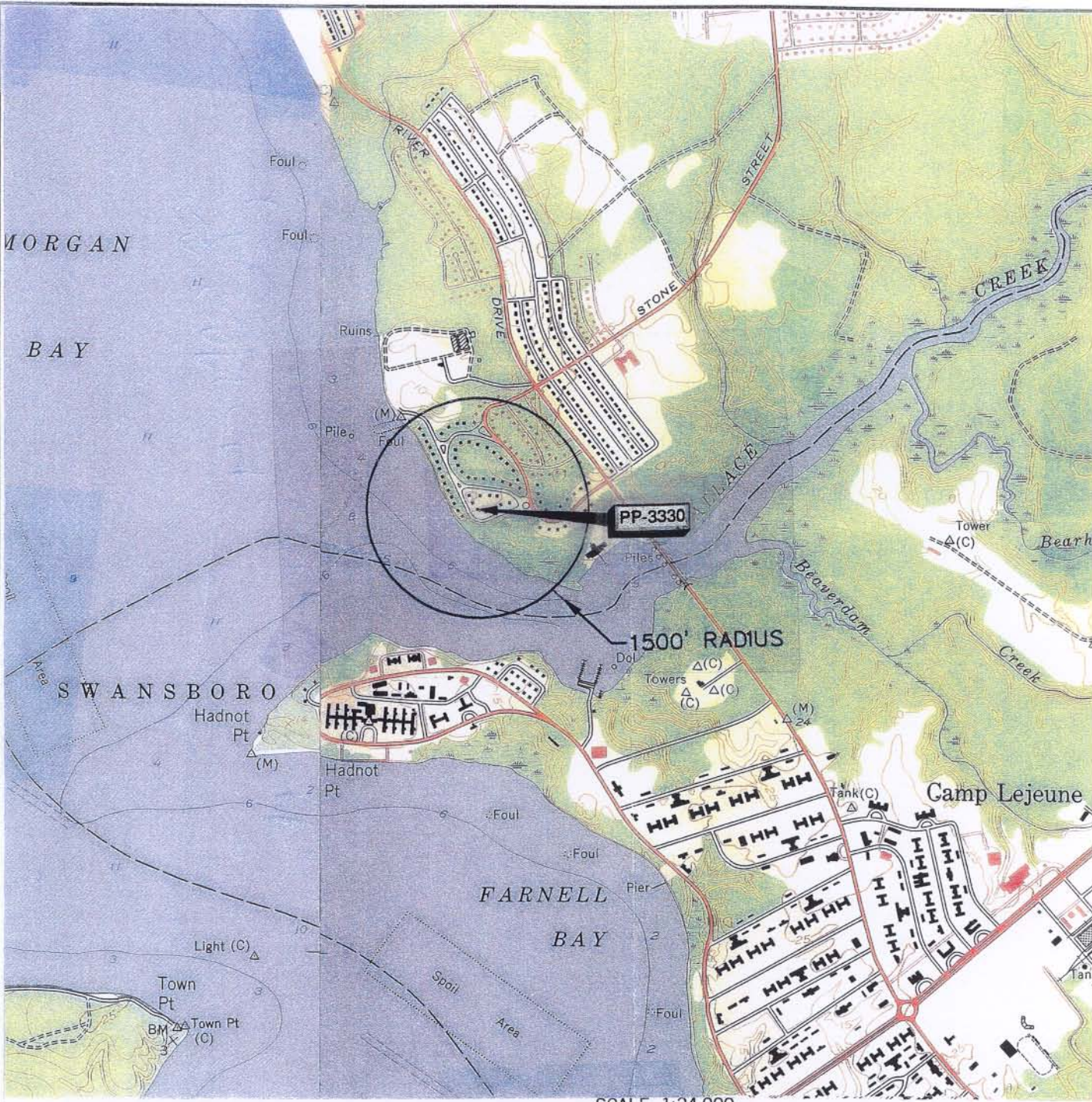
FIGURES

MORGAN BAY

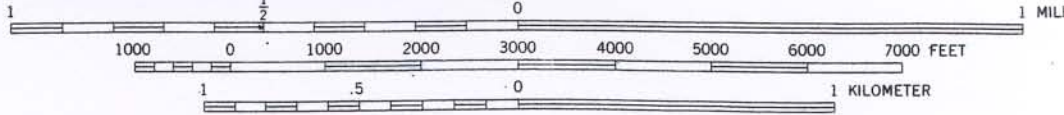
SWANSBORO

FARNELL BAY

Camp Lejeune



SCALE 1:24 000

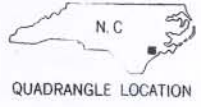


CAMP LEJEUNE, N. C.

N3437.5—W7715/7.5

1952

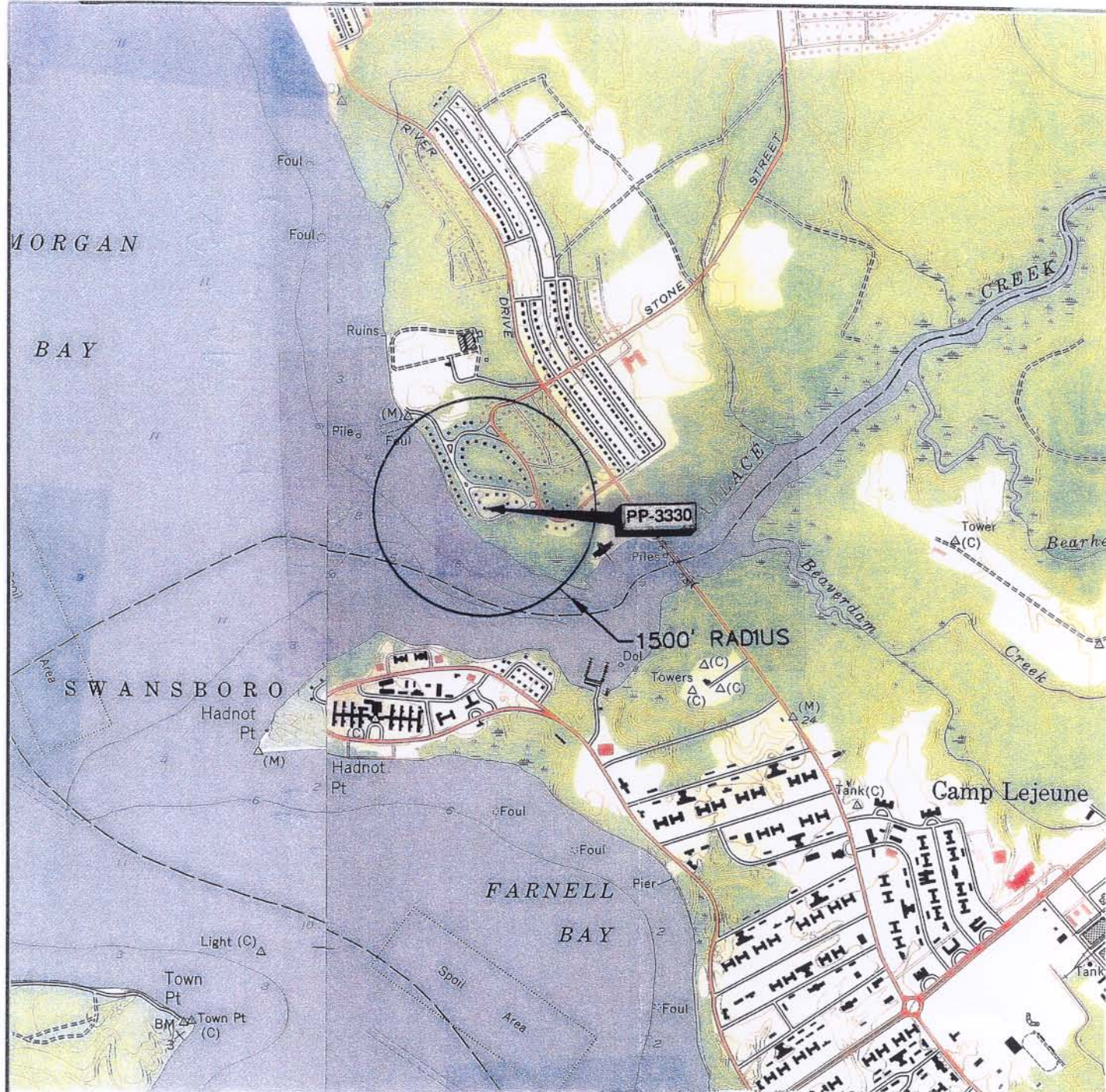
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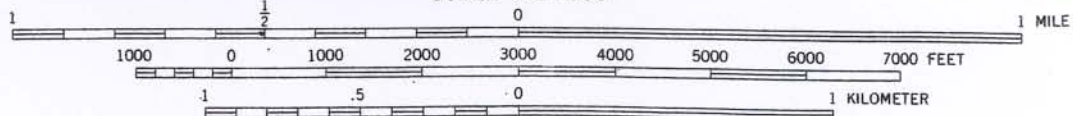
QUADRANGLE LOCATION

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
 NOTE: NO WATER WELLS IDENTIFIED WITHIN A 1,500 FEET RADIUS OF SUBJECT SITE

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE LOCATION AND WATER SURVEY	FIGURE 1
	JOB NO: 203-010 DATE: MAY 2003	SCALE: AS SHOWN	DRAWN BY: WHW



SCALE 1:24 000



CAMP LEJEUNE, N. C.

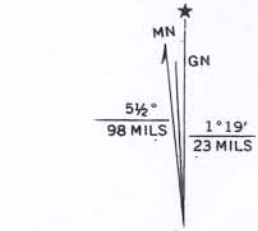
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1952

PHOTOREVISED 1971



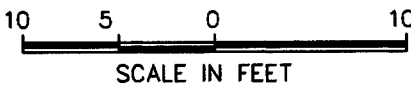
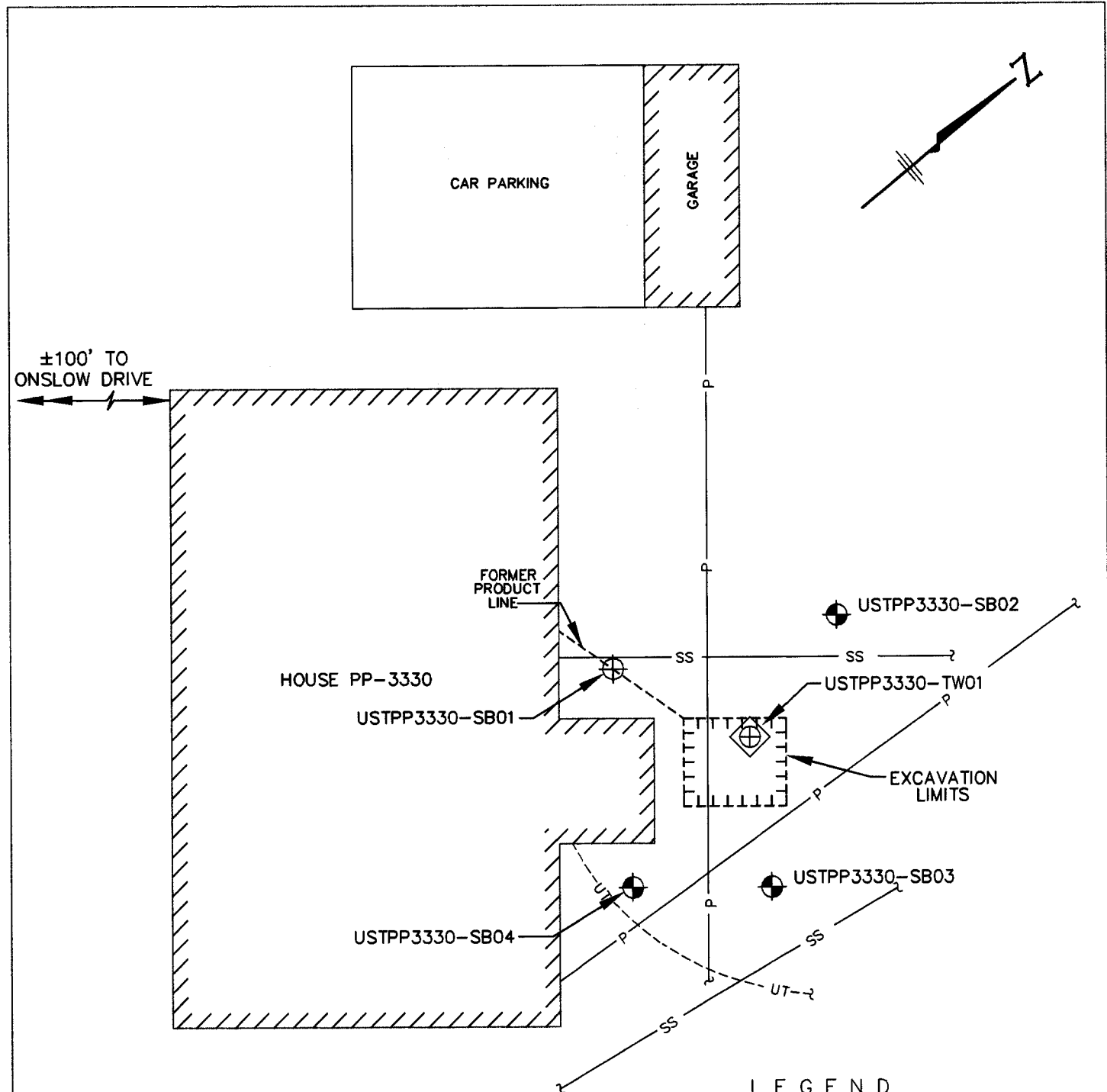
QUADRANGLE LOCATION



UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

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

<p>WILMINGTON, NORTH CAROLINA</p>	<p>PROJECT</p> <p>PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.</p>	<p>TITLE</p> <p>SITE LOCATION WITH PLACES OF PUBLIC ASSEMBLY</p>	<p>FIGURE</p> <p>2</p>	
	<p>JOB NO: 202043-02</p>	<p>DATE: SEP 2002</p>	<p>SCALE: AS SHOWN</p>	<p>DRAWN BY: WHW</p>



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

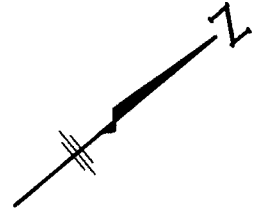
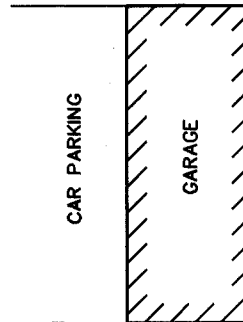
LEGEND		DESCRIPTION
EXISTING	NEW	BUILDING
		SOIL BORING
		TYPE II WELL (TEMPORARY)
		POWER LINE
		SANITARY SEWER
		UNDERGROUND TELEPHONE

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH UTILITIES	FIGURE 3
	JOB NO: 203010-41 DATE: APR 2003	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: MDM

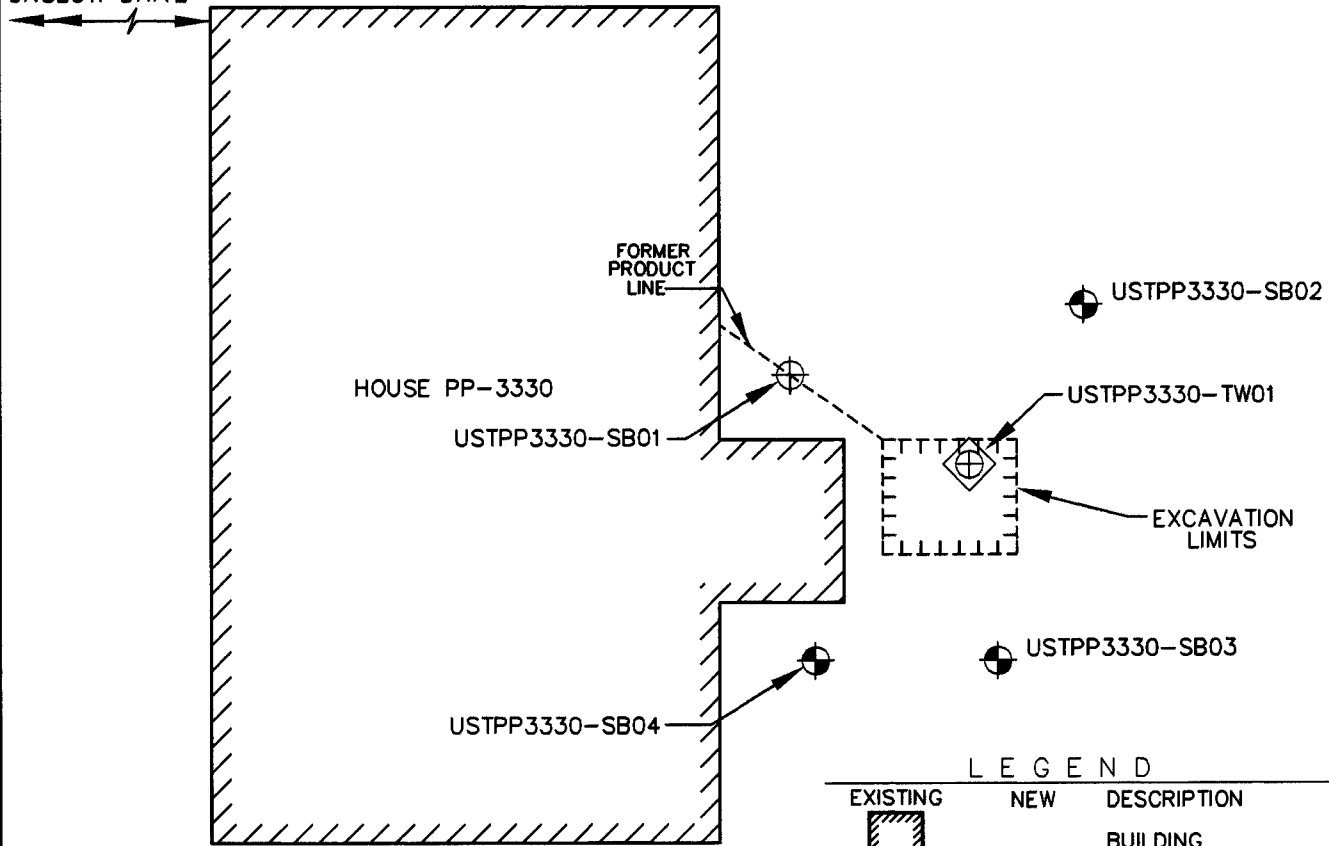
Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern		All Target Analytes
	Date Collected	Sample Depth (ft. BGS)	
	Residential MSCC (mg/kg)		Varies
	Industrial/Commercial MSCC (mg/kg)		Varies
	Soil to Groundwater MSCC (mg/kg)		Varies
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3330-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB04 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB04D (0-1)	3/24/03	0-1	BQL

All results in mg/kg.



±100' TO ONSLOW DRIVE



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

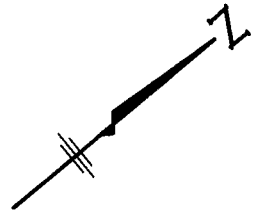
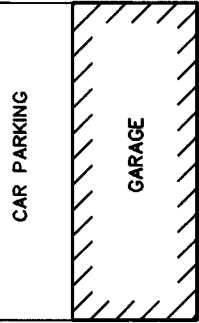
LEGEND		
EXISTING	NEW	DESCRIPTION
		BUILDING
		SOIL BORING
		TYPE II WELL (TEMPORARY)

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8260B/5035	FIGURE 4A
	JOB NO: 203010-41 DATE: APR 2003	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: MDM

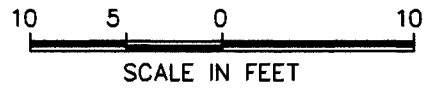
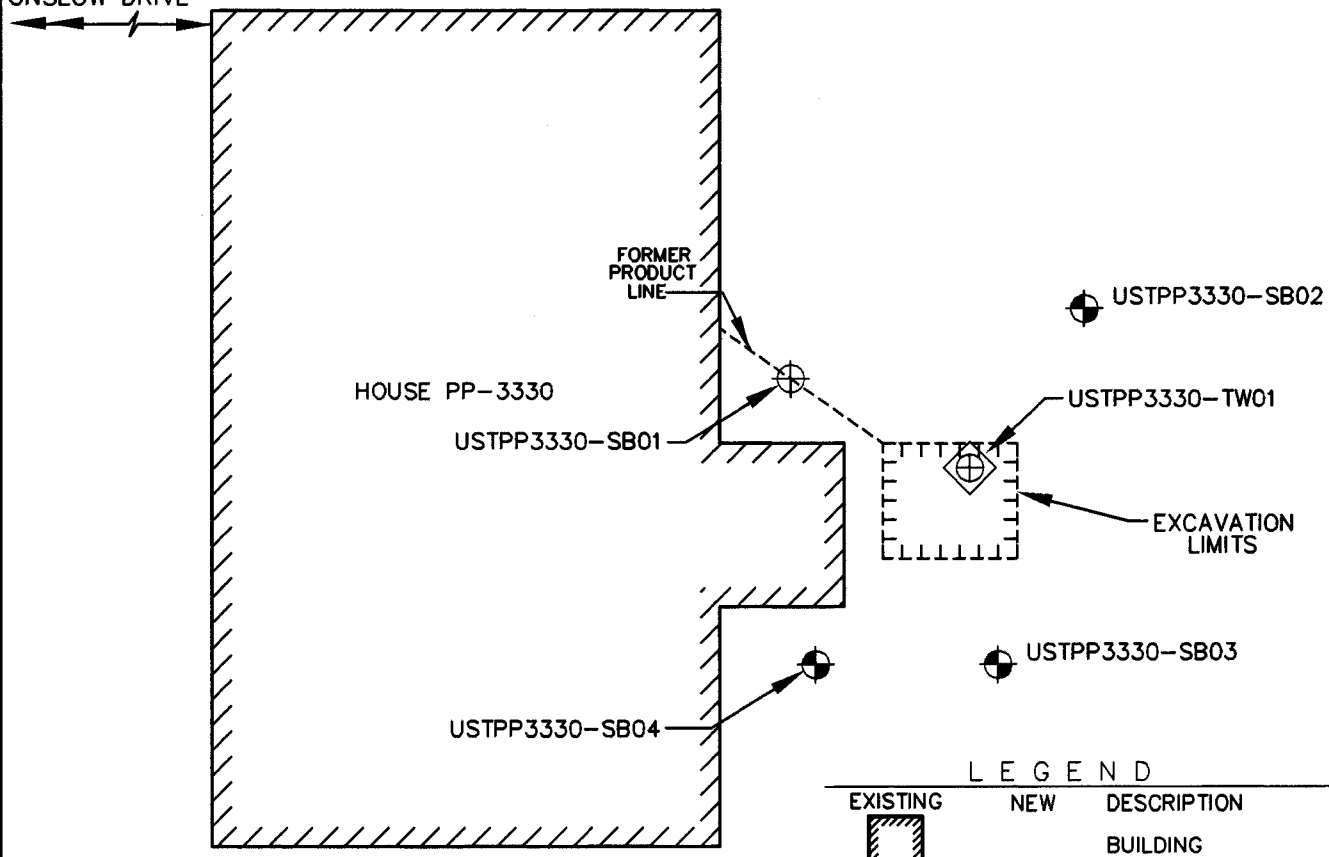
Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern →		All Target Analytes
	Date Collected	Sample Depth (ft. BGS)	
	Residential MSCC (mg/kg)		Varies
	Industrial/Commercial MSCC (mg/kg)		Varies
	Soil to Groundwater MSCC (mg/kg)		Varies
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3330-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3330-SB04 (0-1)	3/24/03	0-1	BQL

All results in mg/kg.



±100' TO
ON SLOW DRIVE



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

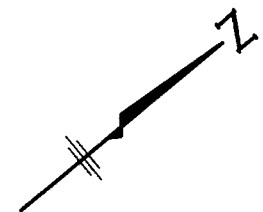
LEGEND		
EXISTING	NEW	DESCRIPTION
		BUILDING
		SOIL BORING
		TYPE II WELL (TEMPORARY)

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8270	FIGURE 4B
	JOB NO: 203010-41 DATE: APR 2003	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: MDM

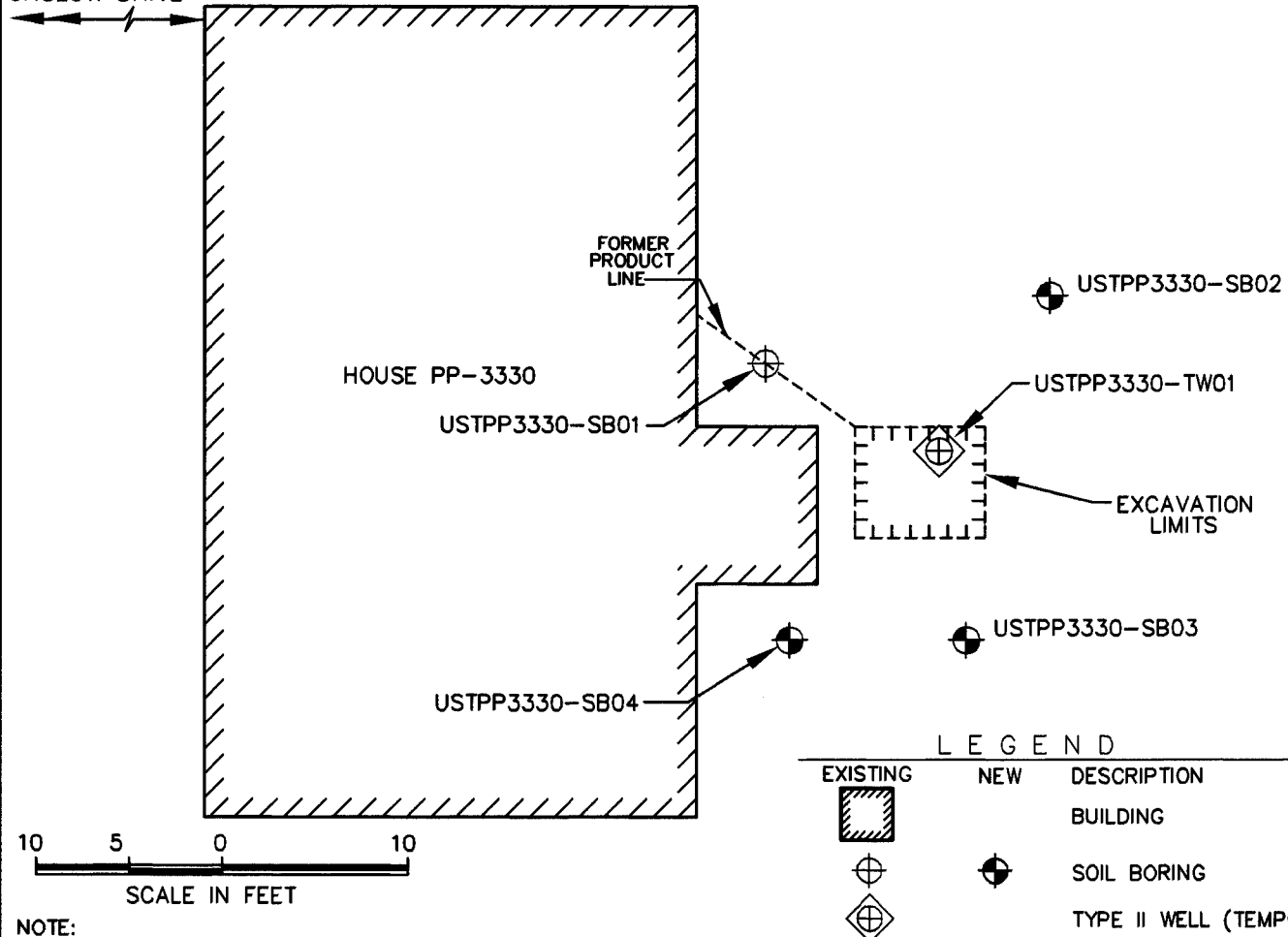
Analytical Method: MADEP VPH/EPH AS COMPARED TO NCDENR MSCCs

Sample ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Date Collected	Sample Depth (ft. BGS)				
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
USTPP3330-SB01 (2-3)	7/22/02	2 - 3	<10	<20	<10	<20
USTPP3330-SB02 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3330-SB03 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3330-SB04 (0-1)	3/24/03	0-1	<10	<20	<10	<20

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



±100' TO
ON SLOW DRIVE

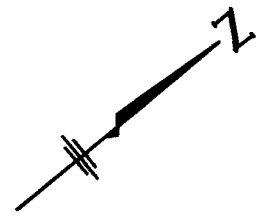
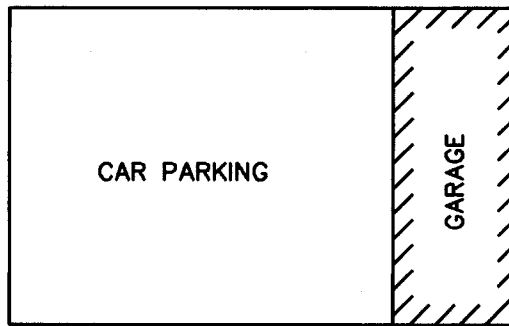


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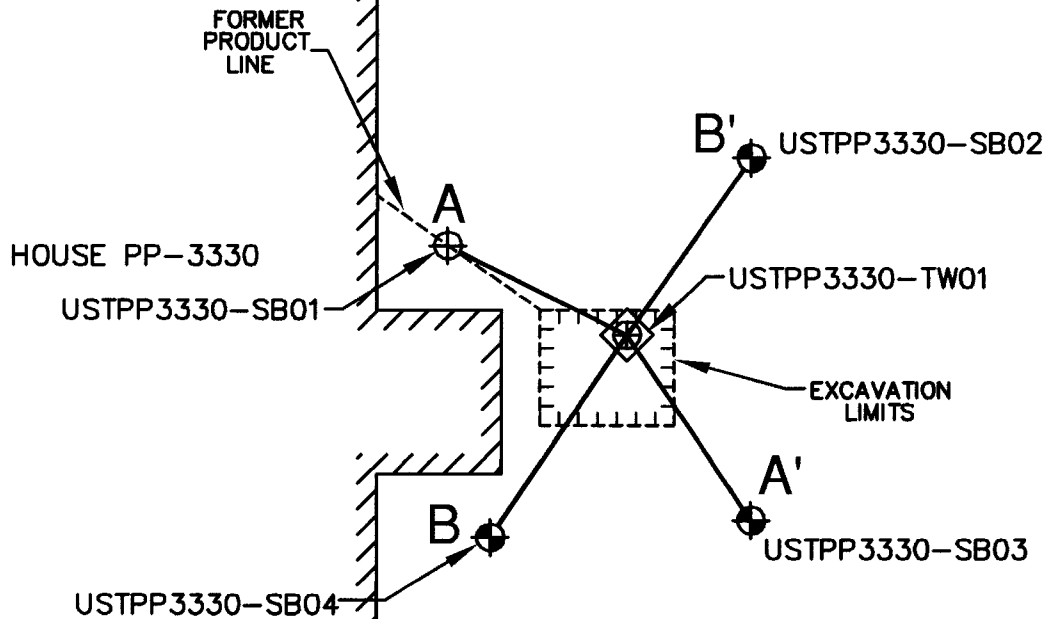
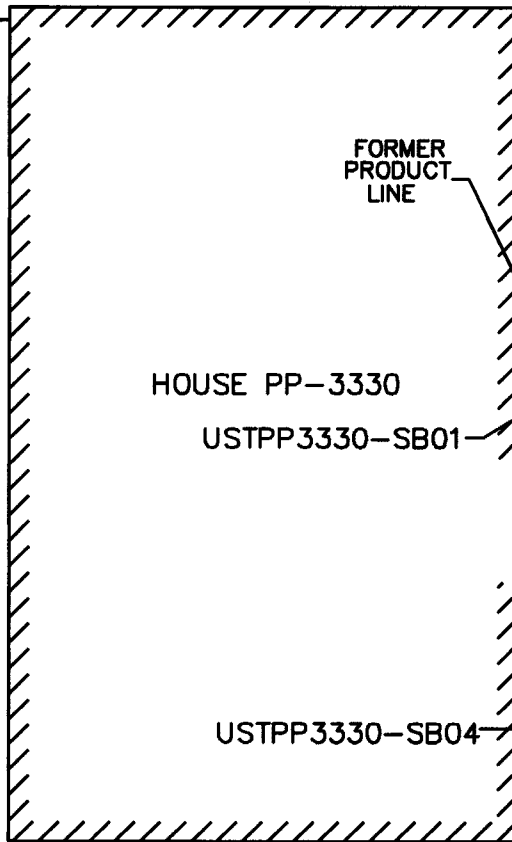
EXISTING	NEW	DESCRIPTION
		BUILDING
		SOIL BORING
		TYPE II WELL (TEMPORARY)

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

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 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: 203010-41 DATE: APR 2003	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: MDM



±100' TO
ON SLOW DRIVE

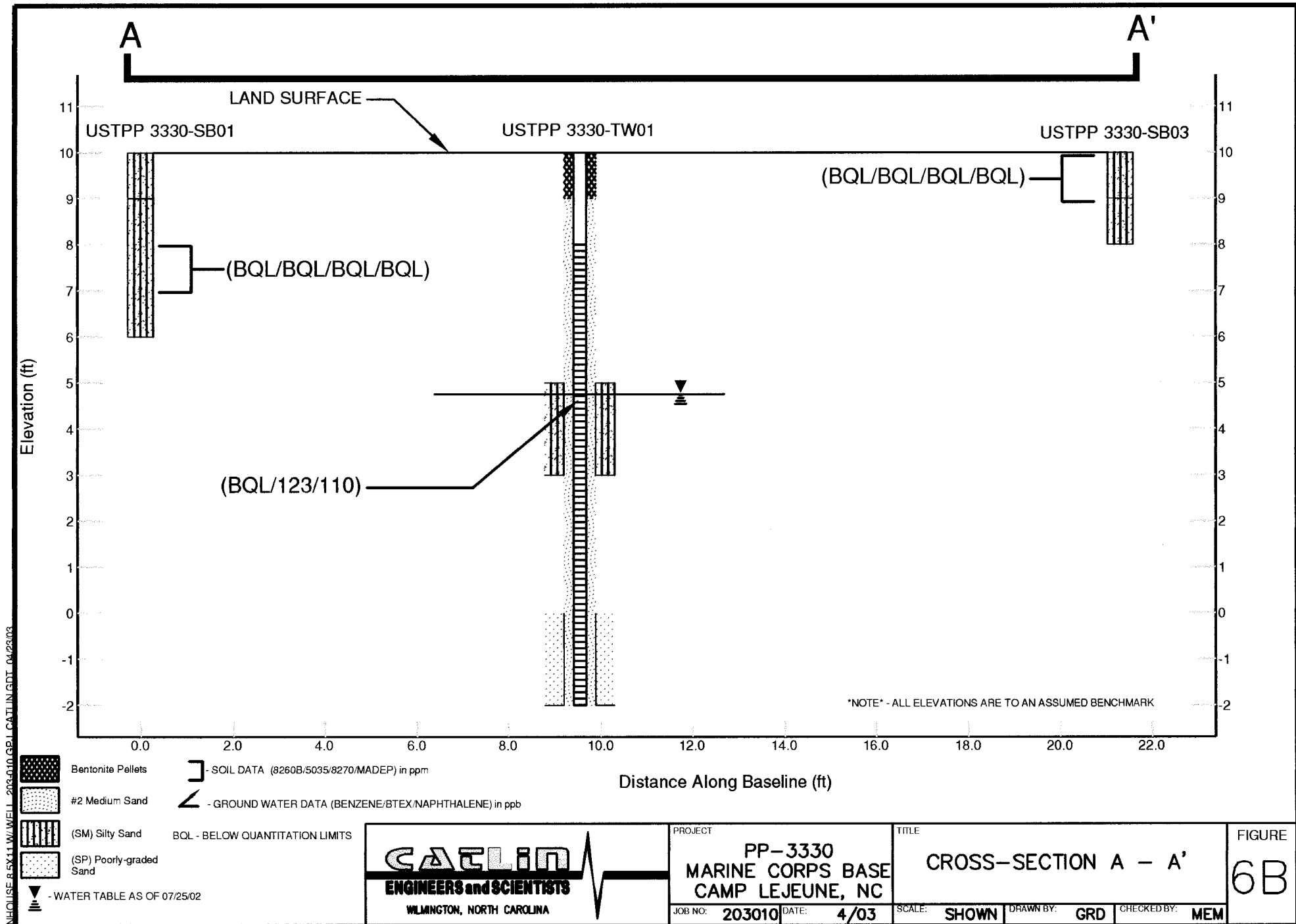


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EXISTING	NEW	DESCRIPTION
		BUILDING
		SOIL BORING
		TYPE II WELL (TEMPORARY)

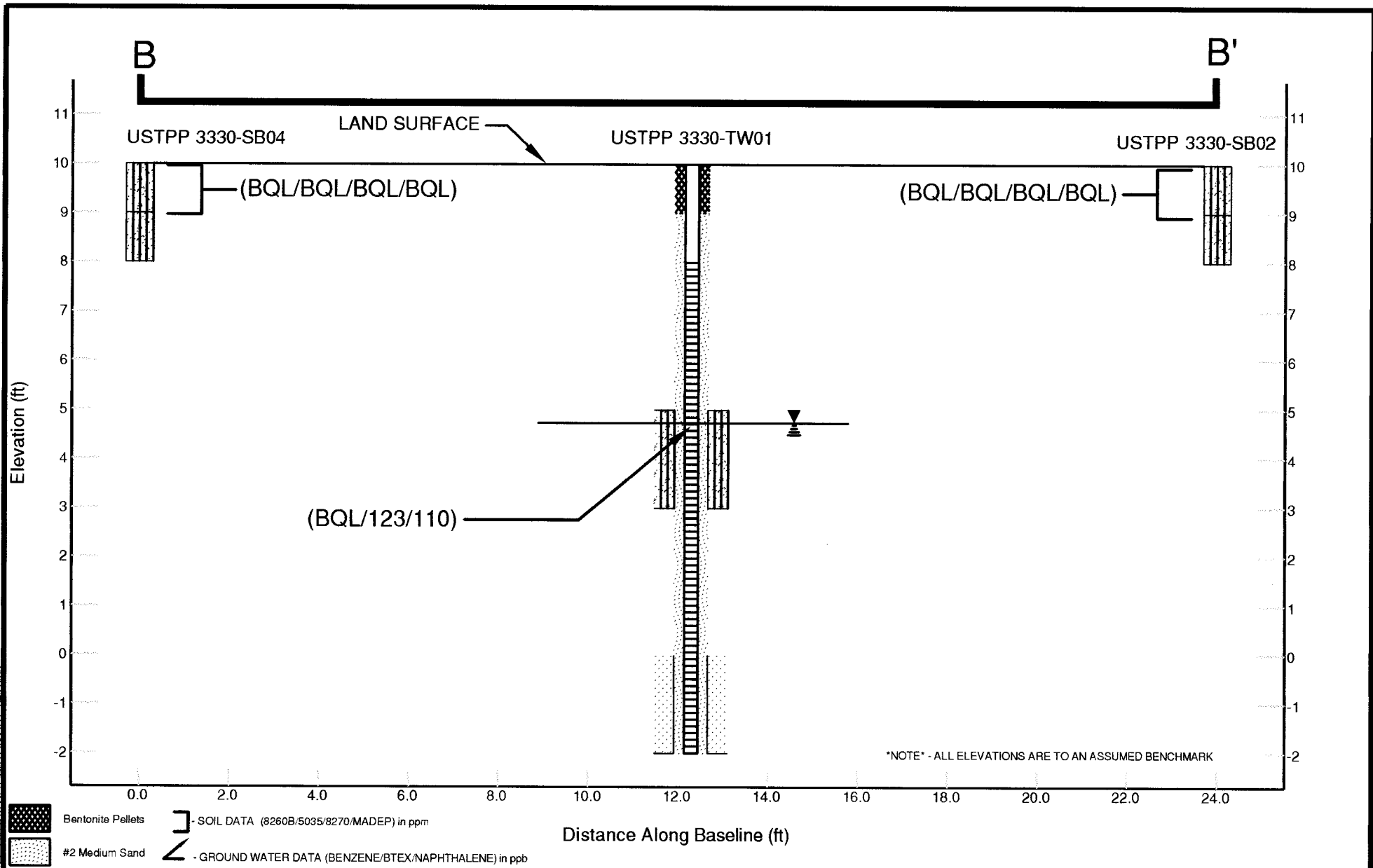
NOTE:
1. MAP ADAPTED FROM J.A. JONES

 WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE CROSS-SECTION PLAN VIEW	FIGURE 6A
	JOB NO: 203010	DATE: 05/03	SCALE: 1"=10' DRAWN BY: GRD CHECKED BY: MEM











IN HOUSE 8.5X11 W/ WELL - 2005-010.GPJ CATLIN IN.GDT 04/28/03

INHOUSE 8.5X11.W/WEILL_2003.010.GPJ.CATLIN.GDT_04/23/03



NOTE - ALL ELEVATIONS ARE TO AN ASSUMED BENCHMARK

-  Bentonite Pellets
-  #2 Medium Sand
-  (SM) Silty Sand
-  (SP) Poorly-graded Sand
-  - WATER TABLE AS OF 07/25/02
-  - SOIL DATA (8260B/5035/8270/MADEP) in ppm
-  - GROUND WATER DATA (BENZENE/BTEX/NAPHTHALENE) in ppb
- BQL - BELOW QUANTITATION LIMITS

 CATLIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT PP-3330 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE CROSS-SECTION B - B'		FIGURE 6C
	JOB NO: 203010 DATE: 4/03	SCALE: SHOWN	DRAWN BY: GRD	CHECKED BY: MEM

APPENDIX A
BORING LOGS

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203-010	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3330	LOGGED BY: Charles Ray	WELL ID: USTPP 3330-TW01	
	DRILLER: Bobbie Fowler		
NORTHING:	EASTING:	CREW: Tom Sterler	
SYSTEM: N/A	BORING LOCATION:	T.O.C. ELEV.: 10.00	
DRILL MACHINE: CME 45B ATV	METHOD: HSA	0 HOUR DTW:	BORING DEPTH: 12.0
START DATE: 07/23/02	FINISH DATE: 07/23/02	24 HOUR DTW: 5.27	WELL DEPTH: 12.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in							
									0.0 LAND SURFACE	10.0	0.0
5.0	HP	HP	HP	HP		SM		GRAY, TAN, SILTY, V.F. TO F. SAND. SLIGHT HCO, SAT.	5.0	5.0	1.0
7.0									7.0	3.0	
10.0	HP	HP	HP	HP		SP		LIGHT GRAY, WELL SORTED, V.F. TO F. SAND. HIGH HCO, SAT.	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	12.0

CATLIN BORING LOG 203-010.GEL CATLIN.GDI 05/02/03

 Bentonite Pellets  #2 Medium Sand

BORING LOG

CATLIN

ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203-010	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3330	LOGGED BY: Charles Ray	BORING ID: USTPP	
	DRILLER: Charles Ray	3330-SB01	
NORTHING:	EASTING:	CREW: Tom Sterler	
SYSTEM: N/A	BORING LOCATION:		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)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	
							DEPTH	ELEVATION
0.0							0.0	LAND SURFACE 10.0
0.0		HA	▲0		SM		0.0	DARK BROWN TO TAN, SILTY, V.F., MODERATELY WELL SORTED SAND. MOIST, NO HCO.
1.0		HA	▲0				1.0	9.0
2.0		HA	▲0	sampled	SM			TAN, WELL SORTED, SILTY, V.F. SAND. MOIST, NO HCO.
3.0		HA	▲0					
4.0		HA	▲0				4.0	6.0
								Boring Terminated at Elevation 6.0 ft Elevation based on assumed land surface elevation of 10 feet.

CATLIN ENVIRONMENTAL LOG_203-010.GPJ CATLIN.GDT_05/02/03

BORING LOG

CATLIN

ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203-010	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3330	LOGGED BY: J. Carscallen	BORING ID: USTPP 3330-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: 3.0	BORING DEPTH: 3.0
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)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	
							DEPTH	ELEVATION
0.0			0 200 400 600 800 1000				0.0	LAND SURFACE 10.0
0.0		GRAB ▲0		USTPP3330 SB02 (0-1)	SM		1.0	SILTY SAND, VERY FINE GRAINED; BROWN-ORANGE; MOIST 9.0
1.0		▲0			SM		2.0	SILTY SAND, VERY FINE GRAINED; BROWN-ORANGE; MOIST 8.0
2.0							3.0	SOIL WET AT 3.0 FEET BLS. 7.0
								Boring Terminated at Elevation 7.0 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.: 203-010	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3330	LOGGED BY: J. Carscallen	BORING ID: USTPP 3330-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: 3.0	BORING DEPTH: 3.0
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)	LAB.	U S C S	L O G	SOIL AND ROCK DESCRIPTION	
							DEPTH	ELEVATION
0.0			0 200 400 600 800 1000				0.0	LAND SURFACE 10.0
0.0		GRAB	▲0	USTPP3330 SB033 (0-1)	SM		1.0	SILTY SAND, VERY FINE GRAINED; BROWN-ORANGE; MOIST 9.0
1.0			▲0		SM		2.0	SILTY SAND, VERY FINE GRAINED; BROWN-ORANGE; MOIST 8.0
2.0							3.0	SOIL WET AT 3.0 FEET BLS. 7.0
								Boring Terminated at Elevation 7.0 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.: 203-010	STATE: NC	COUNTY: Onslow	LOCATION: MCB, Camp Lejuene
PROJECT NAME: PP-3330	LOGGED BY: J. Carscallen	BORING ID: USTPP 3330-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: 3.0	BORING DEPTH: 3.0
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)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	
							DEPTH	ELEVATION
			0 200 400 600 800 1000				0.0	LAND SURFACE 10.0
0.0		GRAB	▲0				1.0	SILTY SAND, VERY FINE GRAINED; BROWN-ORANGE; MOIST
								USTPP3330-SB04 (0-1) + SM DUPLICATE
1.0			▲0		SM		2.0	SILTY SAND, VERY FINE GRAINED; BROWN-ORANGE; MOIST
2.0							3.0	SOIL WET AT 3.0 FEET BLS.
							7.0	Boring Terminated at Elevation 7.0 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 WELUPIEZOMETER 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**

203-010
PARADIGM ANALYTICAL LABORATORIES, INC.
2627 Northchase Parkway S.E.
Wilmington, North Carolina 28405
(910) 350-1903
Fax (910) 350-1557

FILE COPY

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

April 8, 2003

Report Number: G128-1080

Client Project ID: PP-3330

Dear Mr. Mason,

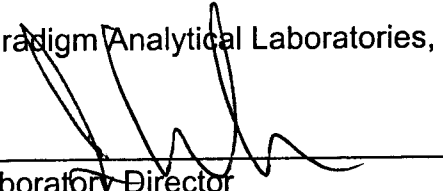
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained 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: USTPP3330-SB02 (0-1)

Date Analyzed: 3/31/03

Client Project ID: PP-3330

Analyzed By: EKR

Lab Sample ID: 66346

Date Collected: 3/24/03

Lab Project ID: G128-1080

Date Received: 3/25/03

Matrix: Soil

%Solids: 91.7

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.055	BQL
Acrolein	0.11	BQL
Acrylonitrile	0.11	BQL
Benzene	0.0055	BQL
Bromobenzene	0.0055	BQL
Bromochloromethane	0.0055	BQL
Bromodichloromethane	0.0055	BQL
Bromoform	0.0055	BQL
Bromomethane	0.0055	BQL
2-Butanone	0.027	BQL
n-Butylbenzene	0.0055	BQL
sec-Butylbenzene	0.0055	BQL
tert-Butylbenzene	0.0055	BQL
Carbon disulfide	0.0055	BQL
Carbon tetrachloride	0.0055	BQL
Chlorobenzene	0.0055	BQL
Chloroethane	0.0055	BQL
2-Chloroethyl vinyl ether	0.0055	BQL
Chloroform	0.0055	BQL
Chloromethane	0.0055	BQL
2-Chlorotoluene	0.0055	BQL
4-Chlorotoluene	0.0055	BQL
Dibromochloromethane	0.0055	BQL
1,2-Dibromo-3-chloropropane	0.0055	BQL
Dibromomethane	0.0055	BQL
1,2-Dibromoethane (EDB)	0.0055	BQL
1,2-Dichlorobenzene	0.0055	BQL
1,3-Dichlorobenzene	0.0055	BQL
1,4-Dichlorobenzene	0.0055	BQL
trans-1,4-Dichloro-2-butene	0.0055	BQL
1,1-Dichloroethane	0.0055	BQL
1,1-Dichloroethene	0.0055	BQL
1,2-Dichloroethane	0.0055	BQL
cis-1,2-Dichloroethene	0.0055	BQL
trans-1,2-dichloroethene	0.0055	BQL
1,2-Dichloropropane	0.0055	BQL
1,3-Dichloropropane	0.0055	BQL
2,2-Dichloropropane	0.0055	BQL
1,1-Dichloropropene	0.0055	BQL
cis-1,3-Dichloropropene	0.0055	BQL
trans-1,3-Dichloropropene	0.0055	BQL
Dichlorodifluoromethane	0.0055	BQL
Diisopropyl ether (DIPE)	0.0055	BQL
Ethylbenzene	0.0055	BQL
Hexachlorobutadiene	0.0055	BQL

Reviewed by: mjl

Flags: BQL = Below Quantitation Limit

N.C. Certification #481 S.C. Certification #99029

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3330-SB03 (0-1)

Date Analyzed: 3/31/03

Client Project ID: PP-3330

Analyzed By: EKR

Lab Sample ID: 66347

Date Collected: 3/24/03

Lab Project ID: G128-1080

Date Received: 3/25/03

Matrix: Soil

%Solids: 87.2

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.057	BQL
Acrolein	0.11	BQL
Acrylonitrile	0.11	BQL
Benzene	0.0057	BQL
Bromobenzene	0.0057	BQL
Bromochloromethane	0.0057	BQL
Bromodichloromethane	0.0057	BQL
Bromoform	0.0057	BQL
Bromomethane	0.0057	BQL
2-Butanone	0.029	BQL
n-Butylbenzene	0.0057	BQL
sec-Butylbenzene	0.0057	BQL
tert-Butylbenzene	0.0057	BQL
Carbon disulfide	0.0057	BQL
Carbon tetrachloride	0.0057	BQL
Chlorobenzene	0.0057	BQL
Chloroethane	0.0057	BQL
2-Chloroethyl vinyl ether	0.0057	BQL
Chloroform	0.0057	BQL
Chloromethane	0.0057	BQL
2-Chlorotoluene	0.0057	BQL
4-Chlorotoluene	0.0057	BQL
Dibromochloromethane	0.0057	BQL
1,2-Dibromo-3-chloropropane	0.0057	BQL
Dibromomethane	0.0057	BQL
1,2-Dibromoethane (EDB)	0.0057	BQL
1,2-Dichlorobenzene	0.0057	BQL
1,3-Dichlorobenzene	0.0057	BQL
1,4-Dichlorobenzene	0.0057	BQL
trans-1,4-Dichloro-2-butene	0.0057	BQL
1,1-Dichloroethane	0.0057	BQL
1,1-Dichloroethene	0.0057	BQL
1,2-Dichloroethane	0.0057	BQL
cis-1,2-Dichloroethene	0.0057	BQL
trans-1,2-dichloroethene	0.0057	BQL
1,2-Dichloropropane	0.0057	BQL
1,3-Dichloropropane	0.0057	BQL
2,2-Dichloropropane	0.0057	BQL
1,1-Dichloropropene	0.0057	BQL
cis-1,3-Dichloropropene	0.0057	BQL
trans-1,3-Dichloropropene	0.0057	BQL
Dichlorodifluoromethane	0.0057	BQL
Diisopropyl ether (DIPE)	0.0057	BQL
Ethylbenzene	0.0057	BQL
Hexachlorobutadiene	0.0057	BQL

Reviewed by: jsr

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3330-SB03 (0-1)

Date Analyzed: 3/31/03

Client Project ID: PP-3330

Analyzed By: EKR

Lab Sample ID: 66347

Date Collected: 3/24/03

Lab Project ID: G128-1080

Date Received: 3/25/03

Matrix: Soil

%Solids: 87.2

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0057	BQL
Iodomethane	0.0057	BQL
Isopropylbenzene	0.0057	BQL
4-Isopropyltoluene	0.0057	BQL
Methylene chloride	0.023	BQL
4-Methyl-2-pentanone	0.0057	BQL
Methyl-tert-butyl ether (MTBE)	0.0057	BQL
Naphthalene	0.0057	BQL
n-Propyl benzene	0.0057	BQL
Styrene	0.0057	BQL
1,1,1,2-Tetrachloroethane	0.0057	BQL
1,1,2,2-Tetrachloroethane	0.0057	BQL
Tetrachloroethene	0.0057	BQL
Toluene	0.0057	BQL
1,2,3-Trichlorobenzene	0.0057	BQL
1,2,4-Trichlorobenzene	0.0057	BQL
Trichloroethene	0.0057	BQL
1,1,1-Trichloroethane	0.0057	BQL
1,1,2-Trichloroethane	0.0057	BQL
Trichlorofluoromethane	0.0057	BQL
1,2,3-Trichloropropane	0.0057	BQL
1,2,4-Trimethylbenzene	0.0057	BQL
1,3,5-Trimethylbenzene	0.0057	BQL
Vinyl chloride	0.0057	BQL
m-,p-Xylene	0.011	BQL
o-Xylene	0.0057	BQL

Surrogate Spike Recoveries		Spike Added	Surrogate Result	%Rec
Compound		(mg/KG)	(mg/KG)	
Bromofluorobenzene		0.0500	0.0482	96
1,2-Dichloroethane-d4		0.0500	0.0544	109
Toluene-d8		0.0500	0.0518	104

Comments:

All results are corrected for dilution.

Reviewed by: jkrc

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3330-SB04 (0-1)

Date Analyzed: 3/31/03

Client Project ID: PP-3330

Analyzed By: EKR

Lab Sample ID: 66348

Date Collected: 3/24/03

Lab Project ID: G128-1080

Date Received: 3/25/03

Matrix: Soil

%Solids: 81.4

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: MA

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3330-SB04 (0-1)	Date Analyzed: 3/31/03
Client Project ID: PP-3330	Analyzed By: EKR
Lab Sample ID: 66348	Date Collected: 3/24/03
Lab Project ID: G128-1080	Date Received: 3/25/03
Matrix: Soil	%Solids: 81.4
	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	0.025	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	Spike Added	Surrogate Result	%Rec
Compound	(mg/KG)	(mg/KG)	
Bromofluorobenzene	0.0500	0.0478	96
1,2-Dichloroethane-d4	0.0500	0.0550	110
Toluene-d8	0.0500	0.0499	100

Comments:

All results are corrected for dilution.

Reviewed by: MK

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3330-SB04D (0-1)

Date Analyzed: 3/31/03

Client Project ID: PP-3330

Analyzed By: EKR

Lab Sample ID: 66349

Date Collected: 3/24/03

Lab Project ID: G128-1080

Date Received: 3/25/03

Matrix: Soil

%Solids: 81.4

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: pkc

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 8260B/5035

Client Sample ID: USTPP3330-SB04D (0-1)	Date Analyzed: 3/31/03
Client Project ID: PP-3330	Analyzed By: EKR
Lab Sample ID: 66349	Date Collected: 3/24/03
Lab Project ID: G128-1080	Date Received: 3/25/03
Matrix: Soil	Dilution: 1
%Solids: 81.4	

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	0.025	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	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Compound			
Bromofluorobenzene	0.0500	0.0491	98
1,2-Dichloroethane-d4	0.0500	0.0536	107
Toluene-d8	0.0500	0.0507	101

Comments:

All results are corrected for dilution.

Reviewed by: mtc

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3330

Sample Information and Analytical Results	
Sample Identification	USTPP3330-SB02 (0-1)
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/24/03
Date Received	03/25/03
Date Extracted	03/24/03
Date Analyzed	03/29/03
Dry Weight	92
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	98
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: G128-1080-66346

Reviewed By: m/c

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3330

Sample Information and Analytical Results	
Sample Identification	USTPP3330-SB03 (0-1)
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/24/03
Date Received	03/25/03
Date Extracted	03/24/03
Date Analyzed	03/29/03
Dry Weight	87
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	95
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: G128-1080-66347

Reviewed By: mtk

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3330

Sample Information and Analytical Results	
Sample Identification	USTPP3330-SB04 (0-1)
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/24/03
Date Received	03/25/03
Date Extracted	03/24/03
Date Analyzed	03/29/03
Dry Weight	81
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	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: G128-1080-66348

Reviewed By: mmc

PARADIGM ANALYTICAL LABORATORIES, INC.

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		ML		RL	
	(µg/L)	(mg/Kg)	(µg/L)	(mg/Kg)	(µg/L)	(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		%RSD or CCC	Method of Quantitation
	(µg/L)	(mg/Kg)		
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		RPD
	(µg/L)	(mg/Kg)	
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: mlc

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles

by GCMS 8270

Client Sample ID: USTPP3330-SB02 (0-1)

Client Project ID: PP-3330

Lab Sample ID: 66346

Lab Project ID: G128-1080

Matrix: Soil

%Solids: 91.7

Date Collected: 3/24/2003

Date Received: 3/25/2003

Date Analyzed: 3/31/2003

Analyzed By: MRC

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acenaphthene	0.34	BQL
Acenaphthylene	0.34	BQL
Anthracene	0.34	BQL
Benzo[a]anthracene	0.34	BQL
Benzo[a]pyrene	0.34	BQL
Benzo[b]fluoranthene	0.34	BQL
Benzo[g,h,i]perylene	0.34	BQL
Benzo[k]fluoranthene	0.34	BQL
Benzoic Acid	0.68	BQL
Bis(2-chloroethoxy)methane	0.34	BQL
Bis(2-chloroethyl)ether	0.34	BQL
Bis(2-chloroisopropyl)ether	0.34	BQL
Bis(2-ethylhexyl)phthalate	0.34	BQL
4-bromophenyl phenyl ether	0.34	BQL
Butylbenzylphthalate	0.34	BQL
4-Chloroaniline	1.7	BQL
4-Chloro-3-methylphenol	0.34	BQL
2-Chloronaphthalene	0.34	BQL
2-Chlorophenol	0.34	BQL
4-Chlorophenyl phenyl ether	0.34	BQL
Chrysene	0.34	BQL
Di-n-Butylphthalate	0.34	BQL
Di-n-octylphthalate	0.34	BQL
Dibenzo[a,h]anthracene	0.34	BQL
Dibenzofuran	0.34	BQL
1,2-Dichlorobenzene	0.34	BQL
1,3-Dichlorobenzene	0.34	BQL
1,4-Dichlorobenzene	0.34	BQL
3,3'-Dichlorobenzidine	0.68	BQL
2,4-Dichlorophenol	0.34	BQL
Diethylphthalate	0.34	BQL
2,4-Dimethylphenol	0.34	BQL
Dimethylphthalate	0.34	BQL
4,6-Dinitro-2-methylphenol	1.7	BQL
2,4-Dinitrophenol	1.7	BQL
2,4-Dinitrotoluene	0.34	BQL
2,6-Dinitrotoluene	0.34	BQL
Fluoranthene	0.34	BQL
Fluorene	0.34	BQL
Hexachlorobenzene	0.34	BQL

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles

by GCMS 8270

Client Sample ID: USTPP3330-SB02 (0-1)

Date Collected: 3/24/2003

Client Project ID: PP-3330

Date Received: 3/25/2003

Lab Sample ID: 66346

Date Analyzed: 3/31/2003

Lab Project ID: G128-1080

Analyzed By: MRC

Matrix: Soil

%Solids: 91.7

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Hexachlorobutadiene	0.34	BQL
Hexachlorocyclopentadiene	0.68	BQL
Hexachloroethane	0.34	BQL
Indeno(1,2,3-c,d)pyrene	0.34	BQL
Isophorone	0.34	BQL
2-Methylnaphthalene	0.34	BQL
2-Methylphenol	0.34	BQL
3- & 4-Methylphenol	0.34	BQL
N-Nitrosodi-n-propylamine	0.34	BQL
N-Nitrosodiphenylamine	0.34	BQL
Naphthalene	0.34	BQL
2-Nitroaniline	0.34	BQL
3-Nitroaniline	1.7	BQL
4-Nitroaniline	1.7	BQL
Nitrobenzene	0.34	BQL
2-Nitrophenol	0.34	BQL
4-Nitrophenol	1.7	BQL
Pentachlorophenol	1.7	BQL
Phenanthrene	0.34	BQL
Phenol	0.34	BQL
Pyrene	0.34	BQL
1,2,4-Trichlorobenzene	0.34	BQL
2,4,5-Trichlorophenol	0.34	BQL
2,4,6-Trichlorophenol	0.34	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	9.8	98
2-Fluorophenol	10	8.0	80
Nitrobenzene-d5	10	9.4	94
Phenol-d6	10	8.4	84
2,4,6-Tribromophenol	10	9.4	94
4-Terphenyl-d14	10	10.5	105

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: USTPP3330-SB02 (0-1)

Client Project ID: PP-3330

Lab Sample ID: 66346

Lab Project ID: G128-1080

Matrix: Soil

% SOLIDS: 91.7

Date Collected: 3/24/2003

Date Received: 3/25/2003

Date Analyzed: 3/31/2003

Analyzed By: MRC

Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (mg/KG)
1	Unknown	15.95			0.19
2	Unknown	17.61			0.18
3					
4					
5					
6					
7					
8					
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

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles

by GCMS 8270

Client Sample ID: USTPP3330-SB03 (0-1)

Client Project ID: PP-3330

Lab Sample ID: 66347

Lab Project ID: G128-1080

Matrix: Soil

%Solids: 87.2

Date Collected: 3/24/2003

Date Received: 3/25/2003

Date Analyzed: 3/31/2003

Analyzed By: MRC

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acenaphthene	0.36	BQL
Acenaphthylene	0.36	BQL
Anthracene	0.36	BQL
Benzo[a]anthracene	0.36	BQL
Benzo[a]pyrene	0.36	BQL
Benzo[b]fluoranthene	0.36	BQL
Benzo[g,h,i]perylene	0.36	BQL
Benzo[k]fluoranthene	0.36	BQL
Benzoic Acid	0.72	BQL
Bis(2-chloroethoxy)methane	0.36	BQL
Bis(2-chloroethyl)ether	0.36	BQL
Bis(2-chloroisopropyl)ether	0.36	BQL
Bis(2-ethylhexyl)phthalate	0.36	BQL
4-bromophenyl phenyl ether	0.36	BQL
Butylbenzylphthalate	0.36	BQL
4-Chloroaniline	1.8	BQL
4-Chloro-3-methylphenol	0.36	BQL
2-Chloronaphthalene	0.36	BQL
2-Chlorophenol	0.36	BQL
4-Chlorophenyl phenyl ether	0.36	BQL
Chrysene	0.36	BQL
Di-n-Butylphthalate	0.36	BQL
Di-n-octylphthalate	0.36	BQL
Dibenzo[a,h]anthracene	0.36	BQL
Dibenzofuran	0.36	BQL
1,2-Dichlorobenzene	0.36	BQL
1,3-Dichlorobenzene	0.36	BQL
1,4-Dichlorobenzene	0.36	BQL
3,3'-Dichlorobenzidine	0.72	BQL
2,4-Dichlorophenol	0.36	BQL
Diethylphthalate	0.36	BQL
2,4-Dimethylphenol	0.36	BQL
Dimethylphthalate	0.36	BQL
4,6-Dinitro-2-methylphenol	1.8	BQL
2,4-Dinitrophenol	1.8	BQL
2,4-Dinitrotoluene	0.36	BQL
2,6-Dinitrotoluene	0.36	BQL
Fluoranthene	0.36	BQL
Fluorene	0.36	BQL
Hexachlorobenzene	0.36	BQL

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles

by GCMS 8270

Client Sample ID: USTPP3330-SB03 (0-1)

Date Collected: 3/24/2003

Client Project ID: PP-3330

Date Received: 3/25/2003

Lab Sample ID: 66347

Date Analyzed: 3/31/2003

Lab Project ID: G128-1080

Analyzed By: MRC

Matrix: Soil

%Solids: 87.2

Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Hexachlorobutadiene	0.36	BQL
Hexachlorocyclopentadiene	0.72	BQL
Hexachloroethane	0.36	BQL
Indeno(1,2,3-c,d)pyrene	0.36	BQL
Isophorone	0.36	BQL
2-Methylnaphthalene	0.36	BQL
2-Methylphenol	0.36	BQL
3- & 4-Methylphenol	0.36	BQL
N-Nitrosodi-n-propylamine	0.36	BQL
N-Nitrosodiphenylamine	0.36	BQL
Naphthalene	0.36	BQL
2-Nitroaniline	0.36	BQL
3-Nitroaniline	1.8	BQL
4-Nitroaniline	1.8	BQL
Nitrobenzene	0.36	BQL
2-Nitrophenol	0.36	BQL
4-Nitrophenol	1.8	BQL
Pentachlorophenol	1.8	BQL
Phenanthrene	0.36	BQL
Phenol	0.36	BQL
Pyrene	0.36	BQL
1,2,4-Trichlorobenzene	0.36	BQL
2,4,5-Trichlorophenol	0.36	BQL
2,4,6-Trichlorophenol	0.36	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	9.7	97
2-Fluorophenol	10	8.5	85
Nitrobenzene-d5	10	9.6	96
Phenol-d6	10	8.8	88
2,4,6-Tribromophenol	10	10.9	109
4-Terphenyl-d14	10	10.5	105

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: USTPP3330-SB03 (0-1)
Client Project ID: PP-3330
Lab Sample ID: 66347
Lab Project ID: G128-1080
Matrix: Soil
% SOLIDS: 87.2

Date Collected: 3/24/2003
Date Received: 3/25/2003
Date Analyzed: 3/31/2003
Analyzed By: MRC
Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (mg/KG)
1	Unknown	17.61			0.56
2	Unknown	16.11			0.29
3					
4					
5					
6					
7					
8					
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

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles

by GCMS 8270

Client Sample ID: USTPP3330-SB04 (0-1)

Client Project ID: PP-3330

Lab Sample ID: 66348

Lab Project ID: G128-1080

Matrix: Soil

%Solids: 81.4

Date Collected: 3/24/2003

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

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Semivolatiles

by GCMS 8270

Client Sample ID: USTPP3330-SB04 (0-1)

Date Collected: 3/24/2003

Client Project ID: PP-3330

Date Received: 3/25/2003

Lab Sample ID: 66348

Date Analyzed: 3/31/2003

Lab Project ID: G128-1080

Analyzed By: MRC

Matrix: Soil

%Solids: 81.4

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	10.0	100
2-Fluorophenol	10	9.0	90
Nitrobenzene-d5	10	9.6	96
Phenol-d6	10	9.2	92
2,4,6-Tribromophenol	10	11.4	114
4-Terphenyl-d14	10	10.7	107

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: M/L

PARADIGM ANALYTICAL LABORATORIES, INC.

**Results of Library Search for Semivolatile Compounds
by GCMS**

Client Sample ID: USTPP3330-SB04 (0-1)
 Client Project ID: PP-3330
 Lab Sample ID: 66348
 Lab Project ID: G128-1080
 Matrix: Soil
 % SOLIDS: 81.4

Date Collected: 3/24/2003
 Date Received: 3/25/2003
 Date Analyzed: 3/31/2003
 Analyzed By: MRC
 Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (mg/KG)
1	Unknown	8.19			0.22
2					
3					
4					
5					
6					
7					
8					
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-3330

Sample Information and Analytical Results	
Sample Identification	USTPP3330-SB02 (0-1)
Sample Matrix	Soil
Date Collected	03/24/03
Date Received	03/25/03
Date Extracted	03/27/03
Date Analyzed	03/28/03
Dry Weight	91.7
Dilution Factor	1
C ₉ -C ₁₈ Aliphatics*	< 10 (mg/Kg)
C ₁₉ -C ₃₆ Aliphatics*	< 10 (mg/Kg)
C ₁₁ -C ₂₂ Aromatics*	< 10 (mg/Kg)
Aliphatic Surrogate % Recovery	87
Aromatic Surrogate % Recovery	86

Comments:

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

Lab info: G128-1080-66346

Reviewed By: mlc

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: PP-3330

Sample Information and Analytical Results	
Sample Identification	USTPP3330-SB03 (0-1)
Sample Matrix	Soil
Date Collected	03/24/03
Date Received	03/25/03
Date Extracted	03/27/03
Date Analyzed	03/28/03
Dry Weight	87.2
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	85
Aromatic Surrogate % Recovery	85

Comments:

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

Lab info: G128-1080-66347

Reviewed By: m/c

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & AssociatesProject Name: PP-3330

Sample Information and Analytical Results	
Sample Identification	USTPP3330-SB04 (0-1)
Sample Matrix	Soil
Date Collected	03/24/03
Date Received	03/25/03
Date Extracted	03/27/03
Date Analyzed	03/28/03
Dry Weight	81.4
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	89

Comments:

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

Lab info: G128-1080-66348

Reviewed By: mmc

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		ML		RL	
	(mg/Kg)	(µg/L)	(mg/Kg)	(µg/L)	(mg/Kg)	(µg/L)
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		%RSD or CCC	Method of Quantitation
	(µg/L)	(mg/Kg)		
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		RPD
	(µg/mL)	(mg/Kg)	
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.

2627 Northchase Parkway SE, Wilmington, NC 28405

Phone: (910)-350-1903 FAX: (910)-350-1557

Chain-of Custody Record & Analytical Request

COC# 19463

Page 1 of 1

Client: CATLIN Project ID: PP-3330 Date: 3/25/03 Report To: MIKE E. MASEN
 Address: 220 OLD DAIRY ROAD Contact: MIKE E. MASEN Turnaround: STANDARD
 Address: WILMINGTON, NC 28405 Phone: 452-58361 Job Number: 203-010-03
 Quote #: DOD 101 Fax: 462-7563 P.O. Number: 23022A-8 Invoice To: SHIELA C. CATLIN

Sample ID	Date	Time	Matrix	Preservatives			Analyses			Temperature	State Certification Requested
				ICE	Mt/Kanal	Sodium Bisulfite	B260 + 1RE + MTBE	VPH	B270 + 10 Ks		
USTPP3330-- SB02 (0-1)	3/24/03	1445	Soil	+	+	+	+	+	+		
USTPP3330-- SB03 (0-1)	3/24/03	1500	Soil	+	+	+	+	+	+		
USTPP3330-- SB04 (0-1)	3/24/03	1515	Soil	+	+	+	+	+	+		
USTPP3330-- SB04 D (0-1)	3/24/03	1515	Soil	+	+	+	+	+	+		
Comments: Please specify any special reporting requirements											
* SUMMARY EDD FORMAT											
G128-1080											

Relinquished By: Shelia Lewis Date: 3/25/03 Time: 0940
 Received By: Julie Baker Date: 3/26/03 Time: 0940
 Temperature: ON ICE
 State Certification Requested: NC SC Other

SEE REVERSE FOR
TERMS AND CONDITIONS

APPENDIX F
UST CLOSURE SAMPLING RESULTS

