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CATLIN
ENGINEERS and SCIENTISTS

Post Office Box 10279
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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: Additional Soil Sampling
Incident Name: **Building PP-3354**
Incident Number: **24015**
Marine Corps Base
Camp Lejeune, North Carolina

**Navy Contract No. N62470-01-D-3009**
**Delivery Order No. 0065**
**CATLIN Project No. 203-026**

Dear Mr. Conway:

As reported by J.A. Jones Environmental Services Company (J.A. Jones) in the *Underground Storage Tank Closure Report Marine Corps Base Building CC-3354, MCB, Camp Lejeune, NC,* dated January 24, 2002, compounds were identified above Residential MSCCs in soil samples CC3354-1 and CC3354-2 collected during underground storage tank (UST) removal activities. The samples were collected from the eastern (CC3354-1) and northern (CC3354-2) sidewalls of the UST basin from a reported depth of four feet below land surface (BLS). Concentrations of $C_9$-$C_{22}$ Aromatics were identified through laboratory analysis at a concentration of 770 mg/kg in sample CC3354-1 and 543 mg/kg in sample CC3354-2. The current Residential MSCC for $C_9$-$C_{22}$ Aromatics is 469 mg/kg. A copy of the Soil Sample Analytical Results Table as presented in the UST Closure report is attached. A copy of the site map submitted by J.A. Jones with the UST Closure Report illustrating the sample locations has been attached.

As detailed in the document *Leaking Underground Storage Tank (LUST) Phase I Limited Site Assessment Report for UST PP-3354 Marine Corps Base, Camp Lejeune, North Carolina* dated November 29, 2002, CATLIN personnel collected one groundwater sample from within the former UST basin and collected one soil sample from beneath the former distribution line in July 2002. Laboratory analysis of these samples revealed no concentrations of target compounds above accepted State Residential standards. Depth to groundwater at the time of the investigation (July

2002) was reported to be less than five feet BLS. Moist to wet soils were encountered at a depth of three feet BLS. This site has been classified as Low Risk and Residential land use.

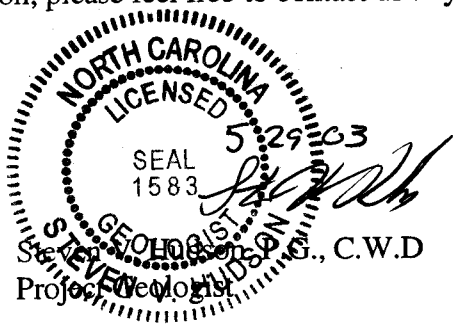
A Notice of Regulatory Requirements dated January 10, 2003 was subsequently issued by NCDENR requesting a Soil Assessment Report (SAR). Due to the limited magnitude of the impact identified during the UST removal activities, NCDENR and MCB Camp Lejeune personnel agreed to a limited scope of work consisting of the collection of two soil samples at the former sample locations CC3354-1 and CC3354-2. CATLIN personnel advanced two soil borings, USTPP3354-SB02 and USTPP3354-SB03, in the vicinity of the previous samples CC3354-1 and CC3354-2 in order to establish compliance with current Residential MSCCs. The soil borings were advanced utilizing hand augering techniques to a depth of three feet BLS on April 15, 2003. Saturated soils were encountered during advancement of the soil boring at a depth of approximately two and one half feet BLS. A representative soil sample was collected from a depth interval of two to two and one half feet BLS and submitted for laboratory analysis per MADEP EPH/VPH. Review of the laboratory analytical results for the submitted samples revealed no compounds above current Residential MSCCs. Laboratory reports and summaries of the laboratory results are attached. Additionally, due to the relatively high groundwater levels observed in July 2002 and April 2003, samples collected below a depth of approximately three feet BLS do not appear to be representative of true vadose soil conditions. Therefore, CATLIN recommends that the site be considered for No Further Action.

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 Environmental and Natural Resources.

Should you have any questions or need additional information, please feel free to contact us at your convenience.

Sincerely,

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




Steven V. Hudson, P.G., C.W.D
Project Geologist

Attachments

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

203-026_final soil ltr

**TABLE 1 SUMMARY OF SOIL LABORATORY RESULTS**

Date: April 2003 Incident Number and Name: 24015 - PP-3354 Facility ID#: N/A

**Analytical Method: MADEP EPH/VPH**

| Sample ID | Contaminant of Concern → | | C5-C8 Aliphatics | C9-C12 Aliphatics | C9-C10 Aromatics | C9-C18 Aliphatics | C19-C36 Aliphatics | C11-C22 Aromatics |
|---|---|---|---|---|---|---|---|---|
| | Date Collected | Sample Depth (ft. BGS) | | | | | | |
| USTPP3354-SB02 | 4/15/03 | 2.0 - 2.5 | <10 | <10 | <10 | 150 | 71 | 58 |
| USTPP3354-SB03 | 4/15/03 | 2.0 - 2.5 | <10 | <10 | <10 | 46 | 17 | 17 |

All results in mg/kg.

ft. BGS = feet below ground surface

**TABLE 2 SUMMARY OF SOIL LABORATORY RESULTS**
Date: April 2003 Incident Number and Name: 24015 - PP-3354 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)<br>Industrial/Commercial MSCC (mg/kg)<br>Soil to Groundwater MSCC (mg/kg) | | | 939<br>24,528<br>72 | 9,386<br>245,280<br>3,255 | 93,860<br>#<br>## | 469<br>12,264<br>34 |
| USTPP3354-SB02 | 4/15/03 | 2.0 - 2.5 | <10 | <160 | 71 | <68 |
| USTPP3354-SB03 | 4/15/03 | 2.0 - 2.5 | <10 | <56 | 17 | <27 |

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

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PARADIGM ANALYTICAL LABORATORIES, INC.
5500 Business Drive
Wilmington, North Carolina 28405
(910) 350-1903
Fax (910) 350-1557

April 28, 2003

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

Report Number: G128-1101

Client Project ID: PP-3354

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.

for Laboratory Director
J. Patrick Weaver

# VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3354

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | USTPP3354-SB02 |
| Sample Matrix | Soil |
| Collection Option (for Soil)* | 3 |
| Date Collected | 04/15/03 |
| Date Received | 04/15/03 |
| Date Extracted | 04/15/03 |
| Date Analyzed | 04/18/03 |
| Dry Weight | 80 |
| 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 | 90 |
| Surrogate % Recovery - FID | 120 |

* = Option 1 = Established fill line on vial, Option 2 = Sampling Device/Brand, or Option 3 = Field weight of soil.

** = Excludes any surrogates or internal standards.

Lab Info: G128-1101-69148

Reviewed By:

# VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: PP-3354

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | USTPP3354-SB03 |
| Sample Matrix | Soil |
| Collection Option (for Soil)* | 3 |
| Date Collected | 04/15/03 |
| Date Received | 04/15/03 |
| Date Extracted | 04/15/03 |
| Date Analyzed | 04/18/03 |
| Dry Weight | 83 |
| 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 | 87 |
| 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: G128-1101-69149

Reviewed By: 

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 | 10 | 10 |

### Calibration Concentration Levels

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

Calibration Check Date: 04/18/03

### Calibration Check

| Range | Levels (µg/L) | Levels (mg/Kg) | RPD |
|---|---|---|---|
| $C_5$-$C_8$ Aliphatics | 200 | 20 | -3.9 |
| $C_9$-$C_{12}$ Aliphatics | 150 | 15 | 1.5 |
| $C_9$-$C_{10}$ Aromatics | 325 | 32.5 | -3.6 |

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

Reviewed By: [signature]

# EPH (Aliphatics/Aromatics) Results

*by MDEP-EPH*

Client Name: Richard Catlin & Associates

Project Name: PP-3354

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | USTPP3354-SB02 |
| Sample Matrix | Soil |
| Date Collected | 04/15/03 |
| Date Received | 04/15/03 |
| Date Extracted | 04/22/03 |
| Date Analyzed | 04/23/03 |
| Dry Weight | 80 |
| Dilution Factor | 1 |
| $C_9$-$C_{18}$ Aliphatics* | 150 (mg/Kg) |
| $C_{19}$-$C_{36}$ Aliphatics* | 71 (mg/Kg) |
| $C_{11}$-$C_{22}$ Aromatics* | 58 (mg/Kg) |
| Aliphatic Surrogate % Recovery | 61 |
| Aromatic Surrogate % Recovery | 48 |
| Fractionation Surrogate 1 % Recovery | 98 |

**Comments:**

* = Excludes any surrogates or internal standards.

Lab info: G128-1101-69148

Reviewed By:

# EPH (Aliphatics/Aromatics) Results

*by MDEP-EPH*

Client Name: Richard Catlin & Associates

Project Name: PP-3354

| Sample Information and Analytical Results | |
|---|---|
| Sample Identification | USTPP3354-SB03 |
| Sample Matrix | Soil |
| Date Collected | 04/15/03 |
| Date Received | 04/15/03 |
| Date Extracted | 04/16/03 |
| Date Analyzed | 04/18/03 |
| Dry Weight | 82.7 |
| Dilution Factor | 1 |
| $C_9$-$C_{18}$ Aliphatics* | 46 (mg/Kg) |
| $C_{19}$-$C_{36}$ Aliphatics* | 17 (mg/Kg) |
| $C_{11}$-$C_{22}$ Aromatics* | 17 (mg/Kg) |
| Aliphatic Surrogate % Recovery | 61 |
| Aromatic Surrogate % Recovery | 68 |
| Fractionation Surrogate 1 % Recovery | 130 |

**Comments:**

* = Excludes any surrogates or internal standards.

Lab info: G128-1101-69149

Reviewed By:

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 3

# EPH Laboratory Reporting Form

## Calibration and QA/QC Information

Initial Calibration Date: 03/19/03

### Calibration Ranges and Limits

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

### Calibration Concentration Levels

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

Calibration Check Date: 04/18/03

### Calibration Check

| Range | Levels (µg/mL) | Levels (mg/Kg) | RPD |
|---|---|---|---|
| $C_9$-$C_{18}$ Aliphatics | 0.6 | 10 | -6.5 |
| $C_{19}$-$C_{36}$ Aliphatics | 0.8 | 13.3 | -3.9 |
| $C_{11}$-$C_{22}$ Aromatics | 1.7 | 28.3 | -5.1 |

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

Attachment 3

# EPH Laboratory Reporting Form

## Calibration and QA/QC Information

Initial Calibration Date: 03/19/03

### Calibration Ranges and Limits

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

### Calibration Concentration Levels

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

Calibration Check Date: 04/23/03

### Calibration Check

| Range | Levels (µg/mL) | Levels (mg/Kg) | RPD |
|---|---|---|---|
| $C_9$-$C_{18}$ Aliphatics | 0.6 | 10 | -2.7 |
| $C_{19}$-$C_{36}$ Aliphatics | 0.8 | 13.3 | -1.2 |
| $C_{11}$-$C_{22}$ Aromatics | 1.7 | 28.3 | -7.7 |

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

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

Chain-of Custody Record & Analytical Request

COC# 31312

Page 1 of 1

lient: Catlin Engr. & Sci. Project ID: PP-3354 Date: 4-15-03 Report To: Mike E. Mason
ddress: 220 Old Dairy Rd. Contact: Mike E. Mason Turnaround: Standard (OVR)
ddress: Wilmington NC 28405 Phone: 452-5861 Job Number: ~~202-048~~ 203-026
uote #: DOD101 Fax: 452-7563 P.O. Number: 230418-8 Invoice To: Sheila

| Sample ID | Date | Time | Matrix | Preservatives: MeOH | | | | Analyses: VPH | EPH | | | | | | | | Comments: Please specify any special reporting requirements |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | G128-1101 |
| MSTPP3354-SB02 | 4/15/03 | 1170 | S | ✓ | | | | ✓ | ✓ | | | | | | | | - Camp Lejeune EDD Format |
| MSTPP3354-SB03 | 4/15/03 | 1115 | S | ✓ | | | | ✓ | ✓ | | | | | | | | - Summary EDD Format |
| | | | | | | | | | | | | | | | | | |
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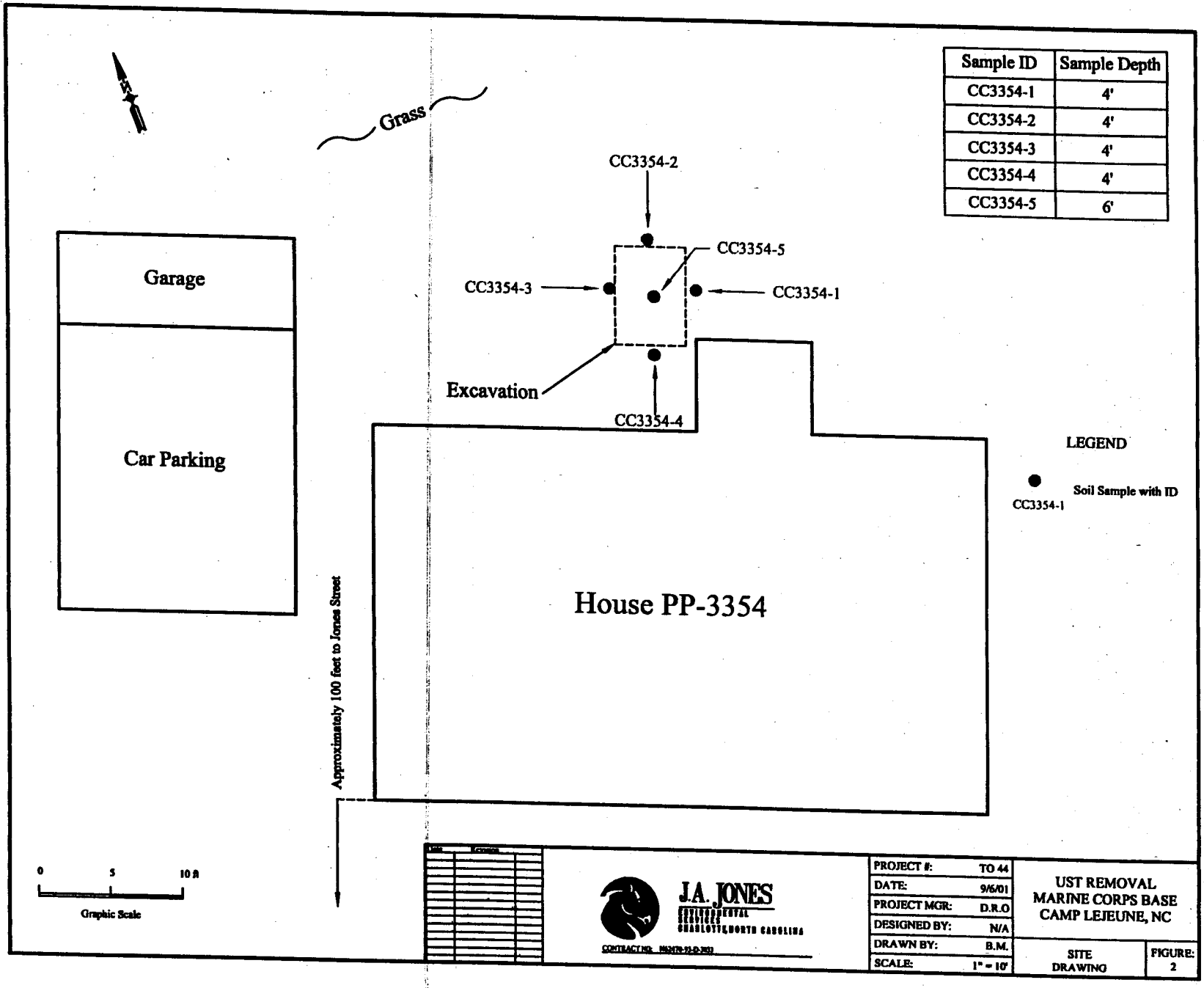
| Relinquished By | Date | Time | Received By | Date | Time | Temperature | State Certification Requested |
|---|---|---|---|---|---|---|---|
| [signature] | 4/15/03 | 1400 | [signature] | 4/15/03 | 1400 | ambient 24°C cooler | NC ____ SC ____ Other ____ |

SEE REVERSE FOR TERMS AND CONDITIONS




| Sample ID | Sample Depth |
|---|---|
| CC3354-1 | 4' |
| CC3354-2 | 4' |
| CC3354-3 | 4' |
| CC3354-4 | 4' |
| CC3354-5 | 6' |

# SOIL SAMPLES ANALYTICAL RESULTS

| SAMPLE ID | DATE | SAMPLE DEPTH | COMPOUND CONCENTRATION (in ppm) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C9-C22 Aromatics | C5-C8 Aliphatics | C9-C18 Aliphatics | C19-C36 Aliphatics | Fluorene | N-Butylbenzene | Sec-Butylbenzene | Ethylbenzene | Isopropylbenzene | 4-Isopropyltoluene | Naphthalene | N-Propylbenzene | 1,2,4-Trimethylbenzene | 1,3,5-Trimethylbenzene | 1-Methylnaphthalene | 2-Methylnaphthalene | Phenanthrene | Acenaphthene | Dibenzofuran | Toluene | Benzoic Acid | Total Xylenes |
| CC-3354-1 | 11/6/01 | 4' | **770** | 110 | 1330 | 22 | 2.5 | | 2.4 | 1.7 | 1.1 | 1.9 | 7.3 | 2.3 | 17 | 5.5 | 16 | 26 | 3.5 | 0.95 | | | | 6.9 |
| CC-3354-2 | 11/6/01 | 4' | **543** | 59 | 850 | 25 | | | 0.28 | | | | 4.3 | | 0.47 | 0.31 | 1.7 | 2 | 0.9 | | | | | |
| CC-3354-3 | 11/6/01 | 4' | 141 | 73 | 828 | 17 | 0.79 | 2.4 | 2.1 | 1.1 | 0.8 | 0.62 | 10 | 1.8 | | | 5.1 | 9.1 | 1.4 | | 0.42 | | | |
| CC-3354-4 | 11/6/01 | 4' | 38 | 12 | 232 | | | | | | | 0.27 | | | | | | | | | | 2.2 | 2.2 | |
| CC-3354-5 | 11/6/01 | 6' | 64 | | 108 | 19 | 3.7 | 0.068 | | 0.085 | | | 14 | | 0.3 | | 25 | 49 | 7 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| Residential Soil Cleanup Level | -- | | 469 | 939 | 9386 | 93860 | 620 | 156 | 156 | 1560 | 1564 | n/e | 63 | 156 | 782 | 782 | n/e | 63 | 469 | 940 | 62 | 3200 | 62571 | 32000 |
| Soil-to-Water Maximum Soil Contaminant Concentration | -- | | 34 | 72 | 3255 | | 44 | 4 | 3 | 0.24 | 2 | n/e | 0.58 | 2 | 8 | 7 | n/e | 3 | 60 | 8 | 4.7 | 7 | 112 | 5 |

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