

SOIL CLEANUP REPORT WITH SITE CLOSURE REQUEST

PARADISE POINT

NCDENR Incident Numbers: 24009, 24010, 24011, 24014

Marine Corps Base
Camp Lejeune, North Carolina

March 1, 2006

Prepared for:



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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
2L GWQS	Underground Storage Tank Section (Effective July 1, 2001)
AS	NCAC T15A:02L Groundwater Quality Standards
AST	Air Sparge
BDL	Aboveground Storage Tank
BN	Below Detection Limit
BNA	Base/Neutral (extractables)
BQL	Base/Neutral/Acid (extractables)
BLS	Below Quantitation Limit
BTEX	Below Land Surface
CAP	Benzene, Toluene, Ethylbenzene, Xylenes
CFR	Corrective Action Plan
Cr	Code of Federal Regulations
CSA	Chromium
DIPE	Comprehensive Site Assessment
DO	Di-isopropyl Ether
DOD	Dissolved Oxygen
DPT	Department of Defense
DWQ	Direct Push Technology
DWM	Division of Water Quality
DTW	Division of Waste Management
EDB	Depth to Water
EMD	Ethylene di-bromide
EPA	Environmental Management Division
EPH	Environmental Protection Agency
EQB	Extractable Petroleum Hydrocarbons
Fe	Environmental Quality Branch
FID	Iron
FT	Flame Ionization Detector
GCL	Feet
GIS	Gross Contaminant Level
GPS	Geographic Information System
Guidelines Vol. II	Global Positioning System
	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
LSA	Limited Site Assessment
LUST	Leaking Underground Storage Tank
m	Meter
MADEP	Massachusetts Department of Environmental Protection
MCAS	Marine Corps Air Station

MCB	Marine Corps Base
MDL	Method Detection Limit
mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MSCC	Maximum Soil Contaminant Concentration
MSL	Mean Sea Level
MTBE	Methyl tertiary butyl ether
µg/Kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
NA	Not Analyzed
N/A	Not Applicable
NAVFAC	Naval Facilities Engineering Command Atlantic
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NE	None Established
NM	Not Measured
NMT	No Measurable Thickness
NS	Not Sampled
OVA	Organic Vapor Analyzer
PAH	Polynuclear Aromatic Hydrocarbons
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
SOW	Scope of Work
STGW	Soil-to-Groundwater
SVE	Soil Vapor Extraction
SVOC	Semi Volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
US	United States
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons
WiRO	NCDENR Wilmington Regional Office

EXECUTIVE SUMMARY

The Paradise Point project sites are located in the Paradise Point housing area of Marine Corps Base Camp Lejeune, North Carolina. The specific sites are located at PP-3326, PP-3330, PP-3332, and PP-3350. These are single family residences, which used heating oil to assist in the heating of the home. The heating oil was stored in 285 gallon underground storage tanks located adjacent to the dwellings.

The tanks were removed in September and October of 2001 by J.A. Jones Environmental Services Company (J.A. Jones). J.A. Jones conducted confirmation soil sampling, which showed each tank basin had been impacted with petroleum hydrocarbons. NCDENR required Marine Corps Base, Camp Lejeune to perform a Phase I Limited Site Assessment (LSA) of the sites in a Notice of Regulatory Requirement letter dated February 22, 2002. Subsequently, CATLIN Engineers and Scientists (CATLIN) performed the assessments and detailed findings in reports dated September 5, 2002 (PP-3350) and November 29, 2002 (PP-3326, PP-3330, PP-3332). During the assessments, CATLIN personnel installed a source area monitoring well in each of the basins and collected both soil and groundwater samples for analysis. They also completed a receptor survey, which allowed them to demonstrate that the sites meet criteria for low risk classification. NCDENR assigned a residential land use to the site.

During the Phase I LSA, soil samples were taken only along the former supply lines. J.A. Jones conducted the required basin sampling during tank removal. While contaminants were detected in the basin above residential MSCCs, there were no detections above the residential standards along the former supply lines. Groundwater contamination was also detected in the source area wells above 2L groundwater quality standards, but below the applicable gross contaminant levels.

Later, CATLIN performed Soil Assessments in 2003 to determine the horizontal boundaries of impacted soils. Three soil samples were taken outside of the former tank basins. Results confirmed the soil contamination was limited to the former tank basins, and CATLIN recommended MCB Camp Lejeune conduct a soil removal action to remedy the contamination source.

Shaw Environmental and Infrastructure Inc. (Shaw) excavated the recommended soils in April and May 2004. They removed approximately 98 cubic yards total soil from the four sites. All of the soil contamination, however, was not removed. MADEP constituents were present in the confirmation soil samples at concentrations which exceeded the applicable residential MSCCs. As a result, ten (10) locations were in need of additional soil remediation.

MCB Camp Lejeune resampled the ten (10) offending locations in December 2005 in order to determine where additional excavation was required, if needed. Osage of Virginia Inc personnel conducted soil sampling of the locations and sent the samples to Paradigm Analytical Laboratories in Wilmington, North Carolina (NC Certification Number 481) for analysis via the MADEP methods. Only one sample (004) at PP-3326 exhibited MADEP concentrations above the residential MSCCs. The other nine (9) samples did not contain contamination above the residential standards. Of the nine (9), only samples PP3326-001 and PP3332-005 contained MADEP constituents at concentrations above the STGW MSCC, but below the residential MSCC.

Based on the December 2005 soil data, Sovereign conducted additional soil excavation at the PP-3326 site. Since soil data showed soil contamination had attenuated to below the applicable residential MSCCs, it was decided that Sovereign would not conduct additional soil removal at the other three sites.

Removal efforts took place on February 10, 2006 and concentrated around the location of sample PP3326-004. Approximately 9.37 tons of soil was removed from the subsurface. The new excavation extended 7 feet out from the Shaw excavation. It was approximately 5 feet deep, and groundwater was encountered. Once removal activities were complete, a confirmation soil sample was obtained from the sidewall and sent to the lab for analysis via EPA Methods 8260, 8270, MADEP VPH, and MADEP EPH. Laboratory analysis confirmed the absence of contamination in the sample obtained from the excavated sidewall. Only acetone was detected at a concentration of 10.3 µg/kg, which is well below both the STGW and residential MSCCs of 2,800 µg/kg and 1,564,000 µg/kg, respectively.

MCB Camp Lejeune also tasked Sovereign to sample the groundwater at the PP-3326 site since groundwater was encountered during both the Shaw and Sovereign excavation activities. A temporary well was installed and subsequently abandoned in the former tank basin on February 14, 2006 and February 20, 2006, respectively. Sovereign sent the groundwater samples under chain of custody for analysis to Paradigm, who tested the groundwater sample for volatiles via EPA method 602, semivolatiles using EPA method 625, and volatile and extractable petroleum hydrocarbons with the MADEP methods. Laboratory data showed contamination in the groundwater sample from PP-3326. Volatiles and semivolatiles were detected, however, only naphthalene was detected above its 2L standard (21 µg/L) at a concentration of 125 µg/L. The ten (10) largest peaks were also identified, and two compounds were quantitated. 1-methylnaphthalene and 2-methylnaphthalene had results of 112 µg/L and 145 µg/L, respectively. The NCGWQS for 2-methylnaphthalene is 14 µg/L. There is no standard listed for 1-methylnaphthalene. MADEP constituents were also detected, but only the C₉-C₂₂ Aromatic concentration (1,350 µg/L) exceeded the 2L standard of 210 µg/L. Groundwater conditions were not re-evaluated at PP-3330, PP-3332, or PP-3350. The most recent groundwater data was taken during the Phase I LSAs, which showed MADEP constituents above the NCGWQSs.

Based on the findings of this investigation and previous reports, soils at PP-3326, PP-3330, PP-3332, and PP-3350 do not contain contaminants above residential MSCCs. Soils at PP-3326 and PP-3332 contained MADEP constituents that were above the STGW MSCCs, but below the residential MSCCs. PP-3330 and PP-3350 contaminant concentrations were below STGW MSCCs. Since this site has been classified as low risk by NCDENR and soil contamination has been remediated to the residential MSCC, no further soil remediation is necessary per the requirements of 15A NCAC 2L .0408.

Groundwater, however, at the four sites remains impacted. Recent monitoring at PP-3326 showed contamination persists above the 2L groundwater quality standards. Past data for PP-3330, PP-3332, and PP-3350 also indicates 2L exceedences. All detections, however, are below applicable GCLs. As such, these sites qualify for No Further Action with Land Use Restrictions.

TITLE PAGE

DATE OF REPORT: March 1, 2006

Facility I.D.: N/A

UST Incident Number: 24009, 24010, 24011, 24014

Site Name: Paradise Point

Site Location: Marine Corps Base Camp Lejeune, North Carolina

Nearest City/Town: Camp Lejeune

County: Onslow

Risk Classification: Low Risk

Land Use Classification: Residential

UST Owner: Commanding General – MCB Camp Lejeune

I&E/EMD/EQB

PSC Box 20004

Address: MCB Camp Lejeune, NC 28542-0004

Phone: (910) 451-5068

UST Operator: Same as above

Address: Same as above

Phone: Same as above

Property Owner: Same as above

Address: Same as above

Phone: Same as above

Property Occupant: Same as above

Address: MCB Camp Lejeune, NC

Phone: None

Consultant/Contractor: Sovereign Consulting Inc.

Address: 606 A-1 Thimble Shoals Blvd.

Newport News, VA 23606

Phone: (757) 594-0980

Release Information

Date Discovered: October 2001

Latitude:

PP-3326 34.6839 N

PP-3330 34.6838 N

PP-3332 34.6841 N

PP-3350 34.6850 N

Longitude:

77.3665 W

77.3672 W

77.3675 W

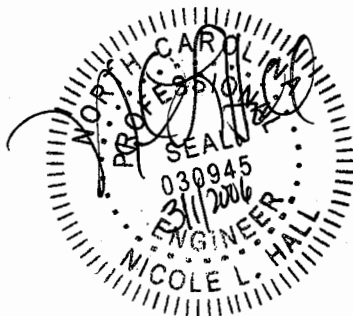
77.3669 W

Estimated Quantity of Release: Unknown

Cause of Release: Unknown

Source of Release (Piping/UST): UST and piping

Sizes and contents of UST system(s) from which the release occurred: The former systems were non-regulated, non-commercial 285 gallon fuel oil USTs which heated single-family residences.



I, Nicole L. Hall a Professional Engineer for Sovereign Consulting Inc., do certify that the information contained in this report is correct and accurate to the best of my knowledge.

2.0 INTRODUCTION

This report summarizes field activities during a recent soil removal action and the associated soil and groundwater sampling, which was conducted at PP-3326, PP-3330, PP-3332, and PP-3350. These four sites are single family homes in the Paradise Point area aboard MCB Camp Lejeune. An evaluation for site closure was also performed for each site in accordance with the 2001 NCDENR DWM UST Guidelines.

The project's scope of work entailed preliminary soil sampling at all four sites. Subsequent removal of contaminated soil was performed at PP-3326 along with the procurement of confirmation soil and groundwater sampling. Samples were sent to the laboratory for analysis, and results of the sampling activities are presented in this report.

3.0 SITE HISTORY

Buildings PP-3326, PP-3330, PP-3332, and PP-3350 are located within the Paradise Point area of Marine Corps Base Camp Lejeune, North Carolina. Each is a single family residence and used heating oil to assist in the heating of the home. The heating oil was stored in 285 gallon underground storage tanks located adjacent to the dwellings. In each case, the tanks were within several feet of the home's foundation.

The tanks were removed in September and October of 2001 by J.A. Jones Environmental Services Company (J.A. Jones). J.A. Jones conducted confirmation soil sampling, which showed each tank basin had been impacted. Details and results of the tank removal activities were previously reported to NCDENR in the following reports:

PP-3326	Underground Storage Tank Closure Report, Building CC-3326, Camp Lejeune, North Carolina, January 22, 2002.
PP-3330	Underground Storage Tank Closure Report, Building CC-3330, MCB Camp Lejeune, North Carolina, January 23, 2002.
PP-3332	Underground Storage Tank Closure Report, Building CC-3332, MCB Camp Lejeune, North Carolina, January 23, 2002.
PP-3350	Underground Storage Tank Closure Report, Building CC-3350, MCB Camp Lejeune, North Carolina, January 24, 2002.

Since subsurface impacts were confirmed, NCDENR required MCB Camp Lejeune conduct Phase I Limited Site Assessment of the sites. These assessments were completed by CATLIN Engineers and Scientists (CATLIN) and are each dated September 5, 2002 (PP-3350) and November 29, 2002 (PP-3326, PP-3330, PP-3332). Groundwater samples at the four sites contained groundwater contaminants in excess of the interim and established NCGWQSs. Levels did not, however, exceed the applicable gross contaminant levels. Soil samples taken during the LSAs did not detect contamination above the residential maximum soil contaminant concentrations. In addition, free product was not encountered at any of the sites

the immediate vicinity of the former tank basins, and they proposed that the impacted soils be removed via soil excavation.

MCB Camp Lejeune, therefore, conducted soil excavation at each site. Shaw Environmental and Infrastructure Inc. (Shaw) mobilized to the sites and performed soil excavation activities in April and May 2004. Results of the removal action were presented in a report dated November 2004. While the remedial action was successful in removing the majority of the contaminated soil, some MADEP constituents persisted at concentrations above the residential maximum soil contaminant concentrations. The following list summarizes the offending locations.

Site	Sidewall location	Shaw sample ID
PP-3326	House side	3326-NW-001
	Left side	3326-WW-004
PP-3330	House side	3330-NW-001
	Left side	3330-WW-004
PP-3332	House side	3332-NW-001
	Opposite of house	3332-WW-002
	Floor	3332-F-005
PP-3350	House side	3350-NW-001
	Opposite of house	3350-SW-002
	Floor	3350-F-005

In December 2005, MCB Camp Lejeune resampled the ten locations listed above to determine which locations required additional excavation. Osage of Virginia Inc. (Osage) personnel conducted preliminary soil sampling at the Paradise Point sites on December 14, 2005. Results from the sampling activities showed that contaminant levels attenuated to below residential MSCCs, with the exception of one sample. C9-C18 Aliphatics and C9-C22 Aromatics persisted in sample PP3326-004 at levels above the residential MSCCs.

Sovereign Consulting Inc. (Sovereign) was then tasked to re-excavate the offending location (sidewall 004) at PP-3326. The soil removal action occurred on February 10, 2006. Approximately, 9.37 tons of soil was excavated. A confirmation soil sample, as shown on Figure 6, was taken and sent to Paradigm Analytical Laboratories in Wilmington, NC (NC Certification Number 481) for analysis via EPA Methods 8260, 8270, MADEP VPH, and MADEP EPH. All compounds were below laboratory quantitation limits, with the exception of acetone at a concentration of 10.3 µg/kg. This is well below both the STGW and residential MSCCs of 2,800 µg/kg and 1,564,000 µg/kg, respectively. Since groundwater was encountered during the Shaw soil removal action, Sovereign installed a temporary well in the former tank basin to obtain a new groundwater sample. The sample was also sent to Paradigm for analysis per EPA Methods 602, 625, MADEP VPH, and MADEP EPH. Groundwater contamination was identified in the sample from well USTPP3326-TW01. This report summarizes the details associated with the December 2005 and February 2006 excavation and sampling activities.

4.0 SITE REMEDIATION

The former 285-gallon fuel oil USTs were closed by removal in September and October 2001 by J.A. Jones. Subsequently, NCDENR required Marine Corps Base, Camp Lejeune to perform a Phase I Limited Site Assessment (LSA) at each of the sites in Notice of Regulatory Requirement letters, dated February 22, 2002. This section presents the results of soil and groundwater assessments and sampling performed in response to the NCDENR notice through February 2006.

4.1 Soil

TANK REMOVALS

J.A. Jones obtained soil samples from each of the sidewalls and centers of the former UST basins during tank closure. The samples were analyzed using risk based methods, and the results showed contamination above the applicable STGW and residential MSCCs. Contaminants detected at the four sites included 1-methylnaphthalene, 2-methylnaphthalene, and C9-C22 Aromatics. Historical data and figures are in Appendix A.

PHASE I LIMITED SOIL ASSESSMENTS

Pursuant to the February 2002 NCDENR notice, CATLIN conducted soil sampling activities during the Phase I LSAs. Samples were taken along only the former fuel delivery lines since J.A. Jones previously took tank basin samples during tank removal. Laboratory analysis of the former supply line samples indicated contaminant concentration levels were either below quantitation limits or below the applicable residential MSCCs. Phase I LSA data is in Appendix A.

SOIL ASSESSMENT REPORTS

CATLIN returned to the sites to collect additional soil data for Soil Assessment Reports. These reports were finalized in May and June 2003. CATLIN collected three additional soil samples at each site in order to delineate the vertical and horizontal extent of the petroleum release at the site. Results of the soil samples enabled CATLIN to conclude that contamination was limited to the areas adjacent to the former tank basin sidewalls. They went on to recommend the following soil yardages for removal.

Site	Amount Soil to be Removed (cyds)
PP-3326	12
PP-3330	26
PP-3332	28
PP-3350	6

SHAW SOIL REMOVAL ACTION

In April and May 2004, Shaw mobilized to the sites to implement the recommendations made in the CATLIN SARs. They removed approximately 35 cubic yards of soil at PP-3326, 27 cubic yards at PP-3332, 29 cubic yards at PP-3332, and 7 cubic yards at PP-3350. While VOCs and SVOCs were detected in some of the samples, there were no concentrations above the applicable residential MSCCs. MADEP constituents, however, were present upon completion of the soil excavation. MADEP contaminants were present above residential standards at the following ten (10) samples: 3326-NW-001, 3326-WW-004, 3330-NW-001, 3330-WW-004, 3332-NW-001, 3332-WW-002, 3332-F-005, 3350-NW-001, 3350-SW-002, and 3350-F-005. The November 2004 report, which detailed removal activities, recommended MCB Camp Lejeune conduct additional soil excavation at the locations exceeding the residential MSCCs.

4.2 Groundwater

PHASE I LIMITED SITE ASSESSMENTS

Also pursuant to the NCDENR NORR, groundwater was sampled during the Phase I LSAs. CATLIN sampled and detected groundwater contamination from the source area wells at each of the sites. All four sites (PP-3326, PP-3330, PP-3332, and PP-3350) displayed C9-C22 Aromatics above the interim GWQS of 210 µg/L. In addition, the PP-3330 groundwater sample contained C9-C18 Aliphatics above the interim GWQS. Ten TICS were detected in the groundwater sample taken at the PP-3350 project site. One of the TICS was identified as 2-methylnaphthalene at a concentration of 110 µg/L, which is above the interim GWQS of 14 µg/L. Groundwater sampling data from the Phase I LSAs are located in Appendix A.

5.0 POST REMEDIATION SAMPLING

Shaw did not remove all of the subsurface contamination at the four Paradise Point project sites. In order to address the remaining contaminants, MCB Camp Lejeune resampled the locations that were identified in the Shaw report as containing contaminants above the residential MSCCs. This sampling was performed on December 14, 2005 and is summarized below. Sovereign then conducted a final soil removal action as well as confirmation soil and groundwater sampling. These activities are also described below.

OSAGE SOIL SAMPLING

Osage personnel, in partnership with Sovereign, performed preliminary soil sampling activities on December 14, 2005. Samples were obtained from the ten (10) locations that exhibited MADEP constituents summarized in the November Shaw report. All samples were collected with an Art's Manufacturing & Supply, Inc. Soil Sampling Kit. Sampling equipment was decontaminated between samples with an Alconox wash and rinsed with distilled water. All borings were also backfilled and restored to previous conditions. The soil samples were packed in pre-labeled jars, stored on ice, and shipped to Paradigm for analysis via the MADEP Methods. Tables 1.1 and 1.2 summarize the results of the sampling event. Only sample PP3326-004 exhibited MADEP concentrations above the residential MSCCs. The other nine (9) samples did not contain contamination above the residential standards. Of the nine (9), only samples PP3326-001 and PP3332-005 contained MADEP constituents at concentrations above the STGW

MSCC, but below the residential MSCC. All other detections were below STGW MSCCs. Upon review of this preliminary data, MCB Camp Lejeune concluded additional excavation was needed at only PP-3326 at sidewall 004. The December 2005 laboratory data is in Appendix B.

SOVEREIGN SOIL REMOVAL ACTION WITH SOIL AND GROUNDWATER SAMPLING

Based on the December 2005 soil data, Sovereign conducted additional soil excavation at the PP-3326 site. Since soil data showed soil contamination had attenuated to below the applicable residential MSCCs, it was decided that Sovereign would not conduct additional soil removal at the other three sites.

Removal efforts concentrated around the location of sample PP3326-004, as shown in Figure 6. Removal activities took place on February 10, 2006. Excavation was performed using a backhoe. Approximately 9.37 tons of soil was removed from the subsurface. The new excavation extended seven (7) feet out from the Shaw excavation. It was approximately five (5) feet deep, and groundwater was encountered. Once removal activities were complete, a confirmation soil sample was obtained from the sidewall at a depth of approximately 2-3 feet. The soil sample was again packed in pre-labeled jars, stored on ice, and shipped to Paradigm to be analyzed using EPA Methods 8260, 8270, MADEP VPH, and MADEP EPH. Laboratory analysis confirms the absence of contamination in the sample obtained from the excavated sidewall. Only acetone was detected at a concentration of 10.3 µg/kg, which is well below both the STGW and residential MSCCs of 2,800 µg/kg and 1,564,000 µg/kg, respectively. Results are summarized on Figure 2 and can also be found in Appendix C.

MCB Camp Lejeune also tasked Sovereign to sample the groundwater at the PP-3326 site since groundwater was encountered during both the Shaw and Sovereign excavation activities. A temporary well was installed and abandoned in the location indicated on Figure 7 on February 14, 2006 and February 20, 2006, respectively. Well construction and abandonment records are in Appendix D, and well construction data is in Table 4.1.

Sovereign conducted groundwater sampling of well USTPP3326-TW01. The intent of the sampling event was to assess the current groundwater quality. Sovereign gauged and sampled the well on February 17, 2006. The static groundwater depth was 3.07 feet from top of casing, and no free product was detected in the well during the site visit. Sovereign purged and sampled the well, then sent the samples under chain of custody for analysis to Paradigm. The lab tested the groundwater sample for volatiles via EPA method 602, semivolatiles using EPA method 625, and volatile and extractable petroleum hydrocarbons with the MADEP methods. Laboratory reports and chain of custody documentation are included in Appendix C.

Laboratory data showed contamination in the groundwater sample from PP-3326. Volatiles detected include ethylbenzene, toluene, and total xylenes at concentrations of 40.0 µg/L, 0.760J µg/L, and 192.6 µg/L, respectively. None of these concentrations are above the applicable NCGWQSs. Semivolatile compounds detected include acenaphthene, fluorene, naphthalene, and phenanthrene. Only naphthalene was detected above its 2L standard (21 µg/L) at a concentration of 125 µg/L. The ten (10) largest peaks were also identified, and two compounds were quantitated. 1-methylnaphthalene and 2-methylnaphthalene had results of 112 µg/L and 145 µg/L, respectively. The NCGWQS for 2-methylnaphthalene is 14 µg/L. There is no standard

listed for 1-methylnaphthalene. MADEP constituents were also detected. C₉-C₁₈ Aliphatics were detected at a concentration of <720 µg/L, which is below the 2L standard of 4,200 µg/L. C₉-C₂₂ Aromatic concentrations (1,350 µg/L), however, exceeded the 2L standard of 210 µg/L.

Groundwater conditions were not re-evaluated at PP-3330, PP-3332, or PP-3350. The most recent groundwater data was taken during the Phase I LSAs. Groundwater at PP-3330, PP-3332, and PP-3350 displayed C₉-C₂₂ Aromatics above the interim GWQS of 210 µg/L. In addition, the PP-3330 groundwater sample contained C₉-C₁₈ Aliphatics above the interim GWQS. Ten TICS were detected in the groundwater sample taken at the PP-3350 project site. One of the TICS was identified as 2-methylnaphthalene at a concentration of 110 µg/L, which is above the interim GWQS of 14 µg/L. Groundwater sampling data from the Phase I LSA reports are located in Appendix A.

6.0 RECEPTOR SURVEY

Sovereign reassessed site conditions and concluded that the receptor surveys previously completed by CATLIN in the Phase I LSA reports still apply. There have been no changes in receptor impact, and there have been no changes to land use of the sites or the surrounding areas. The surveys are in Appendix A.

7.0 CONCLUSIONS AND PETITION FOR SITE CLOSURE

Based on fieldwork and laboratory analytical data gathered during the Phase I LSA, SAR, December 2005 soil sampling, and February 2006 excavation and groundwater sampling event, the following conclusions are presented:

1. Soil samples collected during tank removal confirmed the presence of soil contamination in each of the former tank basins above STGW and residential MSCCs.
2. CATLIN obtained soil samples from along the former delivery lines during the Phase I LSAs. Contaminant concentrations were either below laboratory quantitation limits or the applicable residential MSCCs.
3. Groundwater samples collected at PP-3326, PP-3330, PP-3332, and PP-3350 during the Phase I LSA contained contaminants above 2L standards; however, levels were below established GCLs.
4. Shaw excavation activities removed soil contaminants; however, MADEP constituents were present above residential MSCCs in the following ten (10) samples: 3326-NW-001, 3326-WW-004, 3330-NW-001, 3330-WW-004, 3332-NW-001, 3332-WW-002, 3332-F-005, 3350-NW-001, 3350-SW-002, and 3350-F-005. The November 2004 report recommended MCB Camp Lejeune conduct additional soil excavation at the locations exceeding the residential MSCCs.
5. Osage performed soil sampling in December 2005 at the ten (10) offending locations. Results showed contaminants attenuated to below the residential MSCCs, with the exception of 3326-WW-004 where additional excavation would be required. The other nine (9) samples did

not contain contamination above the residential standards. In fact, only samples PP3326-001 and PP3332-005 contained MADEP constituents at concentrations above the STGW MSCC, but below the residential MSCC. All other detections were below STGW MSCCs.

6. Sovereign conducted additional soil excavation activities at PP-3326 in February 2006. Approximately 9.37 tons of contaminated soil was removed and properly disposed.

7. Sovereign took one confirmation soil sample from the PP-3326 excavation area at a depth of 2-3 feet and analyzed it for VOCs, SVOCs, and MADEP constituents. The only contaminant present was acetone at a concentration of 10.3 µg/kg, which is well below both the STGW and residential MSCCs of 2,800 µg/kg and 1,564,000 µg/kg, respectively. No other contaminants were identified in the confirmation soil sample.

8. Groundwater conditions were monitored only at PP-3326. A sample taken from well USTPP3326-TW01 exhibited naphthalene and C₉-C₂₂ Aromatics at concentrations above their 2L standards. All other analytes were either BQL or present at concentrations less than the applicable groundwater quality standards.

Based on the findings of this investigation and previous reports, soils at PP-3326, PP-3330, PP-3332, and PP-3350 do not contain contaminants above residential MSCCs. Soils at PP-3326 and PP-3332 contained MADEP constituents that were above the STGW MSCCs, but below the residential MSCCs. PP-3330 and PP-3350 contaminant concentrations were below STGW MSCCs. Since these sites have been classified as low risk by NCDENR and soil contamination has been remediated to the residential MSCC, no further soil remediation is necessary per the requirements of 15A NCAC 2L .0408.

Groundwater, however, at the four sites remains impacted. Recent monitoring at PP-3326 showed contamination persists above the 2L groundwater quality standards. Past data for PP-3330, PP-3332, and PP-3350 also indicates 2L exceedences. All detections, however, are below applicable GCLs. As such, these sites qualify for No Further Action as outlined in 15A NCAC 2L .0407(d). Land use restrictions, however, should be implemented at each site since groundwater has not been remediated to the standards established in 15A NCAC 2L.

8.0 PUBLIC NOTICE REQUIREMENTS

Low risk sites that meet the residential maximum soil contaminant concentrations are eligible for a No Further Action status per NCDENR Regulation 15A NCAC 2L .0407 and .0408. The soil contamination identified during the Phase I LSA and SAR is present at levels below the residential maximum soil contaminant concentrations. Some compounds exist above the soil-to-groundwater MSCCs at PP-3326 and PP-3332. PP-3330 and PP-3350 contaminant concentrations, however, were below STGW MSCCs. In addition, groundwater at all four sites contains contaminants above 2L standards, but below GCLs. As such, if NCDENR grants No Further Action status with Land Use Restrictions for the sites, 15A NCAC 2L .0409 requires that public notification be made to property owners and occupants within or contiguous to the area containing contamination within 30 days of the grant.

9.0 REFERENCES

AH Environmental Consultants, *Final Report, Wellhead Protection Plan – 2002 Update, Marine Corps Base, Camp Lejeune*, August 2002.

CATLIN Engineers and Scientists, *Leaking Underground Storage Tank (LUST) Phase I Limited Site Assessment Report for PP-3326, Marine Corps Base Camp Lejeune, North Carolina*, November 29, 2002.

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CATLIN Engineers and Scientists, *Soil Assessment Report for PP-3326, Marine Corps Base Camp Lejeune, North Carolina*, June 10, 2003.

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CATLIN Engineers and Scientists, *Soil Assessment Report for PP-3350, Marine Corps Base Camp Lejeune, North Carolina*, June 18, 2003.

J.A. Jones Environmental Services Inc, *Underground Storage Tank Closure Report, CC-3326, Camp Lejeune, North Carolina*, January 22, 2002.

J.A. Jones Environmental Services Inc, *Underground Storage Tank Closure Report, CC-3330, Camp Lejeune, North Carolina*, January 23, 2002.

J.A. Jones Environmental Services Inc, *Underground Storage Tank Closure Report, CC-3332, Camp Lejeune, North Carolina*, January 23, 2002.

J.A. Jones Environmental Services Inc, *Underground Storage Tank Closure Report, CC-3350, Camp Lejeune, North Carolina*, January 24, 2002.

North Carolina Department of Environment and Natural Resources, Division of Waste Management, Underground Storage Tank Section, *Guidelines for Assessment and Corrective Action*, April 2001.

TABLES

TABLE 1.1
SUMMARY OF PRELIMINARY SOIL SAMPLING RESULTS

Date: December 14, 2005
Incident Number and Name: PP-3326, 24009; PP-3330, 24010; PP-3332, 24011; and
PP-3350, 24014
Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH

Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)						
PP3326-001	12-14-2005	2.5	<10	<10	<10	350	120	57
PP3326-004	12-14-2005	2.5	48	290	460	12,000	1,400	4,300
PP3330-001	12-14-2005	2.5	<10	<10	<10	74	38	<10
PP3330-004	12-14-2005	2.5	<10	<10	<10	<10	<10	<10
PP3332-001	12-14-2005	2.5	<10	<10	<10	<10	<10	<10
PP3332-002	12-14-2005	2.5	<10	<10	<10	<10	<10	<10
PP3332-005	12-14-2005	5.0	<10	40	30	830	110	280
PP3350-001	12-14-2005	2.5	<10	<10	<10	27	<10	<10
PP3350-002	12-14-2005	2.5	<10	<10	<10	<10	<10	<10
PP3350-005	12-14-2005	5.0	<10	<10	<10	<10	<10	<10

- MSCC = maximum soil contamination concentration
- ft. BGS = feet below ground surface
- Results reported in mg/kg
- mg/kg = milligrams per kilogram
- **BOLDED** = detected concentration

TABLE 1.2
SUMMARY OF PRELIMINARY SOIL SAMPLING RESULTS

Date: December 14, 2005
Incident Number and Name: PP-3326, 24009; PP-3330, 24010; PP-3332, 24011; and
PP-3350, 24014
Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH as Compared to NCDENR MSCCs

Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₉ -C ₃₆ Aliphatics	C ₉ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)				
PP3326-001	12-14-2005	2.5	<10	<360	120	<67
PP3326-004	12-14-2005	2.5	48	12,290	1,400	4,760
PP3330-001	12-14-2005	2.5	<10	<84	38	<20
PP3330-004	12-14-2005	2.5	<10	<20	<10	<20
PP3332-001	12-14-2005	2.5	<10	<20	<10	<20
PP3332-002	12-14-2005	2.5	<10	<20	<10	<20
PP3332-005	12-14-2005	5.0	<10	870	110	310
PP3350-001	12-14-2005	2.5	<10	<37	<10	<20
PP3350-002	12-14-2005	2.5	<10	<20	<10	<20
PP3350-005	12-14-2005	5.0	<10	<20	<10	<20
Soil to groundwater MSCC (mg/kg)			72	3,300	##	34
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264

- MSCC = maximum soil contamination concentration
- ft. BGS = feet below ground surface
- Results reported in mg/kg
- mg/kg = milligrams per kilogram
- ## = Considered immobile
- # = Health Based Level > 100%
- **BOLDED** = detected concentration
- **BOLDED** and **SHADED** = detected concentration exceeds residential MSCC

TABLE 2.1
SUMMARY OF CONFIRMATION SOIL SAMPLING RESULTS

Date: February 10, 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Analytical Method: EPA Method 8260

Sample ID	Contaminant of Concern →		Acetone
	Date Collected	Sample Depth (ft BGS)	
USTPP3326-S004	2/10/2006	2-3	.0103 J
Soil to groundwater MSCC (mg/kg)			2.8
Residential MSCC (mg/kg)			1,564
Industrial/Commercial MSCC (mg/kg)			40,880

- Analytes not shown were BQL.
- Quantitation limit for acetone per laboratory data = 52.5 µg/kg
- MSCC = maximum soil contamination concentration
- ft. BGS = feet below ground surface
- All results in mg/kg
- mg/kg = milligrams per kilogram
- **BOLDED** = detected concentration
- J = detected below the quantitation limit

TABLE 2.2
SUMMARY OF CONFIRMATION SOIL SAMPLING RESULTS

Date: February 10, 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern →		All Compounds
	Date Collected	Sample Depth (ft BGS)	
USTPP3326-S004	2/10/2006	2-3	BQL
Soil to groundwater MSCC (mg/kg)			Varies
Residential MSCC (mg/kg)			Varies
Industrial/Commercial MSCC (mg/kg)			Varies

- MSCC = maximum soil contamination concentration
- ft. BGS = feet below ground surface
- All results in mg/kg
- mg/kg = milligrams per kilogram

TABLE 2.3
SUMMARY OF CONFIRMATION SOIL SAMPLING RESULTS

Date: February 10, 2006
 Incident Number and Name: PP-3326, 24009
 Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH

Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)						
USTPP3326-S004	2-10-2006	2-3	<10	<10	<10	<10	<10	<10

- MSCC = maximum soil contamination concentration
- ft. BGS = feet below ground surface
- Results reported in mg/kg
- mg/kg = milligrams per kilogram
- **BOLDED** = detected concentration

TABLE 2.4
SUMMARY OF CONFIRMATION SOIL SAMPLING RESULTS

Date: February 10, 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH as Compared to NCDENR MSCCs

Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₉ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)				
USTPP3326-S004	2-10-2006	2-3	<10	<20	<10	<20
Soil to groundwater MSCC (mg/kg)			72	3,300	##	34
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264

- MSCC = maximum soil contamination concentration
- ft. BGS = feet below ground surface
- Results reported in mg/kg
- mg/kg = milligrams per kilogram
- ## = Considered immobile
- # = Health Based Level > 100%
- **BOLDED** = detected concentration
- **BOLDED** and **SHADED** = detected concentration exceeds residential MSCC

TABLE 3.1
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: February 17, 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Analytical Method: EPA Method 602

Contaminant of Concern			Benzene	Diisopropyl ether (DIPE)	Ethylbenzene	Methyl-tert butyl ether (MTBE)	Toluene	Total Xylenes
Well ID	Sample ID	Date Collected						
USTPP3326- TW01	USTPP3326- TW01	2/17/2006	BQL	BQL	40.0	BQL	0.760	192.6
2L Standard (µg/l)			1	70	550	200	1,000	530
GCL (µg/l)			5,000	70,000	84,500	200,000	257,500	87,500

- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level
- BQL = Below Quantitation Limits
- **BOLDED** = detected concentration

Table 3.2
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: February 17, 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Analytical Method: EPA Method 625 plus 10 largest TICS¹

Contaminant of Concern			Acenaphthene	Fluorene	Naphthalene	Phenanthrene	All Other Analytes
Well ID	Sample ID	Date Collected					
USTPP3326-TW01	USTPP3326-TW01	2/17/2006	3.30 J	6.10 J	125	5.50	BQL
2L Standard (µg/l)			80	280	21	210	Varies
GCL (µg/l)			2,120	280	15,500	410	Varies

- ¹Note – TICS identified include 1-methylnaphthalene and 2-methylnaphthalene at 112 µg/L and 145 µg/L, respectively.
- All results reported in µg/l
- µg/L = micrograms per liter
- GCL = gross contamination level
- BQL = Below Quantitation Limits
- J = detected below the quantitation limit
- BOLDED** = detected concentration
- BOLDED** and **SHADED** = detected concentration exceeds NCGWQS

TABLE 3.3
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: February 17, 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH

Contaminant of Concern			C ₅ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
Well ID	Sample ID	Date Collected						
USTPP3326-TW01	USTPP3326-TW01	2/17/2006	<100	620	710	<100	<100	640

- All results reported in µg/l
- µg/L =micrograms per liter
- GCL = gross contamination level

TABLE 3.4
SUMMARY OF GROUNDWATER SAMPLING RESULTS

Date: February 17, 2006
 Incident Number and Name: PP-3326, 24009
 Facility ID#: N/A

Analytical Method: MADEP Method VPH/EPH as compared to NCDENR 2L Interim GWQS

Contaminant of Concern →			C ₅ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₉ -C ₂₂ Aromatics	C ₁₉ -C ₃₆ Aliphatics
Well ID	Sample ID	Date Collected				
USTPP3326-TW01	USTPP3326-TW01	2/17/2006	<100	< 720	1,350	<100
2L Interim Standard (µg/l)			420	4,200	210	42,000
GCL (µg/l)			NE	NE	NE	NE

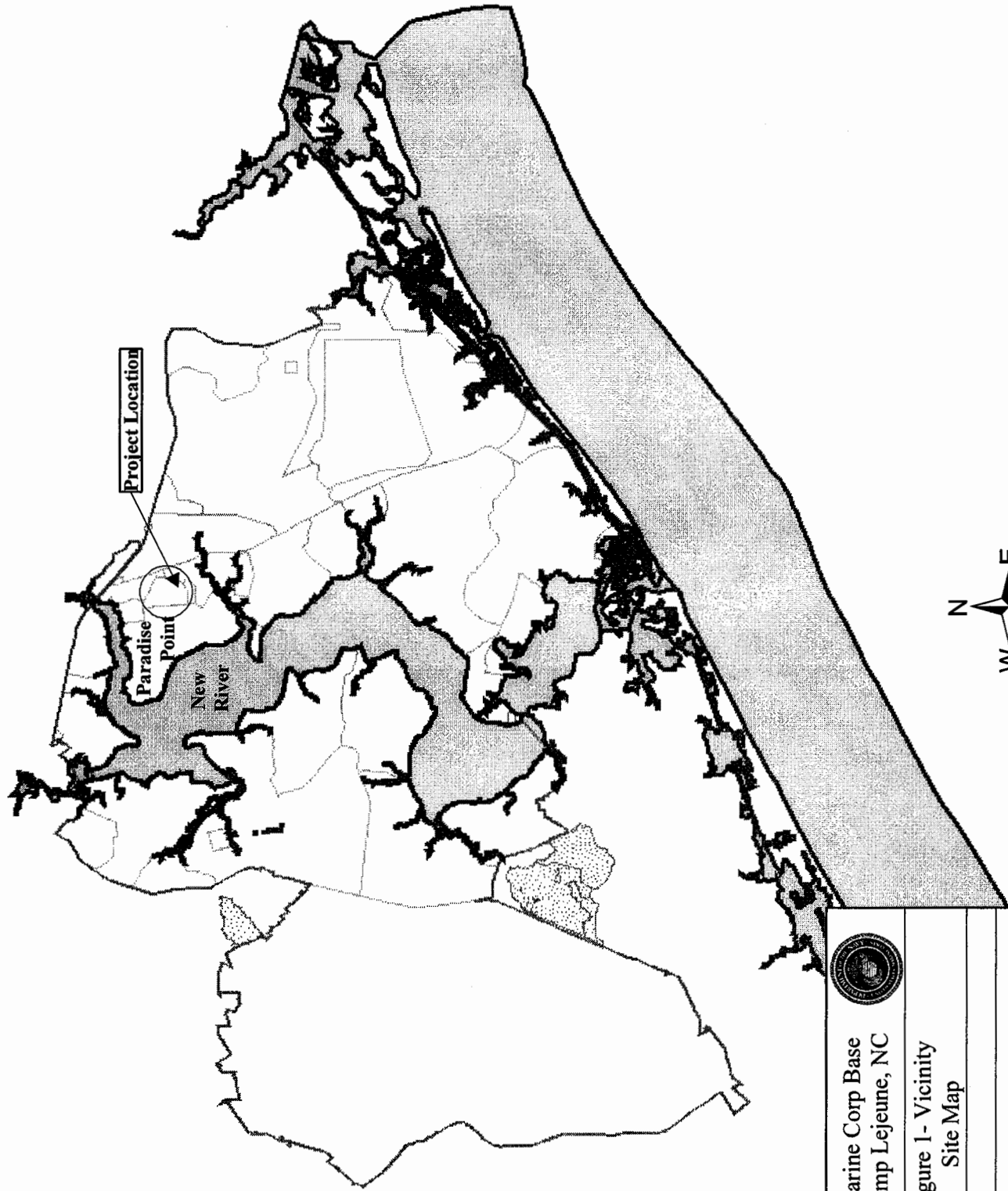
- All results reported in µg/l
- µg/L = micrograms per liter
- GCL = Gross Contaminant Level
- NE = Not Established
- **BOLDED** = detected concentration
- **BOLDED** and **SHADED** = detected concentration exceeds NCGWQS

TABLE 4.1
WELL CONSTRUCTION INFORMATION

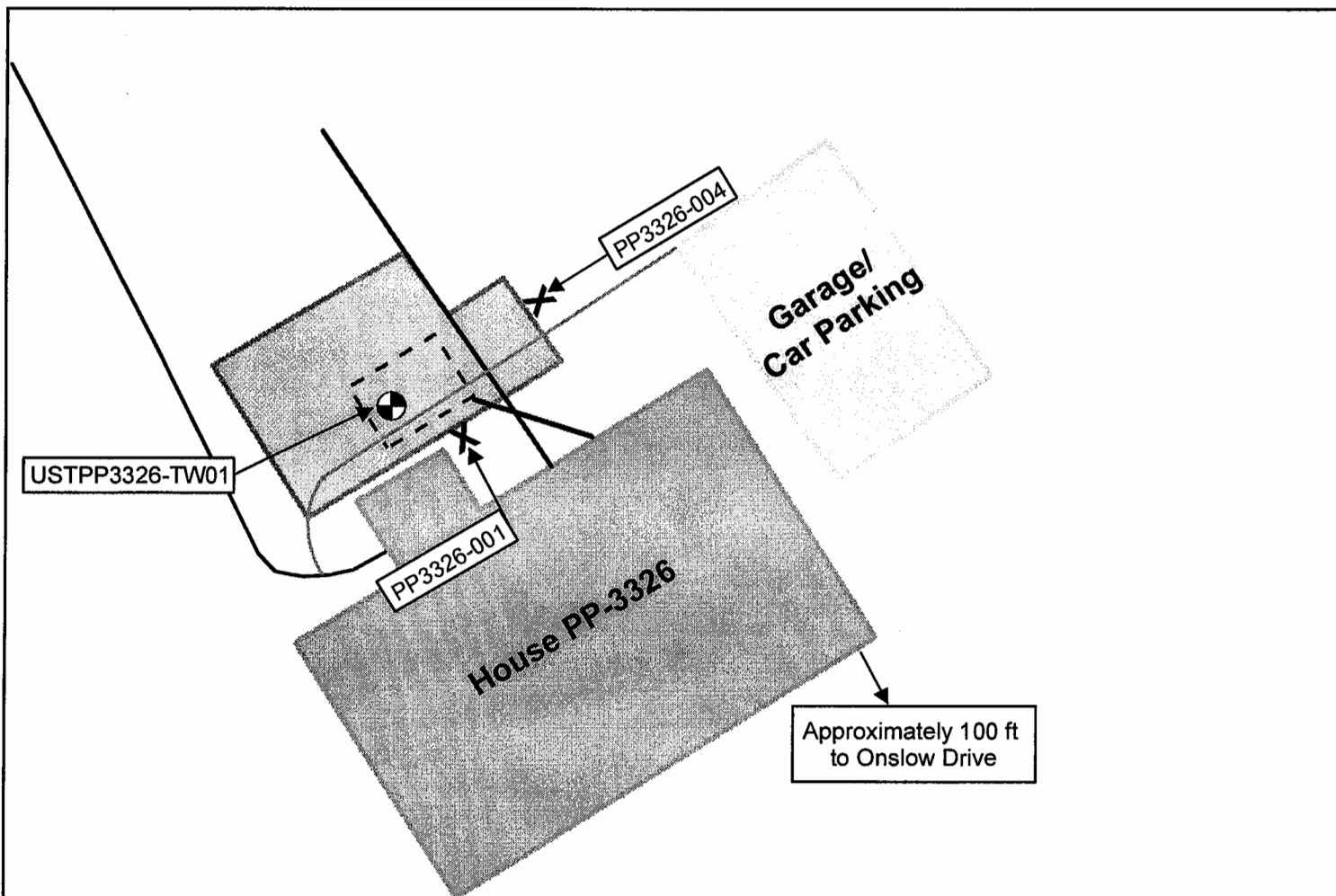
Date: February 2006
Incident Number and Name: PP-3326, 24009
Facility ID#: N/A

Well ID	Date Installed (mm/dd/yy)	Date Water Level Measured (mm/dd/yy)	Well Casing Depth (ft. BGS)	Screened Interval (x to y ft. BGS)	Bottom of Well (ft. BGS)	Top of Casing Elevation (ft.)	Depth to Water from Top of Casing (ft.)	Free Product Thickness (ft.)	Groundwater Elevation (ft.)	Comments
JSTPP3326-TW01	2/14/2006	2/17/2006	Temp well	0-12	12	Unknown	3.07	N/A	Unknown	Temp well, abandoned immediately

FIGURES



 Marine Corp Base Camp Lejeune, NC	Figure 1- Vicinity Site Map	Project No. NV012 Date: February 2006	 606 Thimble Shoals Blvd. Suite A-1 Newport News, VA 23606
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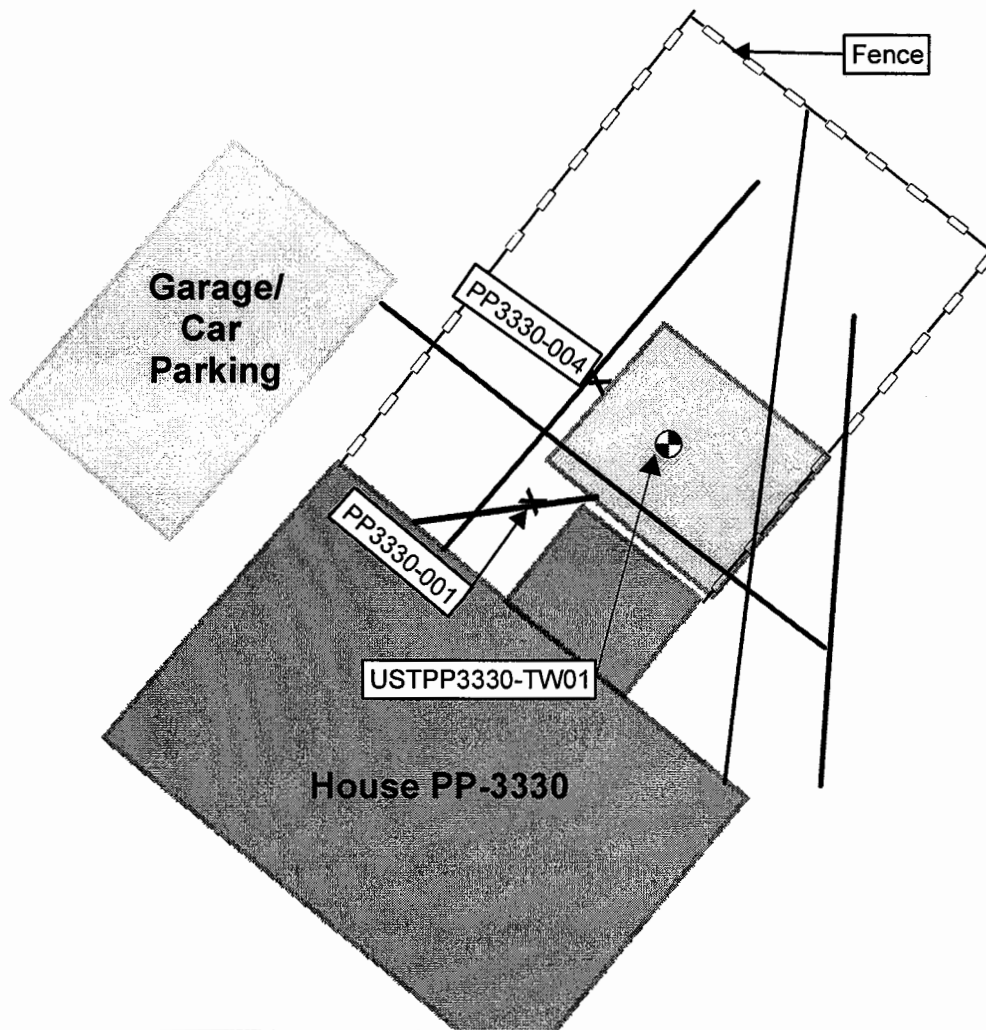
Analytical Method: MADEP Method VPH/EPH								
Sample ID	Contaminant of Concern		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)						
PP3326-001	12/14/2005	2.5	<10	<10	<10	350	120	57
PP3326-004	12/14/2005	2.5	48	290	460	12,000	1,400	4,300

Analytical Method: MADEP Method VPH/EPH as Compared to NCDENR MSCCs						
Sample ID	Contaminant of Concern		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₉ -C ₃₆ Aliphatics	C ₉ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)				
PP3326-001	12/14/2005	2.5	<10	<360	120	<67
PP3326-004	12/14/2005	2.5	48	12,290	1,400	4,760
Soil to Groundwater MSCC (mg/kg)			72	3,300	##	34
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264

Legend - X Soil Sample Locations ⊕ Monitoring Well Locations — Former Product Line — Underground Power Line — Underground Water/Sewer Line — Telephone ⋯ Initial Excavation Limits (Shaw 2004) ▒ Final Excavation Limits (Shaw 2004) ▒ Roads	N W E S 0 2.5 5 Feet	Marine Corp Base Camp Lejeune, NC Figure 2- PP3326 Site Map With December 2005 Soil Sample Results Project No. NV012 Date: February 2006 606 Thimble Shoals Blvd. Suite A-1 Newport News, VA 23606 BEM SYSTEMS, INC. 606 Thimble Shoals Blvd. Suite A-2 Newport News, VA 23606
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Analytical Method: MADEP Method VPH/EPH								
Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)						
PP3330-001	12/14/2005	2.5	<10	<10	<10	74	38	<10
PP3330-004	12/14/2005	2.5	<10	<10	<10	<10	<10	<10

Analytical Method: MADEP Method VPH/EPH as Compared to NCDENR MSCCs							
Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₉ -C ₃₆ Aliphatics	C ₉ -C ₂₂ Aromatics	
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)					
PP3330-001	12/14/2005	2.5	<10	84	38	<20	
PP3330-004	12/14/2005	2.5	<10	<20	<10	<20	
Soil to Groundwater MSCC (mg/kg)			72	3,300	##	34	
Residential MSCC (mg/kg)			939	9,386	93,860	469	
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264	



Legend

- X Soil Sample Location
- ⊙ Monitoring Well Locations
- Former Product Line
- Underground Power Line
- Underground Water/Sewer Line
- Final Excavation Limits (Shaw 2004)



0 2.5 5 Feet



Marine Corp Base Camp Lejeune, NC



Figure 3- PP3330 Site Map
With December 2005
Soil Sample Results

Project No. NV012

Date: February 2006



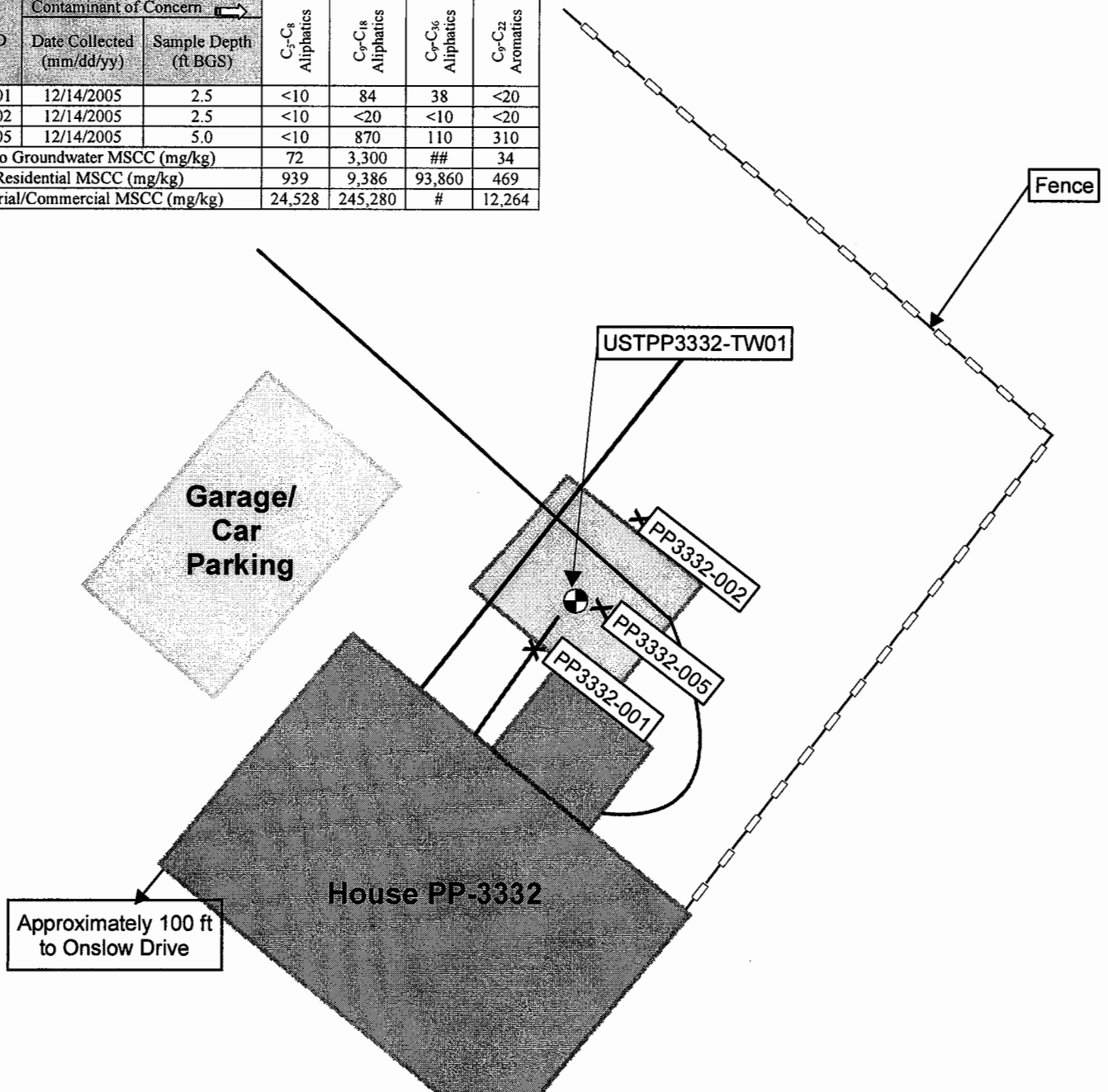
606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606



606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

Analytical Method: MADEP Method VPH/EPH								
Sample ID	Contaminant of Concern		C ₃ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)						
PP3332-001	12/14/2005	2.5	<10	<10	<10	<10	<10	<10
PP3332-002	12/14/2005	2.5	<10	<10	<10	<10	<10	<10
PP3332-005	12/14/2005	5.0	<10	40	30	830	110	280

Analytical Method: MADEP Method VPH/EPH as Compared to NCDENR MSCCs						
Sample ID	Contaminant of Concern		C ₃ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₉ -C ₃₆ Aliphatics	C ₉ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)				
PP3332-001	12/14/2005	2.5	<10	84	38	<20
PP3332-002	12/14/2005	2.5	<10	<20	<10	<20
PP3332-005	12/14/2005	5.0	<10	870	110	310
Soil to Groundwater MSCC (mg/kg)			72	3,300	##	34
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264



Legend

- X** Soil Sample Locations
-  Monitoring Well Locations
-  Former Product Line
-  Underground Power Line
-  Underground Water/Sewer Line
-  Final Excavation Limits Shaw (2004)



0 2.5 5 Feet




**Marine Corp Base
Camp Lejeune, NC**



Figure 4- PP3332 Site Map
With December 2005
Soil Sample Results

Project No. NV012

Date: February 2006



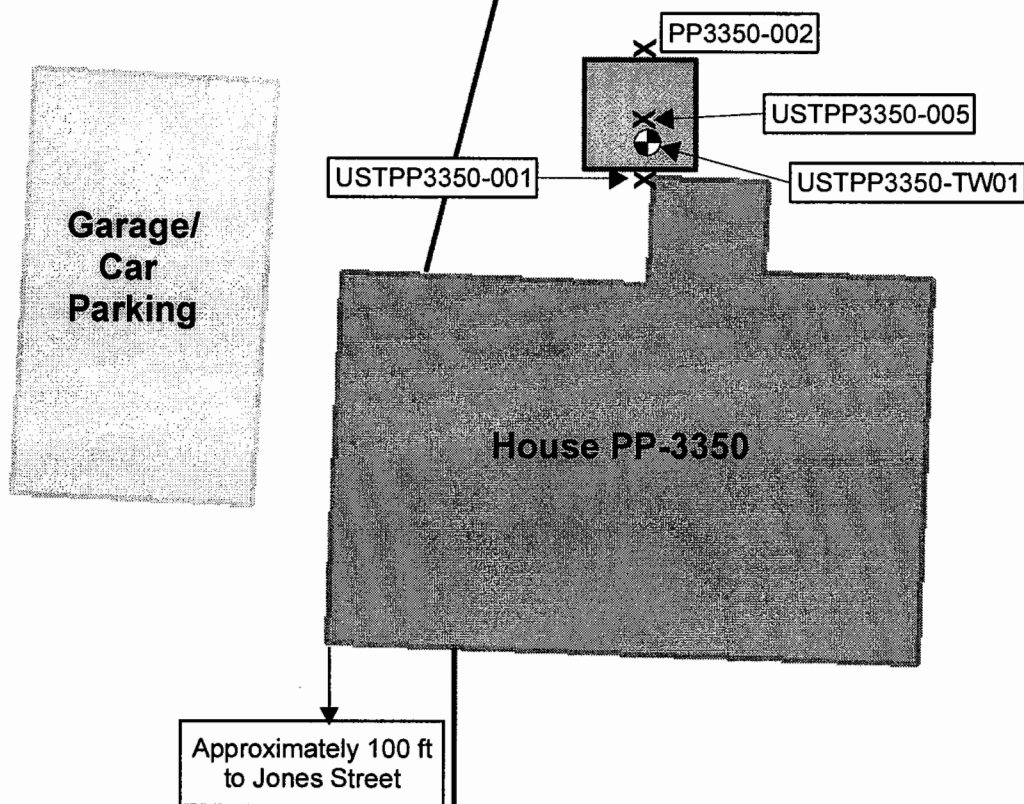
606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606



606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

Analytical Method: MADEP Method VPH/EPH								
Sample ID	Contaminant of Concern 		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₂ Aliphatics	C ₉ -C ₁₀ Aromatics	C ₉ -C ₁₈ Aliphatics	C ₁₉ -C ₃₆ Aliphatics	C ₁₁ -C ₂₂ Aromatics
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)						
PP3350-001	12/14/2005	2.5	<10	<10	<10	27	<10	<10
PP3350-002	12/14/2005	2.5	<10	<10	<10	<10	<10	<10
PP3350-005	12/14/2005	5.0	<10	<10	<10	<10	<10	<10

Analytical Method: MADEP Method VPH/EPH as Compared to NCDENR MSCCs							
Sample ID	Contaminant of Concern →		C ₅ -C ₈ Aliphatics	C ₉ -C ₁₈ Aliphatics	C ₉ -C ₃₆ Aliphatics	C ₉ -C ₂₂ Aromatics	
	Date Collected (mm/dd/yy)	Sample Depth (ft BGS)					
PP3350-001	12/14/2005	2.5	<10	<37	<10	<20	
PP3350-002	12/14/2005	2.5	<10	<20	<10	<20	
PP3350-005	12/14/2005	5.0	<10	<20	<10	<20	
Soil to Groundwater MSCC (mg/kg)			72	3,300	##	34	
Residential MSCC (mg/kg)			939	9,386	93,860	469	
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264	



Legend

- X** Soil Sample Locations
-  Monitoring Well Locations
-  Former Product Line
-  Underground Power Line
-  Underground Water/Sewer Line
-  Final Excavation Limits (Shaw 2004)



0 2.5 5 Feet




**Marine Corp Base
Camp Lejeune, NC**



Figure 5- PP3350 Site Map
With December 2005
Soil Sample Results

Project No. NV012

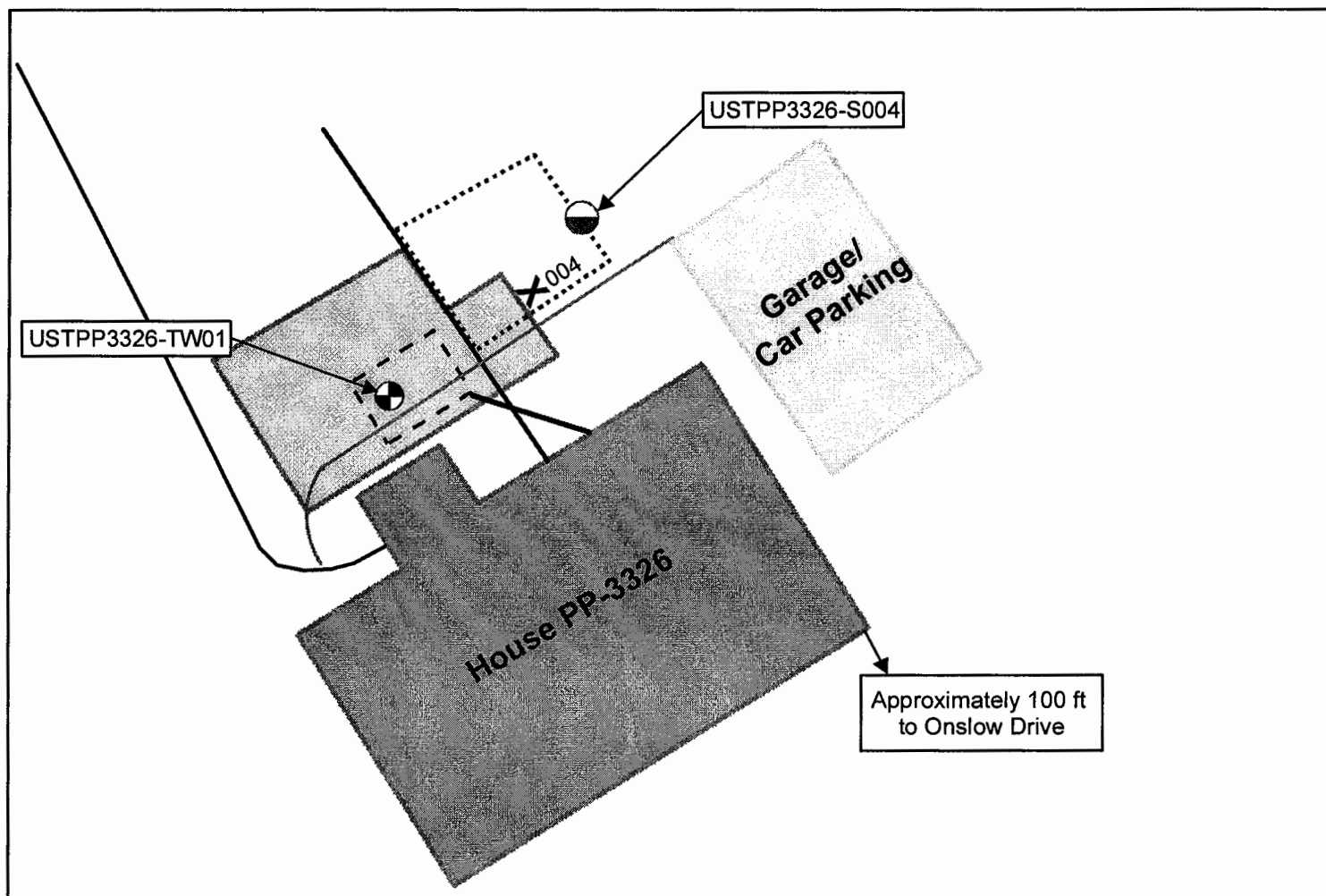
Date: February 2006



606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606

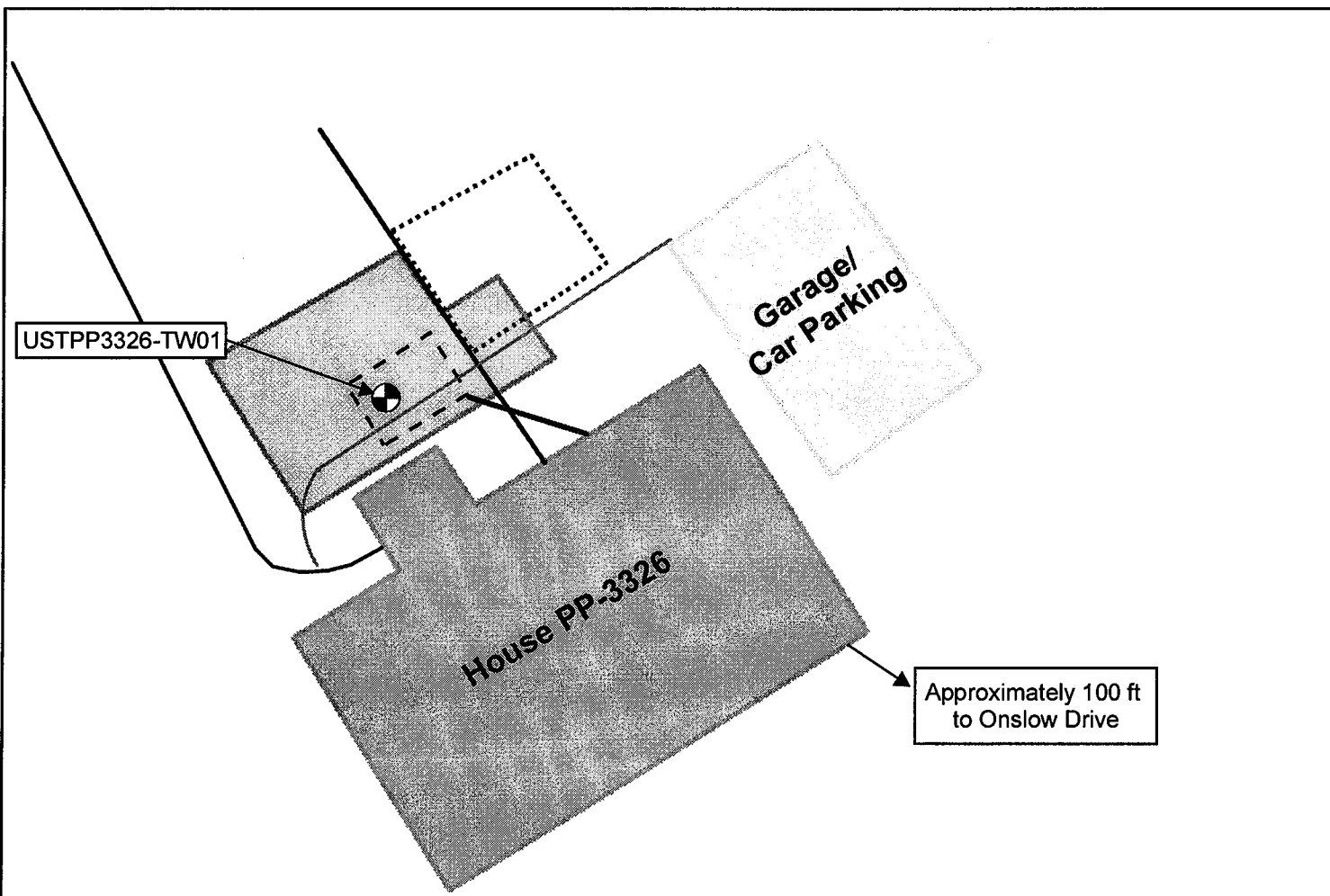


606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606



Acetone	2.8	1,564	40,880	.0103 J	8260
All Compounds	Varies	Varies	Varies	BQL	8270
C ₅ -C ₈ Aliphatics	72	939	24,528	<10	MADEP
C ₉ -C ₁₂ Aliphatics	--	--	--	<10	MADEP
C ₉ -C ₁₀ Aromatics	--	--	--	<10	MADEP
C ₉ -C ₁₈ Aliphatics	3,300	9,386	245,280	<20	MADEP
C ₁₉ -C ₃₆ Aliphatics	--	93,860	--	<10	MADEP
C ₉ -C ₂₂ Aromatics	34	469	12,264	<20	MADEP
C ₁₁ -C ₂₂ Aromatics	--	--	--	<10	MADEP

Legend Soil Boring Locations Monitoring Well Locations Former Product Line Underground Power Line Underground Water/Sewer Line Telephone Line February 2006 Excavation Limits Initial Excavation Limits (Shaw 2004) Final Excavation Limits (Shaw 2004)	 	Marine Corp Base Camp Lejeune, NC	
		Figure 6- PP3326 Final Excavation With February 2006 Soil Sample Results	
		Project No. NV012 Date: February 2006	
		606 Thimble Shoals Blvd. Suite A-1 Newport News, VA 23606	606 Thimble Shoals Blvd. Suite A-2 Newport News, VA 23606

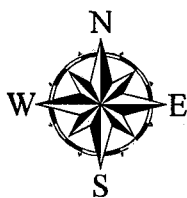


Analyte	Concentration (ppb)	Concentration (ppm)	Regulatory Limit	Sample Result
Benzene	1	5,000	BQL	602
Diisopropyl ether (DIPE)	70	70,000	BQL	602
Ethylbenzene	550	84,500	40	602
MTBE	200	200,000	BQL	602
Toluene	1,000	257,500	0.76	602
Total Xylenes	530	87,500	192.6	602
Acenaphthene	80	2,120	3.30 J	625
Flourene	280	280	6.10 J	625
Naphthalene	21	15,500	125	625
Phenanthrene	210	410	5.50	625
All Other Analytes	Varies	Varies	BQL	625
1-Methynaphthalene	--	--	112	625
2-Methynaphthalene	14	12,500	145	625
C ₅ -C ₈ Aliphatics	420	NE	<100	MADEP
C ₉ -C ₁₈ Aliphatics	4,200	NE	<720	MADEP
C ₁₉ -C ₃₆ Aliphatics	42,000	NE	<100	MADEP
C ₉ -C ₂₂ Aromatics	210	NE	1,350	MADEP

Onslow Drive

Legend

- Monitoring Well Locations
- Former Product Line
- Underground Power Line
- Underground Water/Sewer Line
- Telephone Line
- February 2006 Excavation Limits
- Initial Excavation Limits (Shaw 2004)
- Final Excavation Limits (Shaw 2004)



0 2.5 5 Feet



**Marine Corp Base
Camp Lejeune, NC**



Figure 7- PP3326 Site Map With
February 2006 Groundwater Sample Results

Project No. NV012

Date: February 2006



606 Thimble Shoals Blvd.
Suite A-1
Newport News, VA 23606



606 Thimble Shoals Blvd.
Suite A-2
Newport News, VA 23606

APPENDIX A

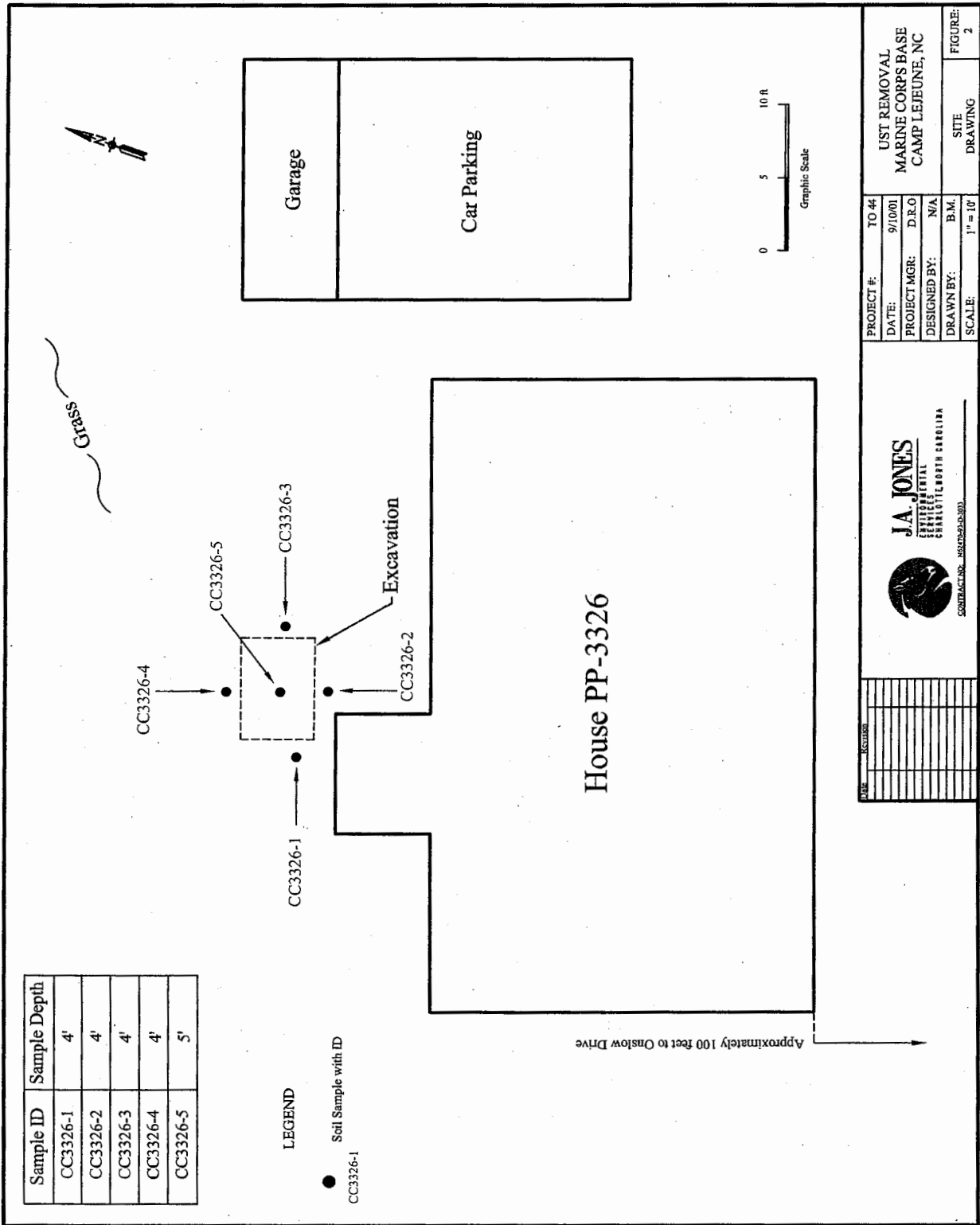
HISTORICAL SOIL AND GROUNDWATER DATA AND FIGURES

**J.A. JONES TANK CLOSURE REPORT
DATA AND FIGURES**

Sample ID	Sample Depth
CC3326-1	4'
CC3326-2	4'
CC3326-3	4'
CC3326-4	4'
CC3326-5	5'

LEGEND

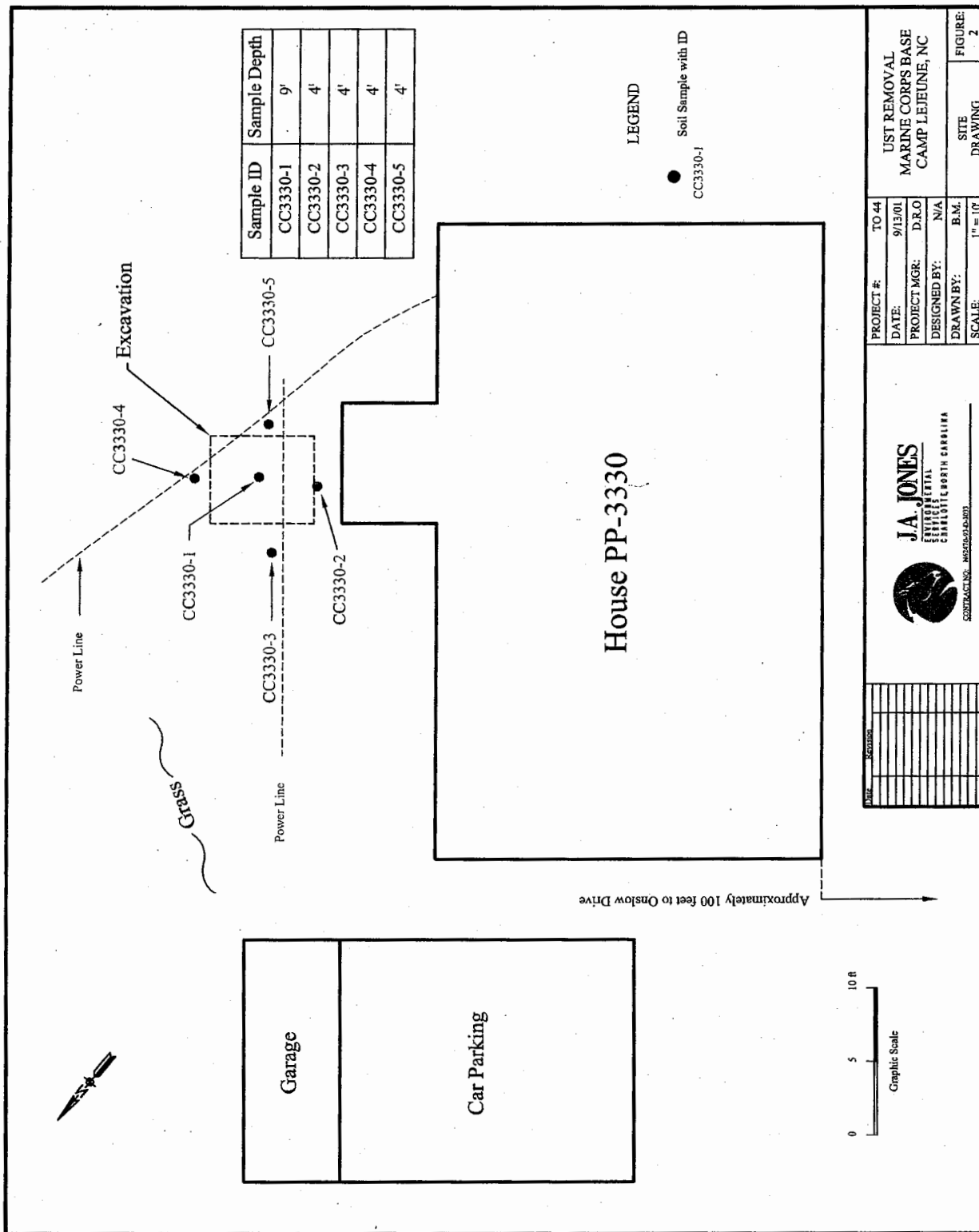
● Soil Sample with ID
CC3326-1



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	Sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Naphthalene	N-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Phenanthrene	Dibenzofuran	Total Xylenes
CC-3326-1	11/5/01	4'	910	230	2230	22	2	1.8	1.4		1.4	14	1.6	12	4.1	14	23	0.92	3.4	0.92	6.27
CC-3326-2	11/5/01	4'	260	76	910	12	0.91	0.82	0.83	0.47	0.69	5.6	0.89	6.7	2.1	5.5	10	0.41	1.7	0.35	3.2
CC-3326-3	11/5/01	4'	670	120	1510	20	1.3	1.4	1.2	0.76	1.2	7.2	1.5	11	3.8	9	16	0.49	2.3	0.51	6.6
CC-3326-4	11/5/01	4'	1150	140	1920	57	3.8	3	2.2	1.6	2.4	16	3.2	24	8	22	50		4.8	1.7	12.6
CC-3326-5	11/5/01	5'	1180	100	1320	30	7.5	0.32	0.29		0.27	34	0.35	2.7	0.81	48	110		12		1.62
Residential Soil Cleanup Level	--																				
Soil-to-Water Maximum Soil Contaminant Concentration	--		469	939	9386	93860	620	156	1560	1564	n/e	63	156	782	782	n/e	63	940	469	62	32000
			34	72	3255		44	3	0.24	2	n/e	0.58	2	8	7	n/e	3	8	60	4.7	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



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	Tert-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Naphthalene	N-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Toluene	Dibenzofuran	Acenaphthene	Total Xylenes	
CC-3330-1	10/31/01	9'	66420	290	30000	128200	12	5.6	3.5		3.8	2	2.6	44	4	29	8.6	81	190	20	4.2	6.7		20.8	
CC-3330-2	11/5/01	4'	1780	440	8100	390	14		3.1	1.5			6.6	53		36	18	87	150	24	1.3	4.5	5.4	26	
CC-3330-3	11/5/01	4'	1840	22	1410	110				0.13			0.41	0.52											
CC-3330-4	11/5/01	4'	4400	650	9250	170	7.8	8.1	4.8	2.8	2.1	5.5	41	3.8	35	35	16	40	64	12	2.3		3.5	24	
CC-3330-5	11/5/01	4'	2080	460	3640	86	7.4		8.2	6.3	3.6	6.3	45	8	63	19	46	72	12		2.8	2.7	36		
Residential Soil Cleanup Level	--		469	939	9386	93860	620	156	156	156	1560	1564	n/e	63	156	782	782	n/e	63	469	3200	62	940	32000	
Soil-to-Water Maximum Soil Contaminant Concentration	--		34	72	3255		44	4	3	3	0.24	2	n/e	0.58	2	8	7	n/e	3	60	7	4.7	8	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

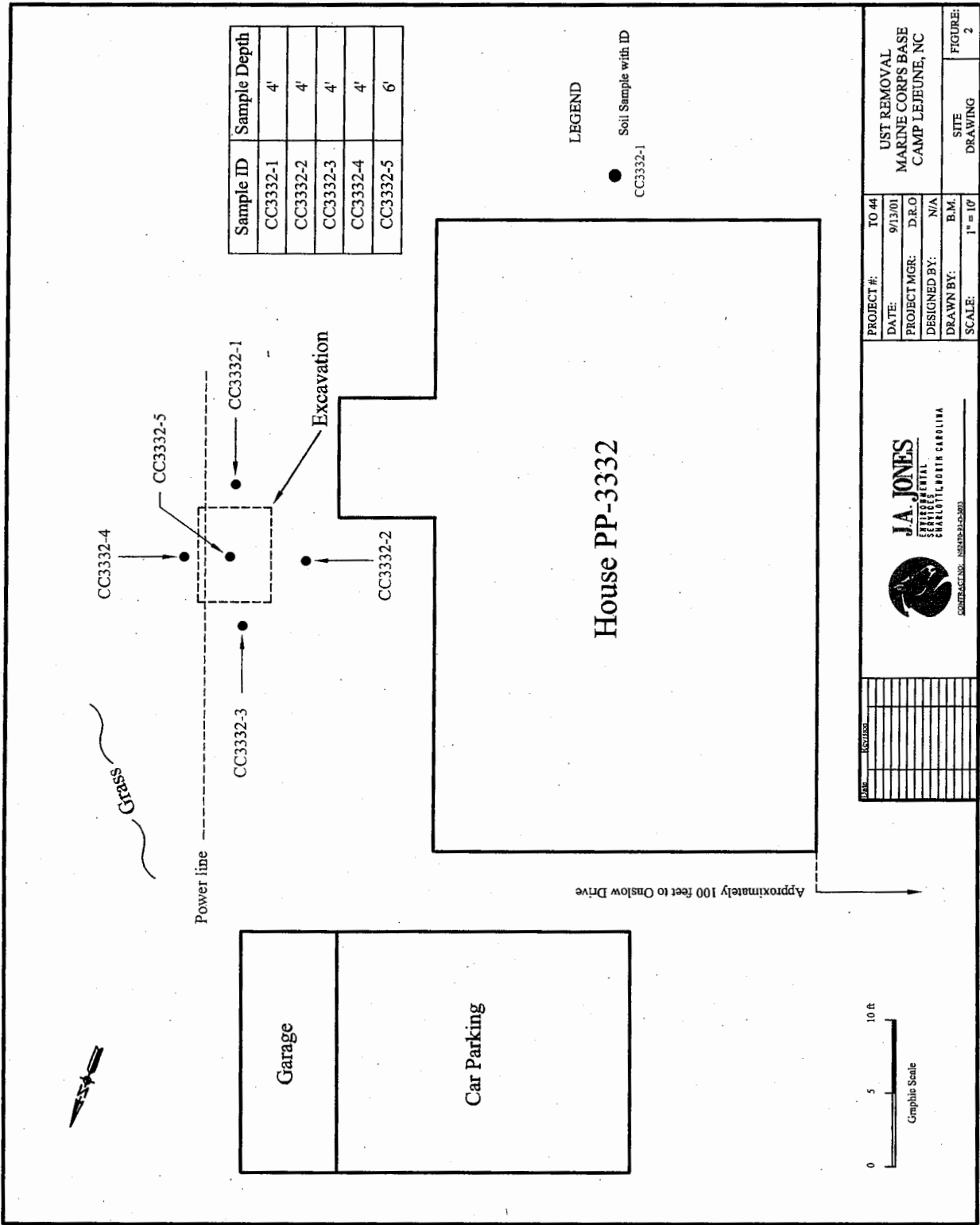


Table SOIL SAMPLES ANALYTICAL RESULTS

SAMPLE ID	DATE	SAMPLE DEPTH	COMPOUND CONCENTRATION (in ppm)																					
			C9-C22 Aromatics	C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	Fluorene	Sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Naphthalene	N-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Dibenzofuran	Acenaphthene	Toluene	Pyrene	Methylene chloride	Total Xylenes
CC-3332-1	11/5/01	4'	3900	670	9160	150	11	7.3	5.2	3.1	6.3	49	6.3	62	20	70	120	18	4.8	4.4				30.2
CC-3332-2	11/5/01	4'	1640	66	1770	67	3.8					35			8.2	25	2.2	7.2	1.2	2.2		0.79		
CC-3332-3	11/5/01	4'	1670	84	1600	83	4.6	1.2			1.3	13		7.5	3.3	26	40	7	1.6	1.8				3.1
CC-3332-4	11/5/01	4'	3170	430	3820	160	12	9.1	5.9	3.5	8.4	56	7.4	76	26	69	110	19	4.4	4.6				32.6
CC-3332-5	11/5/01	6'							0.0098			0.047		0.022	0.0063						0.02	0.038	0.05	
Residential Soil Cleanup Level	--																							
Soil-to-Water Maximum Soil Contaminant Concentration	--		469	939	9386	93860	620	156	1560	1564	n/e	63	156	782	782	n/e	63	469	62	940	3200	469	85	32000
			34	72	3255		44	3	0.24	2	n/e	0.58	2	8	7	n/e	3	60	4.7	8	7	286	0.02	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

Table 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	Sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Naphthalene	N-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	1-Methylnaphthalene	2-Methylnaphthalene	Phenanthrene	Toluene	Benzoic Acid	Dibenzofuran	Pyrene	Acenaphthene	Total Xylenes
CC-3350-1	11/6/01	6.5'	840	110	1920	220	7.1	5.1		2.2	4	11	5.5	39	12	43	87	13						
CC-3350-2	11/6/01	4'	15																0.0061	0.79				
CC-3350-3	11/6/01	4'																						
CC-3350-4	11/6/01	4'	1620	130	1460	42	3	4.7	1.4	1.7	3.5	12	3.7	25	7.1	16	27	5.3			1.1	0.75	1.1	1.7
CC-3350-5	11/6/01	4'	1450	84	1250	37	0.91	2.6	1.1		4.1	7.4	1.5	17	10	4.9	4.2	1.6				0.61	0.62	6
Residential Soil Cleanup Level	--																							
Soil-to-Water Maximum Soil Contaminant Concentration	--		469	939	9386	93860	620	156	1560	1564	n/e	63	156	782	782	n/e	63	469	3200	62571	62	469	940	32000

- 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

**PHASE I LIMITED SITE ASSESSMENT AND SOIL ASSESSMENT REPORT
DATA AND FIGURES**

B. RISK CHARACTERIZATION

Limited Site Assessment Risk Classification and Land Use Form

Part I - Groundwater/Surface Water/Vapor Impacts

High Risk

1. *Has the release contaminated any water supply well including any used for non-drinking purposes?* YES NO

According to I&E/EMD/EQB, the MCB samples the raw water supply wells semi-annually and no contaminants were reported in the latest sampling event. No information provided indicates a water supply well has been contaminated as a result of the release.

2. *Is a water supply well used for drinking water located within 1,000 feet of the source area of the discharge or release?* YES NO

There are no water supply wells located within 1,000 feet of the source area.

3. *Is a water supply well not used for drinking water (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the release?* YES NO

There are no water supply wells located within 1,000 feet of the source area of the release.

4. *Does groundwater within 500 feet of the source area of the release have the potential for future use (there is no other source of water supply other than the groundwater)?* YES NO

No. There are an adequate number of locations for additional water supply wells to be installed on other portions of the base.

5. *Do vapors from the release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety or the environment?* YES NO

If YES describe.

No. No evidence of accumulations has been reported.

6. *Are there any other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment?* YES NO

If YES describe.

No. Review of available previous environmental reports and data collected during this investigation does not provide evidence to suggest other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment.

Intermediate Risk

7. *Is a surface water body located within 500 feet of the source area of the discharge or release?* YES NO

Yes. The New River lies approximately 500 feet west of the subject site.

If YES, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B.0200 by a factor of 10? YES NO

8. *Is the source area of the discharge or release located within an approved or planned wellhead protection area as defined in 42 USC 300h-7(e)?* YES NO
If YES describe.

No. Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB Camp Lejeune has identified wellhead protection areas on the base. Based on the most recent Wellhead Protection Plan Update (2002), the site is not located in a proposed wellhead protection area.

9. *Is the release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985?* YES NO

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.

If YES, is the source area of the release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water?

YES NO

If YES describe

Aquifers below the surficial aquifer in the vicinity of the site 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.

While there is likely recharge to the unconfined surficial aquifer at the Base, this aquifer is not used for water supply in the vicinity of the subject site. Deeper aquifers may obtain a portion of recharge from the surficial aquifer at the Base; however, the amount of recharge provided by the surficial aquifer is expected to be substantially limited due to the presence of confining units.

10. *Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established by the Department?*

YES NO

Groundwater sample results were well below established GCLs.

Part II - Land Use

Property Containing Source Area of Release

The questions below pertain to the property containing the source area of the release.

1. *Does the property contain one or more primary or secondary residences (permanent or temporary)?*

YES NO

Describe.

Yes. The site includes a single-family residence used as base housing for officers and their families.

2. *Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly?*

YES NO

Describe.

No.

3. *Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped?*

YES NO

Describe.

No. As previously mentioned, the subject property is utilized for residential (military housing) purposes.

4. *Do children visit the property?*

YES NO

Explain.

Yes. Since the site is located in a residential area, children may visit the subject area.

Is access to the property reliably restricted consistent with its use (e.g., by fences, security personnel or both)?

YES NO

Explain.

No. As previously mentioned, the site is located in a military residential area. There is no security fence around the former tank location.

5. *Do pavement, buildings, or other structures cap the contaminated soil?* YES NO
Describe.

No. The site is located in a grassy area.

If YES, what mechanisms are in place or can be put into place to ensure that the contaminated soil will remain capped in the foreseeable future?

6. *What is the zoning status of the property?*

The MCB Camp Lejeune is not subject to local or county zoning requirements.

7. *Is the use of the property likely to change in the next 20 years?* YES NO
Explain.

No. The designated use of the military housing on the Base is not likely to change in the foreseeable future.

Property Surrounding Source Area of Release

The questions below pertain to the area within 1500 feet of the source area of the release (excludes property containing source area of the release):

1. *What is the distance from the source area of the release to the nearest primary or secondary residence (permanent or temporary)?*

The source area is located within five feet of a primary residence.

2. *What is the distance from the source area of the release to the nearest school, daycare center, hospital, playground, park, recreation area, church, nursing home or other place of public assembly?*

There were no places of public assembly identified within a 1,500' radius of the subject site (See Figure 2).

3. *What is the zoning status of properties in the surrounding area?*

As previously stated, MCB Camp Lejeune is not subject to local or county zoning requirements. The surrounding property has been developed for military support purposes.

4. *Briefly characterize the use and activities of the land in the surrounding area.*

The surrounding properties are developed and used as base housing for officers and their families.

C. RECEPTOR INFORMATION

1. Water Supply Wells

(Refer to Table 5 and Figure 1)

As shown on Figure 1 and Table 5, there are no water supply wells located within 1,500 feet of subject site.

2. Public Water Supplies

Are public water supplies available within 1,500 feet of the source area of the release?

YES NO

If YES, where is the location of the nearest public water lines and the source(s) of the public water supply (indicate on map). Describe.

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

3. Surface Water

The New River lies approximately 500 feet west of the subject site.

4. Wellhead Protection Areas

As discussed earlier, 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, Pee Dee, 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 Pee Dee Aquifer, in order of increasing depth. Both the Beaufort and Pee Dee 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 and water lines enter the residence on the north side of the residence, immediately east of the source area. Underground power and water lines transect the northern side of the property. It is uncertain exactly where these utilities enter the residence. 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.

D. SITE GEOLOGY AND HYDROGEOLOGY
(Refer to Appendix A)

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 indicate site geology to be comprised of very fine to fine silty sands to a depth of three feet below ground surface. Split spoon samples collected during temporary monitoring well USTPP3326-TW01 boring advancement revealed a silty, fat clay from 10 to 12 feet below ground surface. Boring logs for the soil boring and temporary well are included in Appendix A.

The split spoons collected during advancement of the temporary monitoring well boring revealed soils to be saturated at approximately eight feet below ground surface. Groundwater depth as measured in the monitoring well was 8.56 feet below the top of casing.

Subsurface soils in the water bearing zone were described as silty clay, which typically exhibits low permeability. Based on experience with similar sites, rapid migration of groundwater contamination is not expected.

Due to the low contaminant concentrations observed, degradation of contamination may occur mainly due to adsorption and dispersion.

TABLE 1
SITE HISTORY
UST SYSTEM INFORMATION

PP-3326

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-3326	Fuel Oil*	285	Unknown	(P) 10/01	Yes

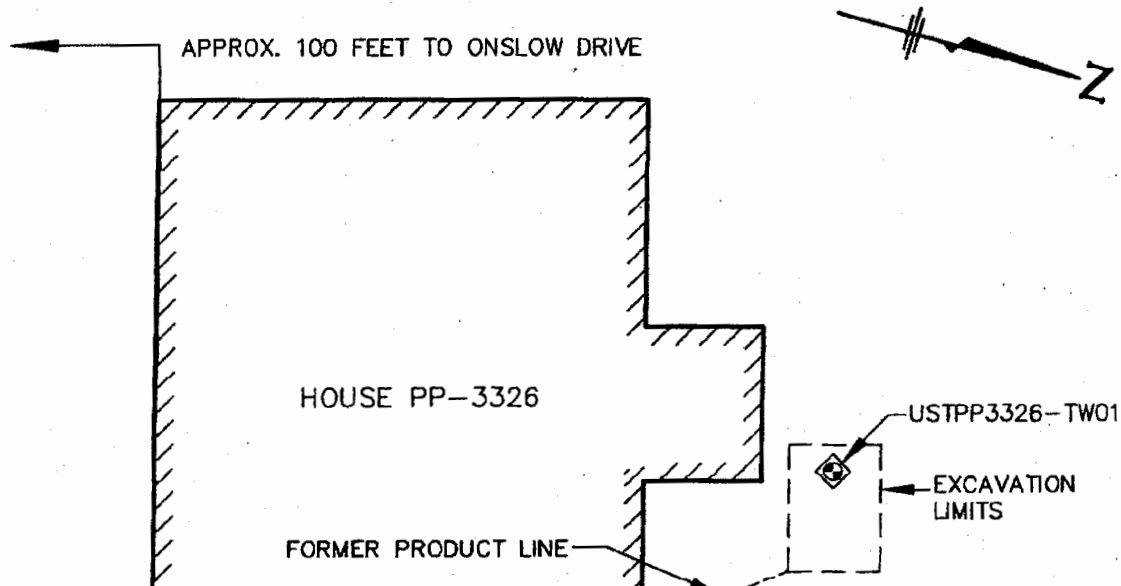
* UST was used strictly for residential heating purposes

* Still in use means not permanently closed.

TABLE 2
SITE HISTORY
UST OWNER/OPERATOR INFORMATION

PP-3326

UST ID Number	Name of Owner or Operator	Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	Owner or Operator?
PP-3326	Commanding General Marine Corps Base Camp Lejeune, NC	Unknown to 10/01	Owner and Operator
Address		Telephone Number	
I&E/EMD/EQB PSC 20004 Marine Corps Base, Camp Lejeune, NC 28542		910-451-5068	



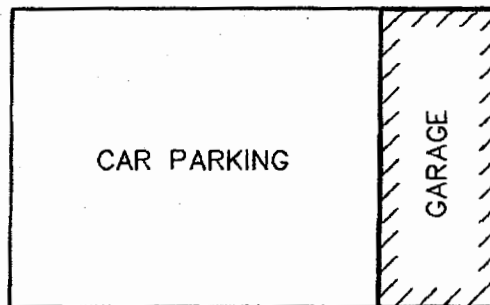
Analytical Method: EPA Method 8260B/5035

USTPP3326-SB01

Sample ID	Contaminant of Concern →		Methylene Chloride	Toluene	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)			
Residential MSCC (mg/kg)			85	3,200	Varies
Industrial/Commercial MSCC (mg/kg)			763	82,000	Varies
Soil to Groundwater MSCC (mg/kg)			0.02	7	Varies
3326	7/22/02	1 - 2	0.03*	0.012	BQL

All results in mg/kg.

*Compound was detected in laboratory method blank.



LEGEND

EXISTING NEW DESCRIPTION



BUILDING



SOIL BORING (HAND AUGER)



TYPE II WELL (TEMPORARY)

NOTE:

1. MAP ADAPTED FROM J.A. JONES

10 5 0 10
SCALE IN FEET

CAELIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3326
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

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

FIGURE

4A

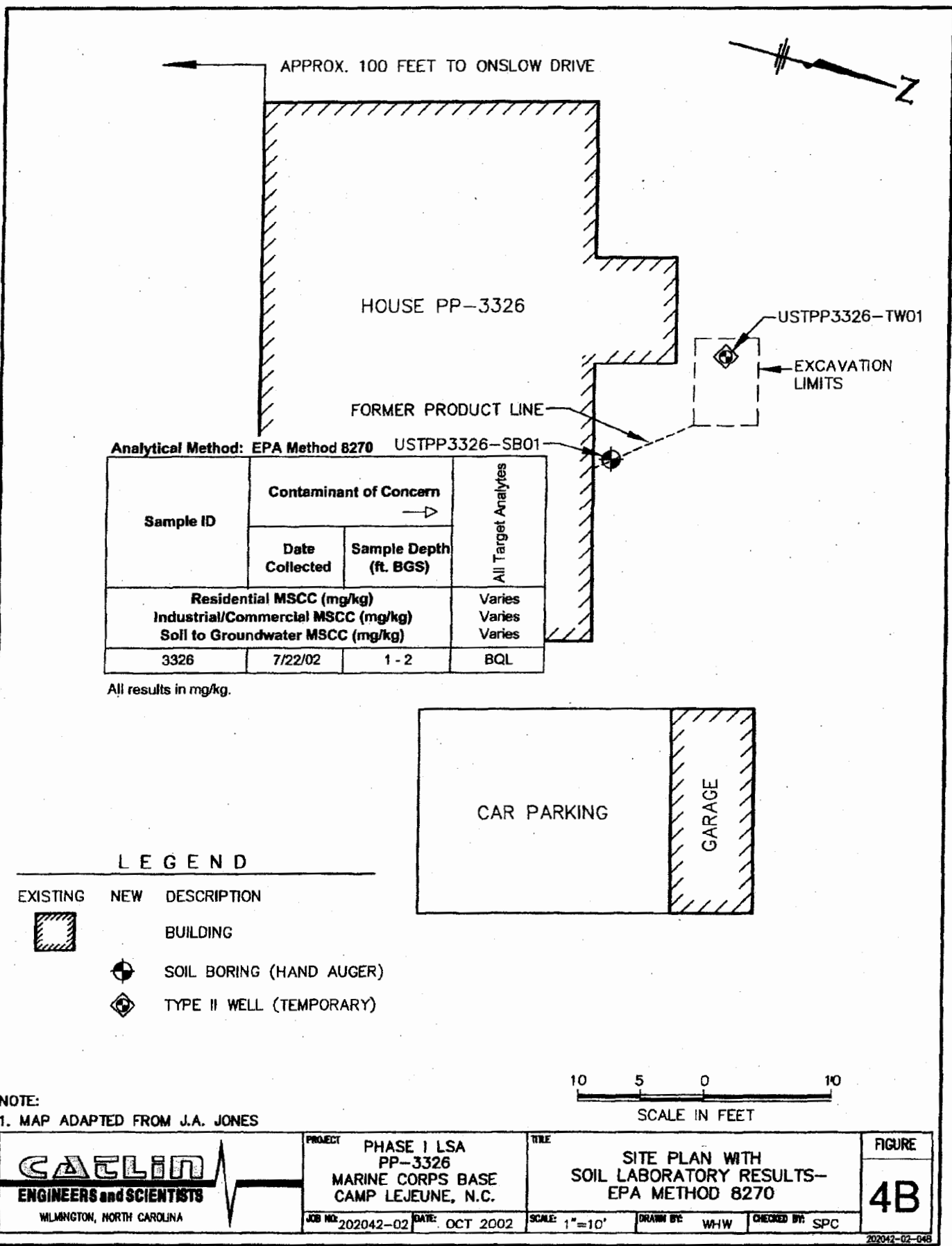
JOB NO. 202042-02 DATE: OCT 2002

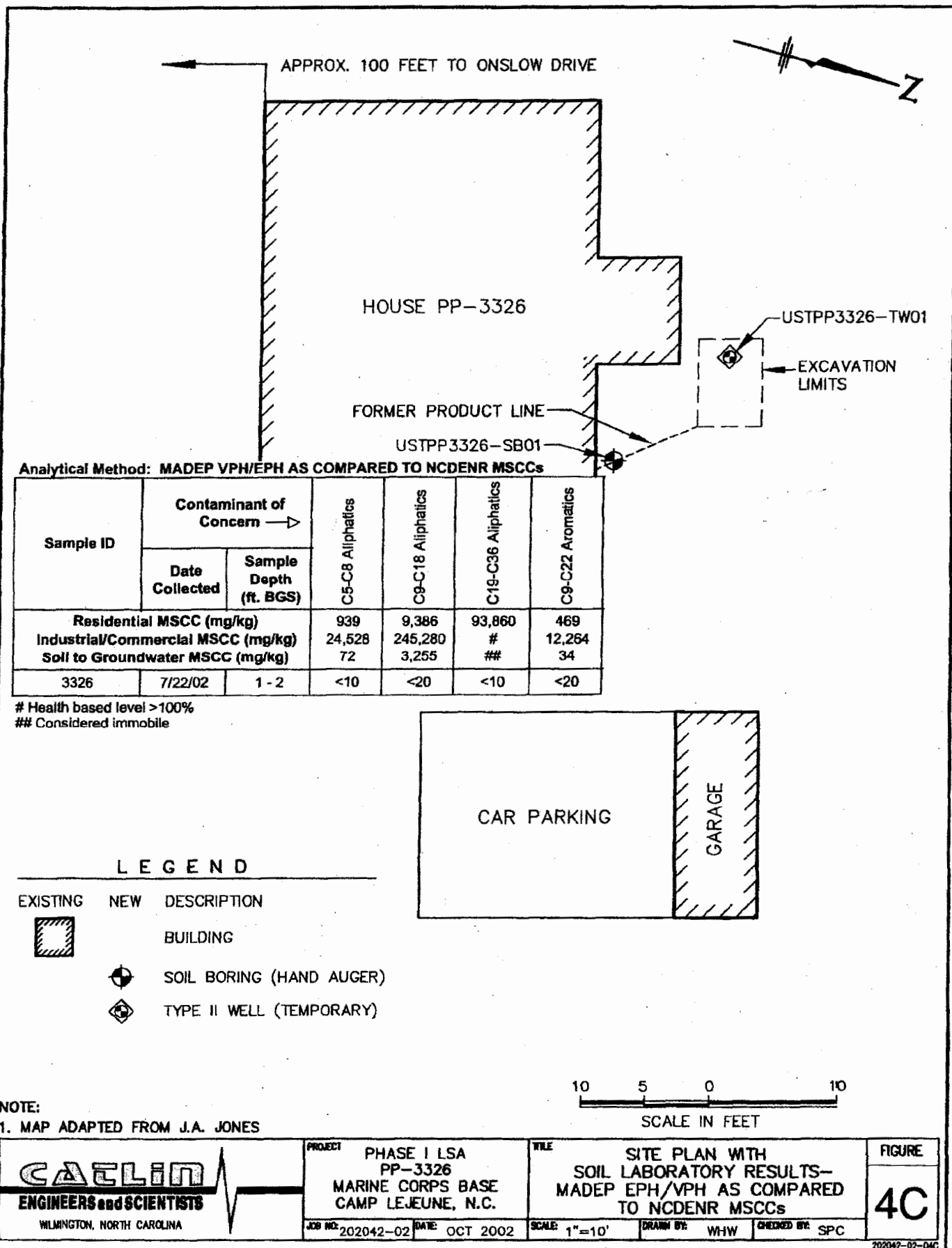
SCALE: 1"=10'

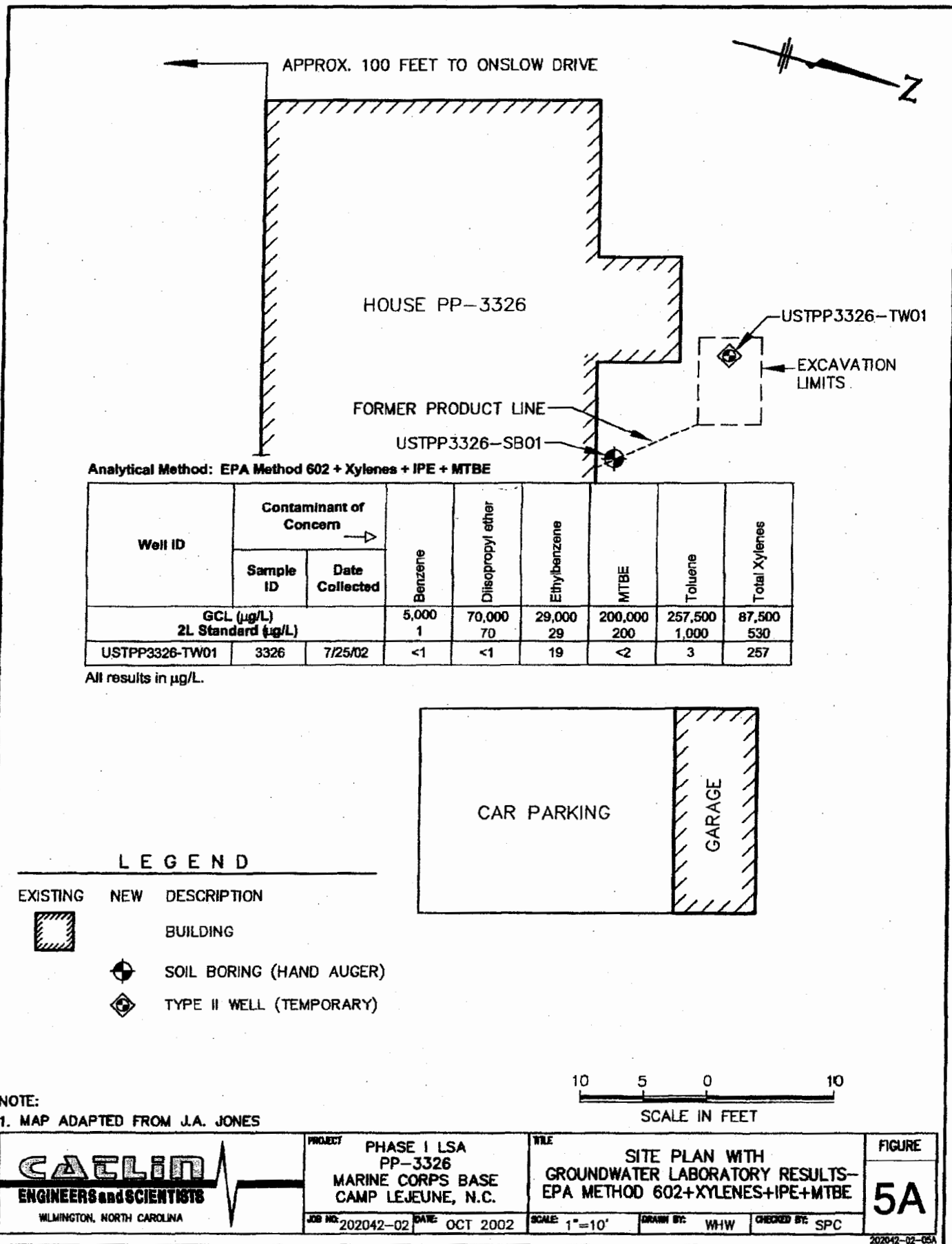
DRAWN BY: WHW

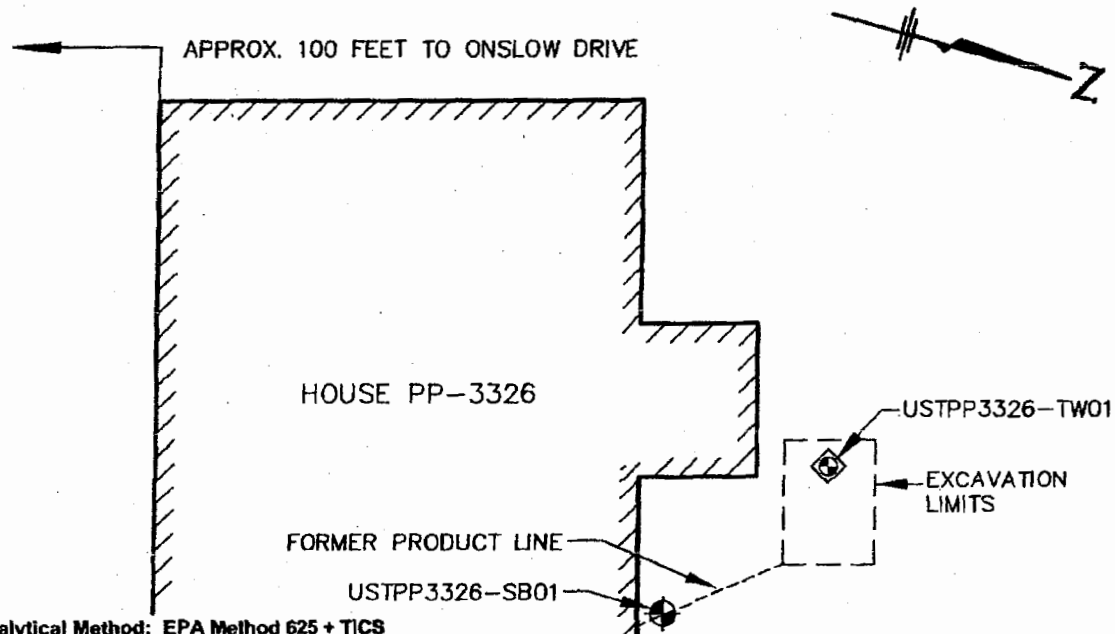
CHECKED BY: SPC

202042-02-04A





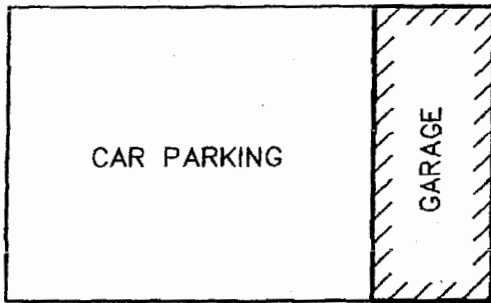




Analytical Method: EPA Method 625 + TICS

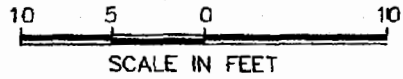
Well ID	Contaminant of Concern →		Naphthalene	Fluorene	All Other Analytes
	Sample ID	Date Collected			
GCL (µg/L)			15,500	950	Varies
2L Standard (µg/L)			21	280	Varies
USTPP3326-TW01	3326	7/25/02	110	10	BQL

All results in µg/L.
Shaded area indicates concentration above 2L Standard.



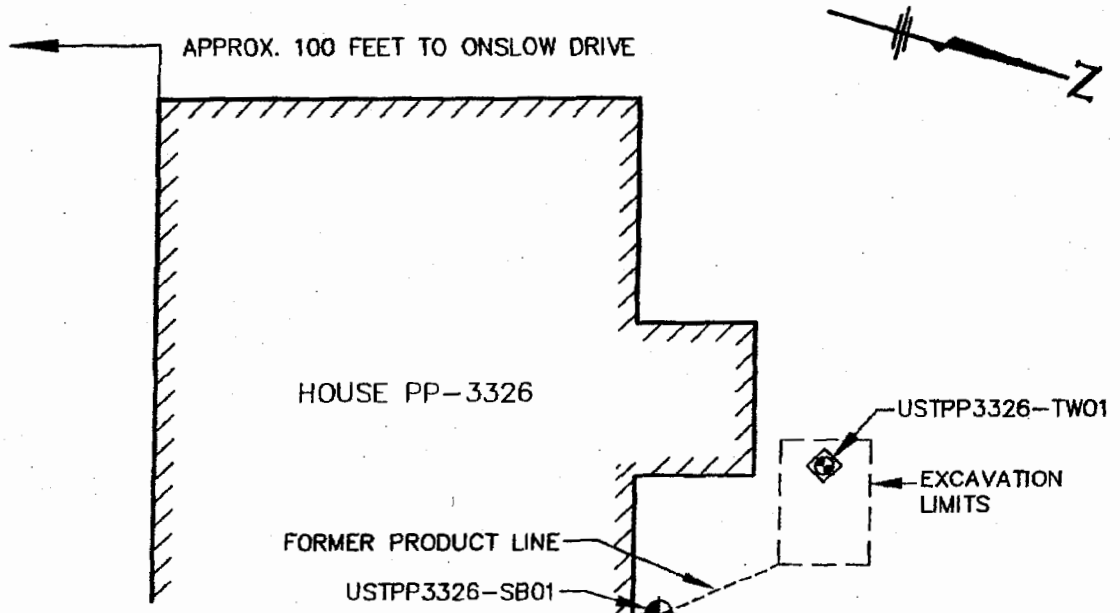
LEGEND

- | | | |
|----------|-----|--------------------------|
| EXISTING | NEW | DESCRIPTION |
| | | BUILDING |
| | | SOIL BORING (HAND AUGER) |
| | | TYPE II WELL (TEMPORARY) |



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

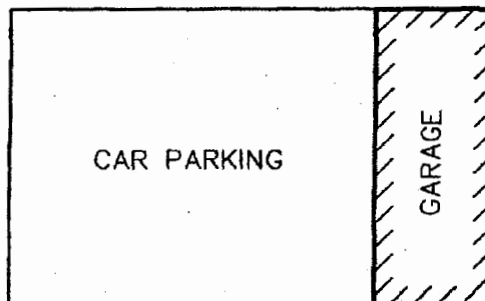
CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT PHASE I LSA PP-3326 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH GROUNDWATER LABORATORY RESULTS- EPA METHOD 625+TICS	FIGURE 5B
	JOB NO: 202042-02 DATE: OCT 2002	SCALE: 1"=10'	DRAWN BY: WHW CHECKED BY: SPC



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

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Sample ID	Date Collected				
IGWQS (µg/L)			420	4,200	42,000	210
USTPP3326-TW01	3326	7/25/02	<100	940	<100	460

All results in µg/L.
Shaded area indicates concentration above IGWQS.



LEGEND

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

NOTE:

1. MAP ADAPTED FROM J.A. JONES

10 5 0 10
SCALE IN FEET

 CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT PHASE I LSA PP-3326 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH GROUNDWATER LABORATORY RESULTS- MADEP EPH/VPH AS COMPARED TO NCDENR IGWQS	FIGURE 5C
	JOB NO. 202042-02 DATE OCT 2002	SCALE 1"=10'	DRAWN BY: WHW CHECKED BY: SPC

B. RISK CHARACTERIZATION

Limited Site Assessment Risk Classification and Land Use Form

Part I - Groundwater/Surface Water/Vapor Impacts

High Risk

1. *Has the release contaminated any water supply well including any used for non-drinking purposes?*

YES NO

According to I&E/EMD/EQB, the MCB samples the raw water supply wells semi-annually and no contaminants were reported in the latest sampling event. No information provided indicates a water supply well has been contaminated as a result of the release.

2. *Is a water supply well used for drinking water located within 1,000 feet of the source area of the discharge or release?*

YES NO

There are no water supply wells located within 1,000 feet of the source area.

3. *Is a water supply well not used for drinking water (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the release?*

YES NO

There are no water supply wells located within 1,000 feet of the source area of the release.

4. *Does groundwater within 500 feet of the source area of the release have the potential for future use (there is no other source of water supply other than the groundwater)?*

YES NO

No. There are an adequate number of locations for additional water supply wells to be installed on other portions of the base.

5. *Do vapors from the release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety or the environment?*
If YES describe.

YES NO

No. No evidence of accumulations have been reported.

6. *Are there any other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment?*
If YES describe.

YES NO

No. Review of available previous environmental reports and data collected during this investigation does not provide evidence to suggest other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment.

Intermediate Risk

7. *Is a surface water body located within 500 feet of the source area of the discharge or release?*

YES NO

Yes. The New River lies approximately 250 feet west of the subject site.

If YES, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B.0200 by a factor of 10?

YES NO

8. *Is the source area of the discharge or release located within an approved or planned wellhead protection area as defined in 42 USC 300h-7(e)?*
If YES describe.

YES NO

No. Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB Camp Lejeune has identified wellhead protection areas on the base. Based on the most recent Wellhead Protection Plan Update (2002), the site is not located in a proposed wellhead protection area.

9. *Is the release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985?*

YES NO

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.

If YES, is the source area of the release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water?

YES NO

If YES describe

Aquifers below the surficial aquifer in the vicinity of the site typically include the Castle Hayne Aquifer, the Beaufort Aquifer, and the Pee Dee Aquifer, in order of increasing depth. Both the Beaufort and Pee Dee 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.

While there is likely recharge to the unconfined surficial aquifer at the Base, this aquifer is not used for water supply in the vicinity of the subject site. Additionally, the amount of recharge provided by the surficial aquifer is expected to be substantially limited due to the presence of confining units.

10. *Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established by the Department?*

YES NO

Groundwater sample results were well below established GCLs.

Part II - Land Use

Property Containing Source Area of Release

The questions below pertain to the property containing the source area of the release.

1. *Does the property contain one or more primary or secondary residences (permanent or temporary)?*
Describe.

YES NO

Yes. The site includes a single-family residence used as base housing for officers and their families.

2. *Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly?*
Describe.

YES NO

No.

3. *Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped?*
Describe.

YES NO

No. As previously mentioned, the subject property is utilized for residential (military housing) purposes.

4. *Do children visit the property?*
Explain.

YES NO

Yes. Since the site is located in a residential area, children may visit the subject area.

Is access to the property reliably restricted consistent with its use (e.g., by fences, security personnel or both)?
Explain.

YES NO

No. As previously mentioned, the site is located in a military residential area. There is no security fence around the former tank location.

5. *Do pavement, buildings, or other structures cap the contaminated soil?* YES NO
Describe.

No. The site is located in a grassy area.

If YES, what mechanisms are in place or can be put into place to ensure that the contaminated soil will remain capped in the foreseeable future?

6. *What is the zoning status of the property?*

The MCB Camp Lejeune is not subject to local or county zoning requirements.

7. *Is the use of the property likely to change in the next 20 years?* YES NO
Explain.

No. The designated use of the military housing on the Base is not likely to change in the foreseeable future.

Property Surrounding Source Area of Release

The questions below pertain to the area within 1500 feet of the source area of the release (excludes property containing source area of the release):

1. *What is the distance from the source area of the release to the nearest primary or secondary residence (permanent or temporary)?*

The source area is located within five feet of a primary residence.

2. *What is the distance from the source area of the release to the nearest school, daycare center, hospital, playground, park, recreation area, church, nursing home or other place of public assembly?*

There were no places of public assembly identified within a 1,500' radius of the subject site (See Figure 2).

3. *What is the zoning status of properties in the surrounding area?*

As previously stated, MCB Camp Lejeune is not subject to local or county zoning requirements. The surrounding property has been developed for military support purposes.

4. *Briefly characterize the use and activities of the land in the surrounding area.*

The surrounding properties are developed and used as base housing for officers and their families.

C. RECEPTOR INFORMATION

1. Water Supply Wells (Refer to Table 5 and Figure 1)

As shown on Figure 1 and Table 5, there were no water supply wells located within 1,500 feet of subject site.

2. Public Water Supplies

Are public water supplies available within 1,500 feet of the source area of the release?

YES NO

If YES, where is the location of the nearest public water lines and the source(s) of the public water supply (indicate on map). Describe.

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 and 425 feet north and south, respectively, of the site.

4. Wellhead Protection Areas

As discussed earlier, 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, Pee Dee, 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 Pee Dee Aquifer, in order of increasing depth. Both the Beaufort and Pee Dee 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. Underground power enters the residence to the southeast of the source area and an underground powerline runs to the garage across the tank basin. 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.

D. SITE GEOLOGY AND HYDROGEOLOGY
(Refer to Appendix A)

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 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.

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 was 5.27 feet below top of casing.

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.

TABLE 1
SITE HISTORY
UST SYSTEM INFORMATION

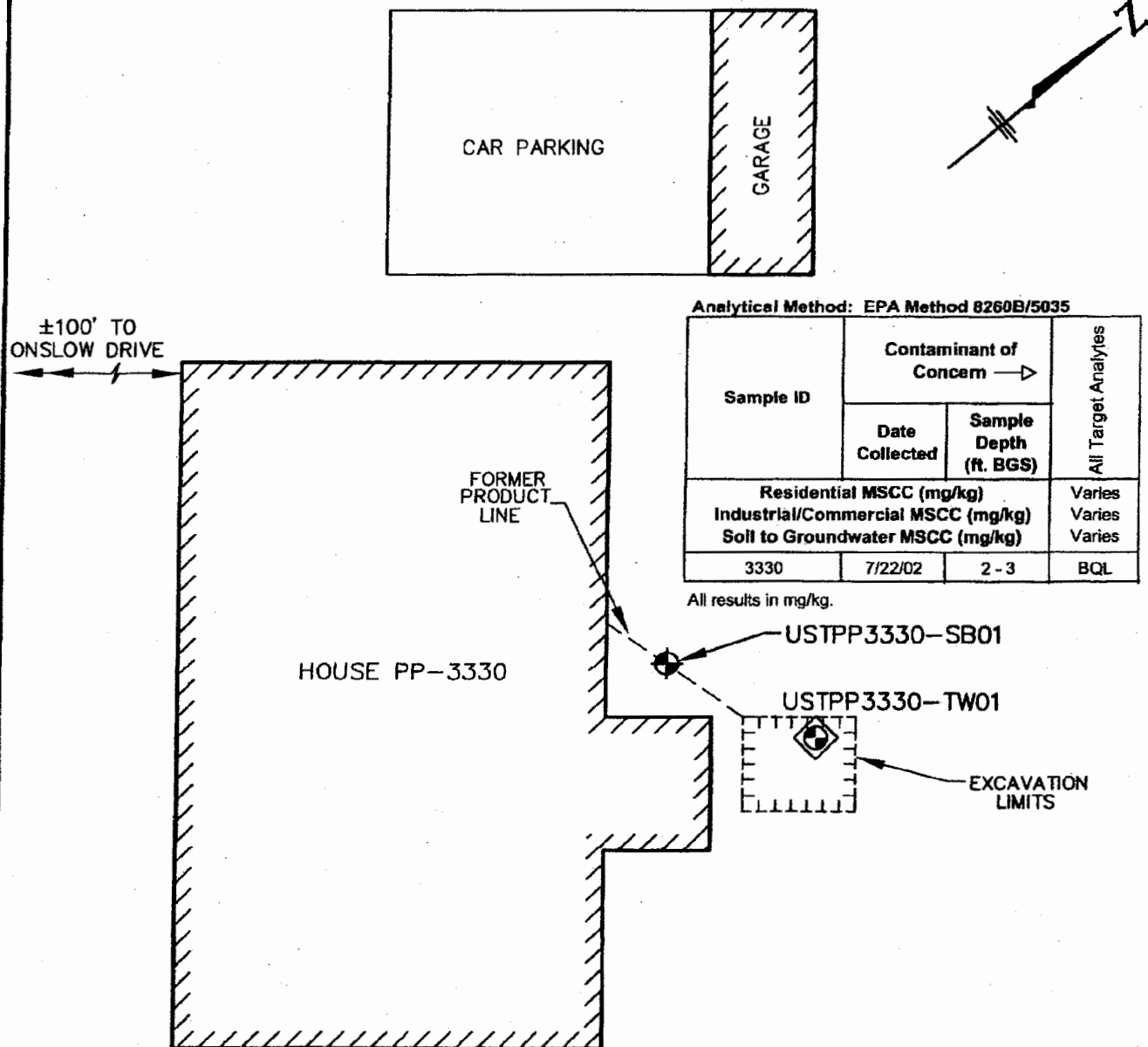
PP-3330

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

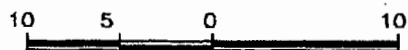
* UST was used strictly for residential heating purposes

* 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	

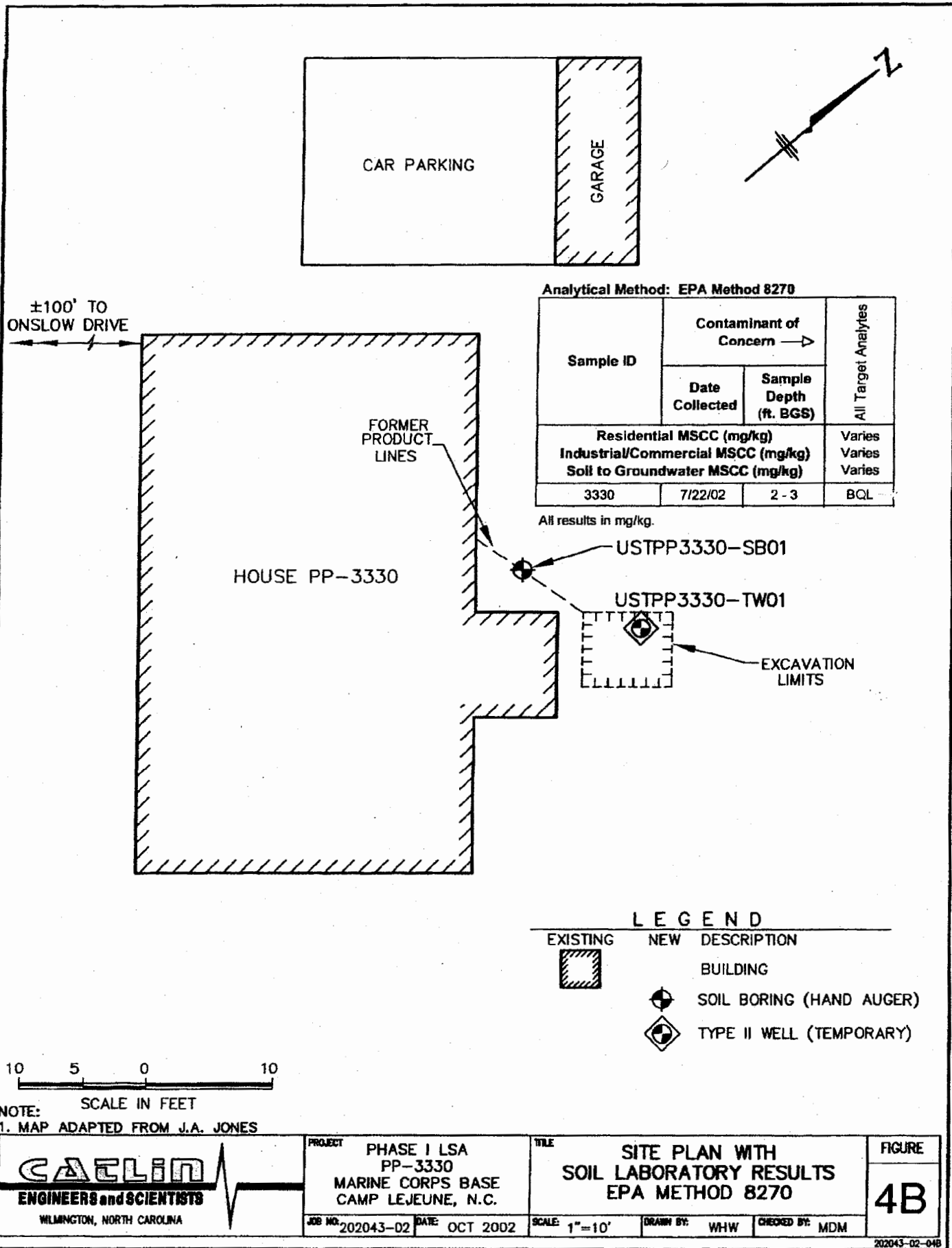


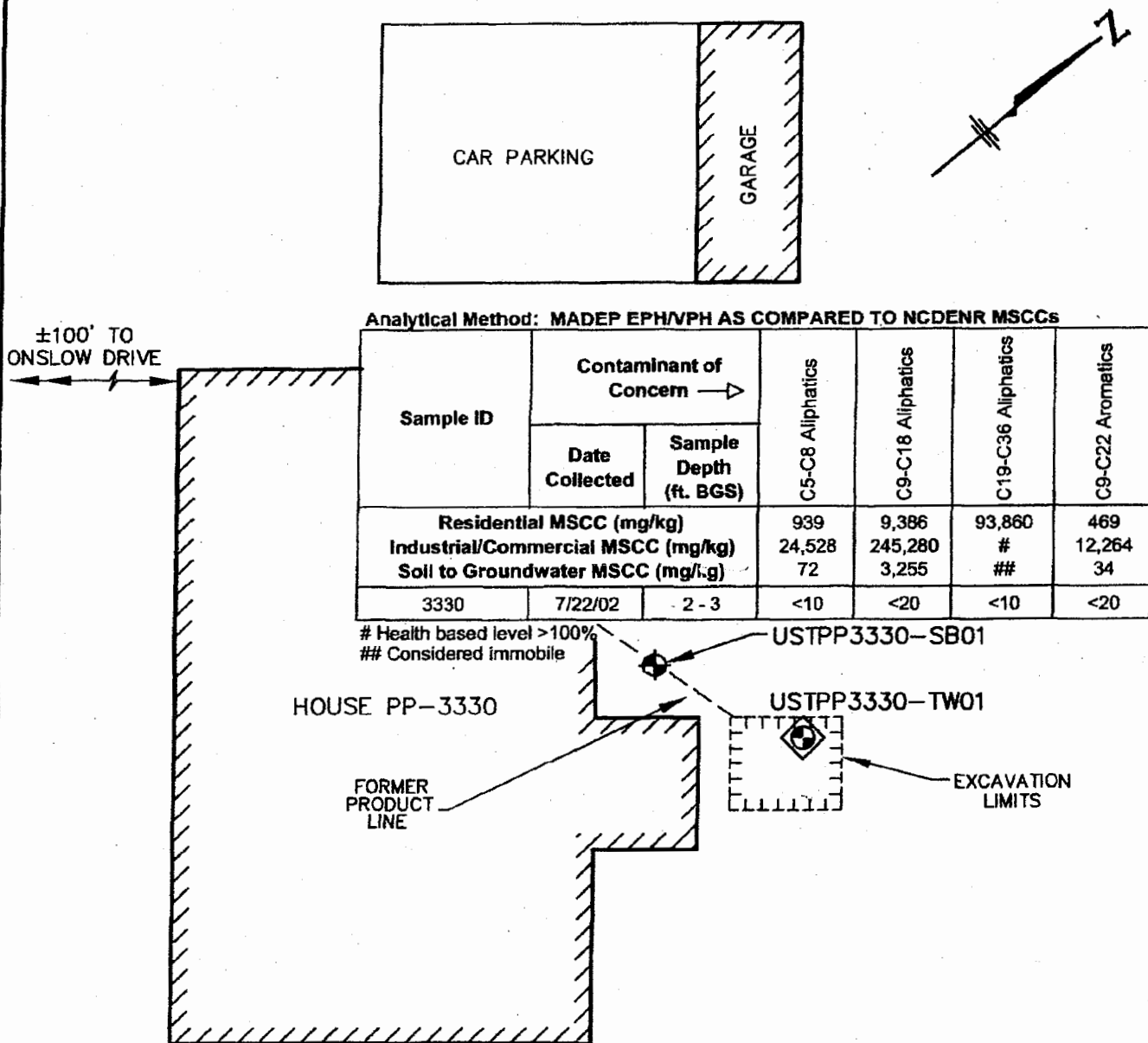
LEGEND		
EXISTING	NEW	DESCRIPTION
		BUILDING
		SOIL BORING (HAND AUGER)
		TYPE II WELL (TEMPORARY)



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

CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT PHASE I LSA PP-3330 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8260B/5035	FIGURE 4A
	JOB NO: 202043-02 DATE: OCT 2002	SCALE: 1"=10' DRAWN BY: WHW CHECKED BY: MDM	202043-02-04A





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

10 5 0 10
SCALE IN FEET

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

CAELIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3330
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 202043-02 DATE OCT 2002

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

SCALE 1"=10'

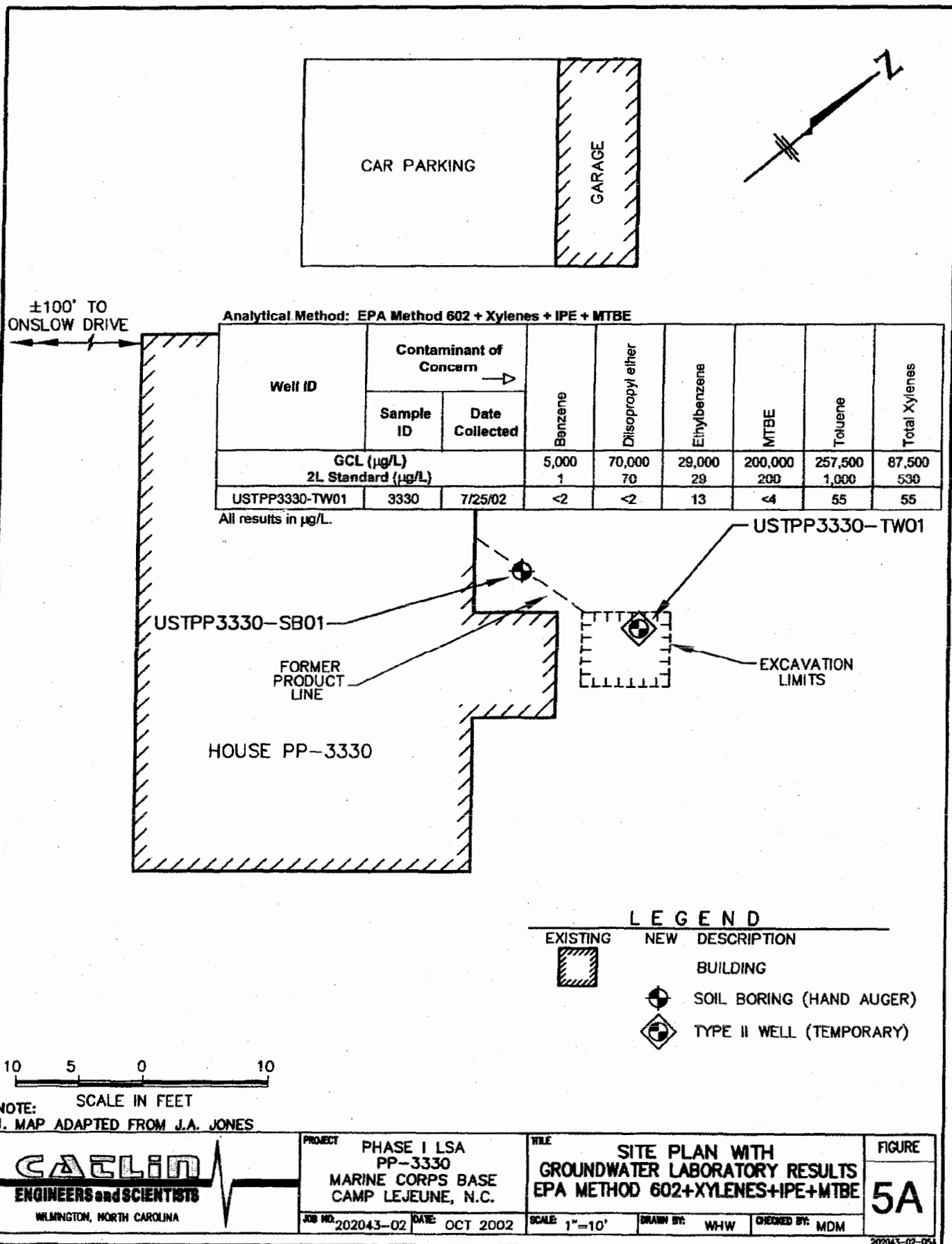
DRAWN BY: WHW

CHECKED BY: MDM

FIGURE

4C

202043-02-04C

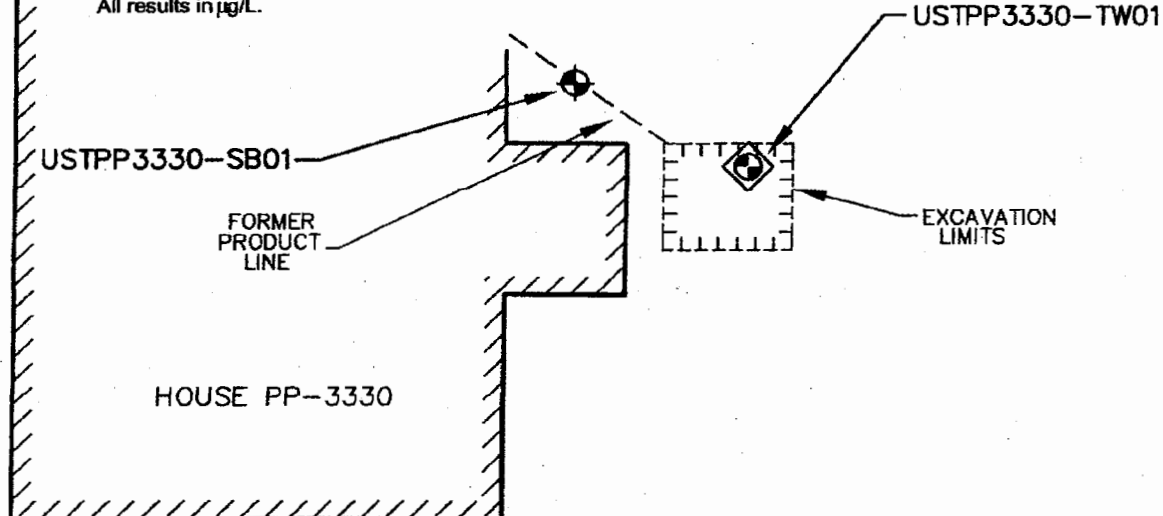


±100' TO
ONSLow DRIVE

Analytical Method: EPA Method 625 + TICS

Well ID	Contaminant of Concern →		Naphthalene	Phenanthrene	Fluorene	Acenaphthene	All Other Analytes
	Sample ID	Date Collected					
GCL (µg/L)			15,500	410	950	2,120	Varies
2L Standard (µg/L)			21	210	280	80	Varies
USTPP3330-TW01	3330	7/25/02	110	50	24	20	BQL

All results in µg/L.



LEGEND

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

10 5 0 10
SCALE IN FEET

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

CAELIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3330
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 202043-02 DATE OCT 2002

TITLE SITE PLAN WITH
GROUNDWATER LABORATORY RESULTS
EPA METHOD 625+TICS

SCALE: 1"=10'

DRAWN BY: WHW

CHECKED BY: MDM

FIGURE

5B

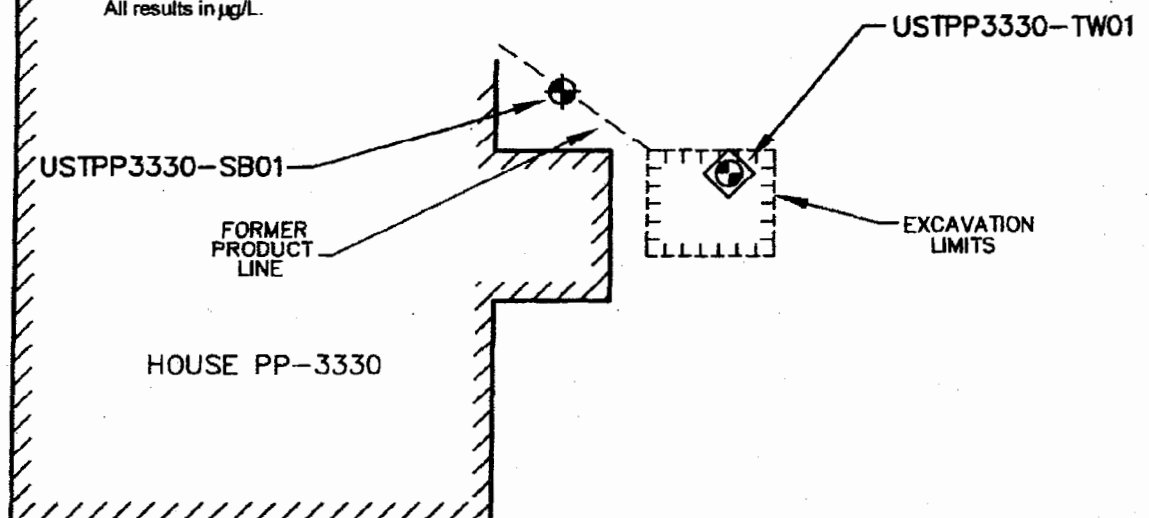
202043-02-056

±100' TO
ON SLOW DRIVE

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

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Sample ID	Date Collected				
IGWQS (µg/L)			420	4,200	42,000	210
USTPP3330-TW01	3330	7/25/02	<100	6,910	1,400	3,730

All results in µg/L.



LEGEND

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

10 5 0 10
SCALE IN FEET

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

CAELIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3330
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO: 202043-02 DATE: OCT 2002

TITLE SITE PLAN WITH
GROUNDWATER LABORATORY RESULTS
MADEP VPH/EPH AS COMPARED
TO NCDENR IGWQS

SCALE 1"=10'

DRAWN BY: WHW

CHECKED BY: MDM

FIGURE
5C

202043-02-05C

B. RISK CHARACTERIZATION

Limited Site Assessment Risk Classification and Land Use Form

Part I - Groundwater/Surface Water/Vapor Impacts

High Risk

1. *Has the release contaminated any water supply well including any used for non-drinking purposes?* YES NO

According to I&E/EMD/EQB, the MCB samples the raw water supply wells semi-annually and no contaminants were reported in the latest sampling event. No information provided indicates a water supply well has been contaminated as a result of the release.

2. *Is a water supply well used for drinking water located within 1,000 feet of the source area of the discharge or release?* YES NO

There are no water supply wells located within 1,000 feet of the source area.

3. *Is a water supply well not used for drinking water (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the release?* YES NO

There are no water supply wells located within 1,000 feet of the source area of the release.

4. *Does groundwater within 500 feet of the source area of the release have the potential for future use (there is no other source of water supply other than the groundwater)?* YES NO

No. There are an adequate number of locations for additional water supply wells to be installed on other portions of the base.

5. *Do vapors from the release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety or the environment?* YES NO
If YES describe.

No. No evidence of accumulations has been reported.

6. *Are there any other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment?* YES NO
If YES describe.

No. Review of available previous environmental reports and data collected during this investigation does not provide evidence to suggest other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment.

Intermediate Risk

7. *Is a surface water body located within 500 feet of the source area of the discharge or release?* **YES** **NO**

Yes. The New River lies approximately 150 feet west of the subject site.

If YES, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B.0200 by a factor of 10? **YES** **NO**

8. *Is the source area of the discharge or release located within an approved or planned wellhead protection area as defined in 42 USC 300h-7(e)?* **YES** **NO**
If YES describe.

No. Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB Camp Lejeune has identified wellhead protection areas on the base. Based on the most recent Wellhead Protection Plan Update (2002), the site is not located in a proposed wellhead protection area.

9. *Is the release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985?* **YES** **NO**

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.

If YES, is the source area of the release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water? **YES** **NO**
If YES describe

Aquifers below the surficial aquifer in the vicinity of the site typically include the Castle Hayne Aquifer, the Beaufort Aquifer, and the Pee Dee Aquifer, in order of increasing depth. Both the Beaufort and Pee Dee 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.

While there is likely recharge to the unconfined surficial aquifer at the Base, this aquifer is not used for water supply in the vicinity of the subject site. Additionally, the amount of recharge provided by the surficial aquifer is expected to be substantially limited due to the presence of confining units.

10. *Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established by the Department?* YES NO

Groundwater sample results were well below established GCLs.

Part II - Land Use

Property Containing Source Area of Release

The questions below pertain to the property containing the source area of the release.

1. *Does the property contain one or more primary or secondary residences (permanent or temporary)?* YES NO
Describe.

Yes. The site includes a single-family residence used as base housing for officers and their families.

2. *Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly?* YES NO
Describe.

No.

3. *Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped?* YES NO
Describe.

No. As previously mentioned, the subject property is utilized for residential (military housing) purposes.

4. *Do children visit the property?*
Explain.

YES NO

Yes. Since the site is located in a residential area, children may visit the subject area.

Is access to the property reliably restricted consistent with its use (e.g., by fences, security personnel or both)?
Explain.

YES NO

No. As previously mentioned, the site is located in a military residential area. There is no security fence around the former tank location.

5. *Do pavement, buildings, or other structures cap the contaminated soil?*
Describe.

YES NO

No. The site is located in a grassy area.

If YES, what mechanisms are in place or can be put into place to ensure that the contaminated soil will remain capped in the foreseeable future?

6. *What is the zoning status of the property?*

The MCB Camp Lejeune is not subject to local or county zoning requirements.

7. *Is the use of the property likely to change in the next 20 years?*
Explain.

YES NO

No. The designated use of the military housing on the Base is not likely to change in the foreseeable future.

Property Surrounding Source Area of Release

The questions below pertain to the area within 1500 feet of the source area of the release (excludes property containing source area of the release):

1. *What is the distance from the source area of the release to the nearest primary or secondary residence (permanent or temporary)?*

The source area is located within five feet of a primary residence.

2. *What is the distance from the source area of the release to the nearest school, daycare center, hospital, playground, park, recreation area, church, nursing home or other place of public assembly?*

There were no places of public assembly identified within a 1,500' radius of the subject site (See Figure 2).

3. *What is the zoning status of properties in the surrounding area?*

As previously stated, MCB Camp Lejeune is not subject to local or county zoning requirements. The surrounding property has been developed for base housing purposes.

4. *Briefly characterize the use and activities of the land in the surrounding area.*

The surrounding properties are developed and used as base housing for officers and their families.

C. RECEPTOR INFORMATION

1. **Water Supply Wells**
(Refer to Table 5 and Figure 1)

As shown on Figure 1 and Table 5, there are no water supply wells located within 1,500 feet of subject site.

2. **Public Water Supplies**

Are public water supplies available within 1,500 feet of the source area of the release?

YES NO

If YES, where is the location of the nearest public water lines and the source(s) of the public water supply (indicate on map). Describe.

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

3. **Surface Water**

The New River lies approximately 150 feet west of the subject site. Two unnamed, intermittent tidal creeks are located approximately 525 and 600 feet from the site.

4. Wellhead Protection Areas

As discussed earlier, 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 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 north eastern side of the residence, north of the source area. Underground power, cable and telephone enter the residence to the 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.

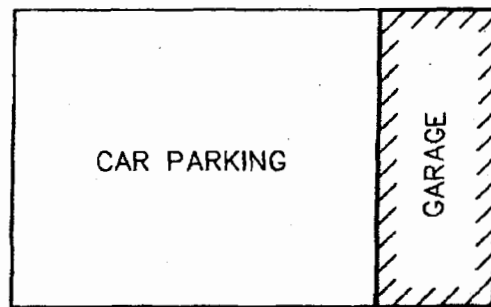
TABLE 1 SITE HISTORY UST SYSTEM INFORMATION UST PP-3332					
UST ID Number	Product (gasoline, diesel, jet fuel, etc.)	Capacity (gallons)	Date Installed (m/dd/yy)	Date Permanently Closed (P), or Still in Use* (C) (m/dd/yy)	Was Release Associated With UST System? (Yes/No)
PP-3332	Fuel Oil ⁺	285	Unknown	(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
UST PP-3332

UST ID Number	Name of Owner or Operator	Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	Owner or Operator?
PP-3332	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	



APPROX. 100 FEET TO ONSLOW DRIVE

Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern →		Toluene	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)		
Residential MSCC (mg/kg)			3,200	Varies
Industrial/Commercial MSCC (mg/kg)			82,000	
Soil to Groundwater MSCC (mg/kg)			7	
3332	7/22/02	3 - 4	0.0058	BQL

All results in mg/kg.
BQL = Below Quantitation Limits, refer to laboratory report for a complete list of analytes and quantitation limits.

FORMER PRODUCT LINES

USTPP3332-SB01

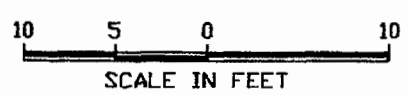
HOUSE PP-3332

EXCAVATION LIMITS

USTPP3332-TW01

LEGEND

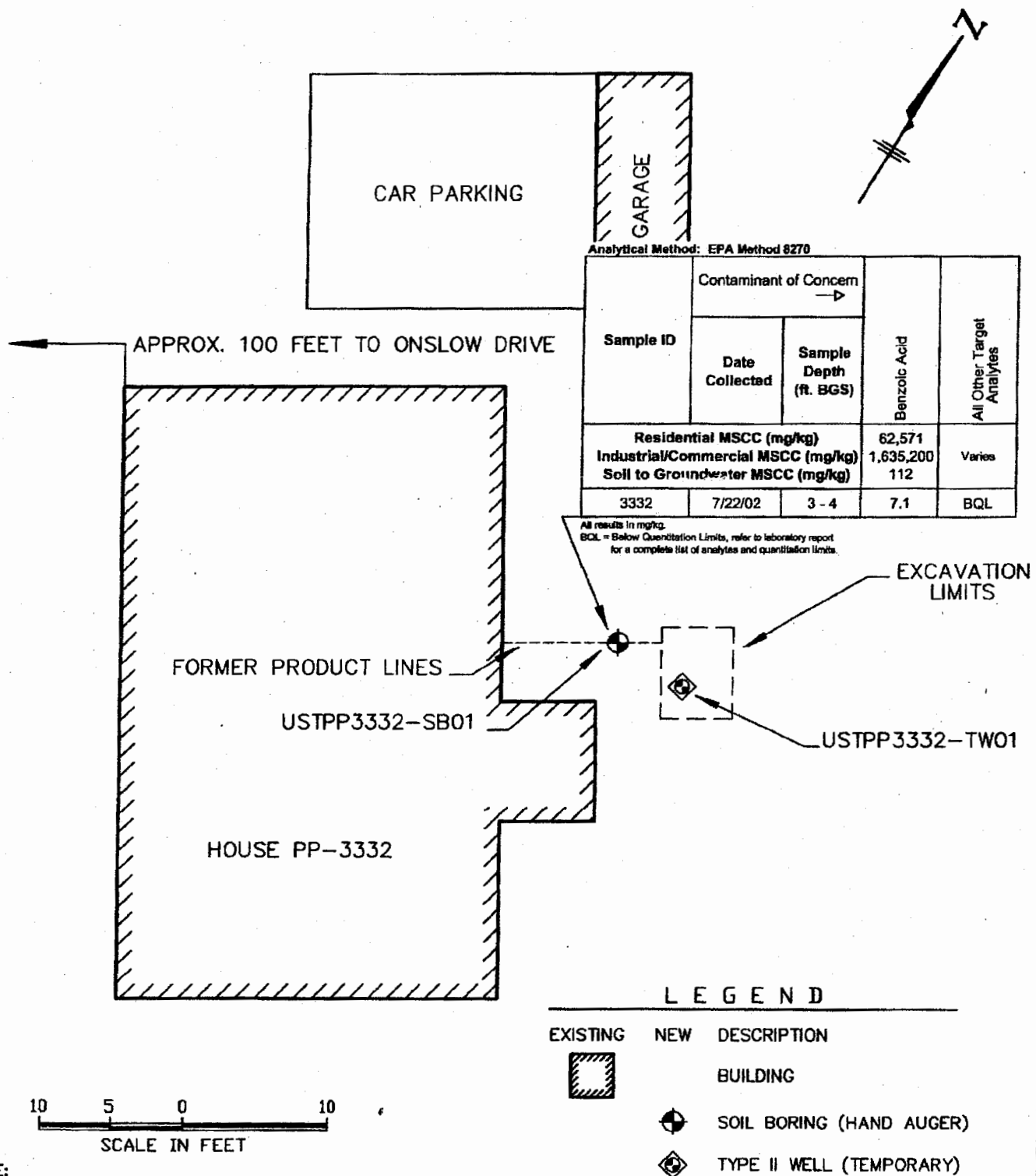
- | EXISTING | NEW | DESCRIPTION |
|----------|-----|--------------------------|
| | | BUILDING |
| | | SOIL BORING (HAND AUGER) |
| | | TYPE II WELL (TEMPORARY) |



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

 WILMINGTON, NORTH CAROLINA	PROJECT	PHASE I LSA PP-3332 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE	SITE PLAN WITH SOIL LABORATORY RESULTS EPA MEHTOD 8260B/5035		FIGURE	4A		
	JOB NO.	202044-02	DATE	SEP 2002	SCALE	1"=10'		DRAWN BY:	HCS

202044-4A



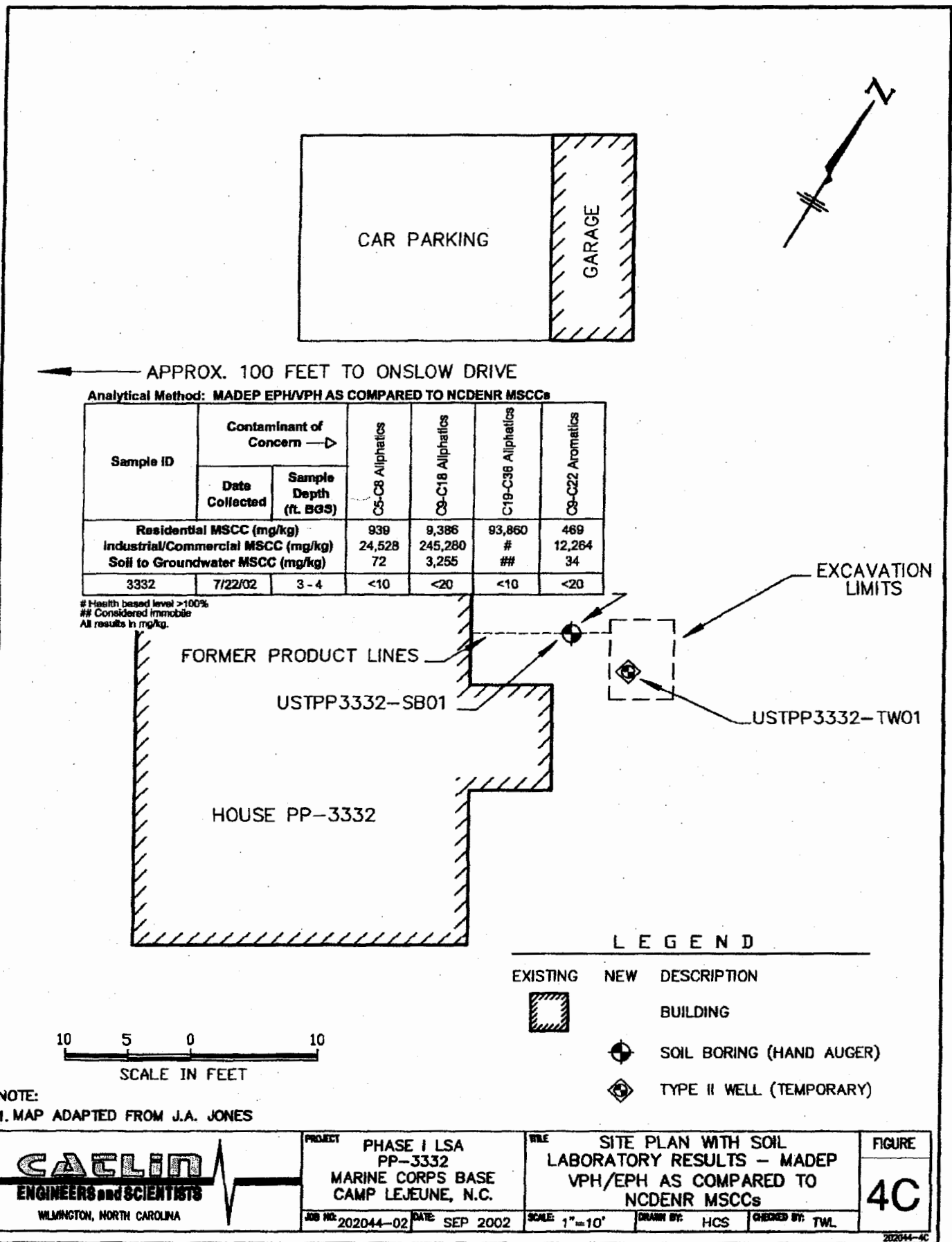
Analytical Method: EPA Method 8270

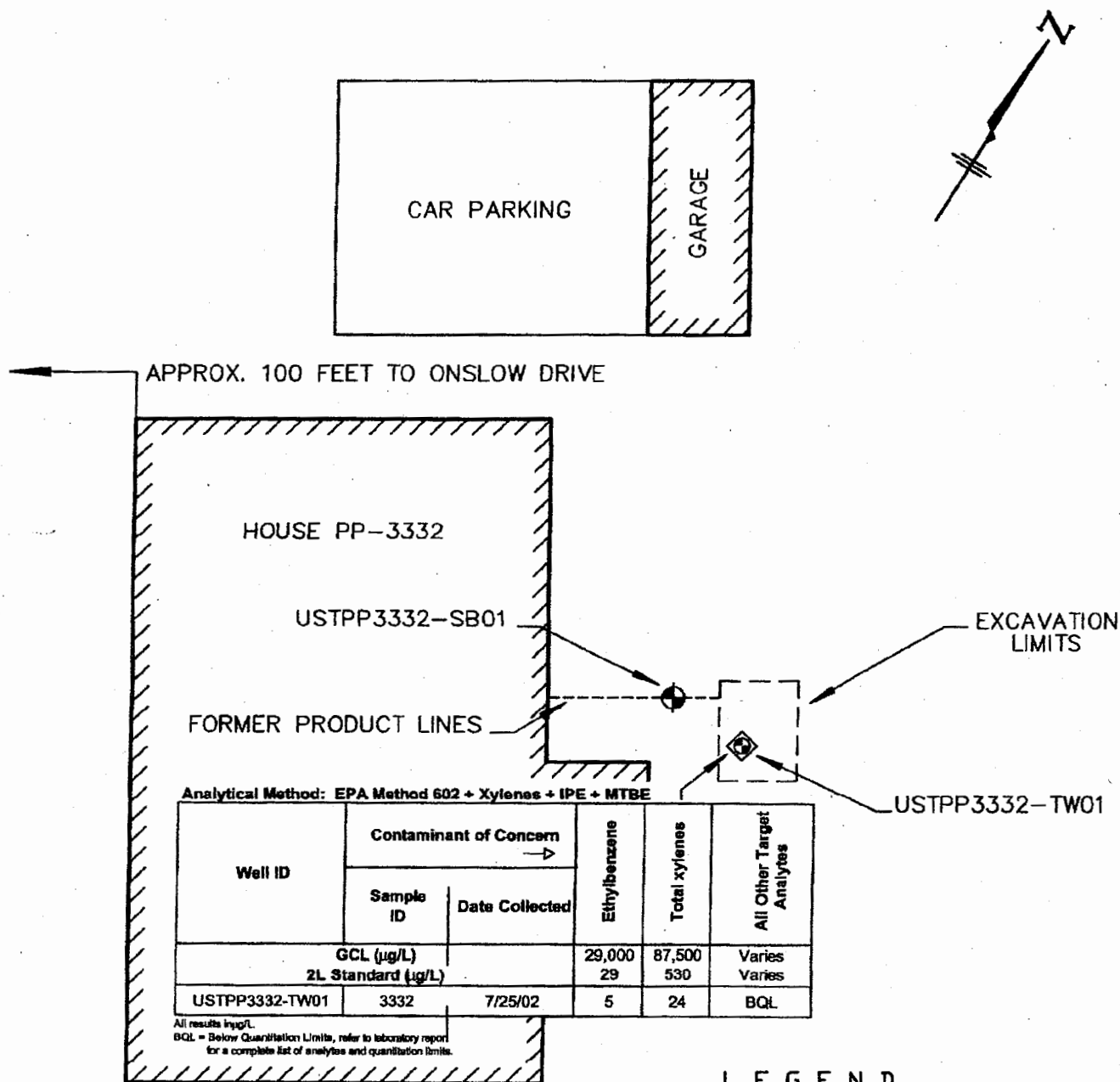
Sample ID	Contaminant of Concern →		Benzole Acid	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)		
Residential MSCC (mg/kg)			62,571	Varies
Industrial/Commercial MSCC (mg/kg)			1,635,200	
Soil to Groundwater MSCC (mg/kg)			112	
3332	7/22/02	3 - 4	7.1	BQL

All results in mg/kg.
BQL = Below Quantitation Limits, refer to laboratory report for a complete list of analytes and quantitation limits.

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

 ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT: PHASE I LSA PP-3332 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE: SITE PLAN WITH SOIL LABORATORY RESULTS EPA MEHTOD 8270	FIGURE: 4B
	JOB NO: 202044-02 DATE: SEP 2002	SCALE: 1"=10' DRAWN BY: HCS CHECKED BY: TWL	





LEGEND

EXISTING NEW DESCRIPTION



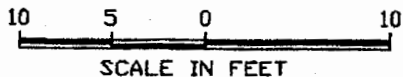
BUILDING



SOIL BORING (HAND AUGER)



TYPE II WELL (TEMPORARY)



NOTE:

1. MAP ADAPTED FROM J.A. JONES

CALIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3332
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 202044-02 DATE: SEP 2002

TITLE SITE PLAN WITH GROUNDWATER
LABORATORY RESULTS - EPA
METHOD 602 + XYLENES +
IPE + MTBE

SCALE: 1"=10'

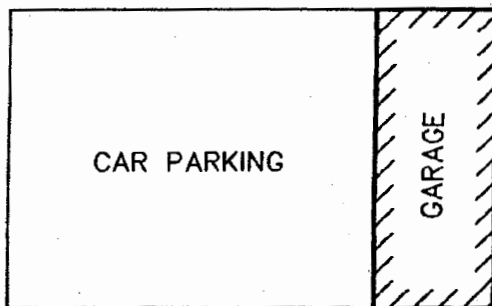
DRAWN BY: HCS

CHECKED BY: TWL

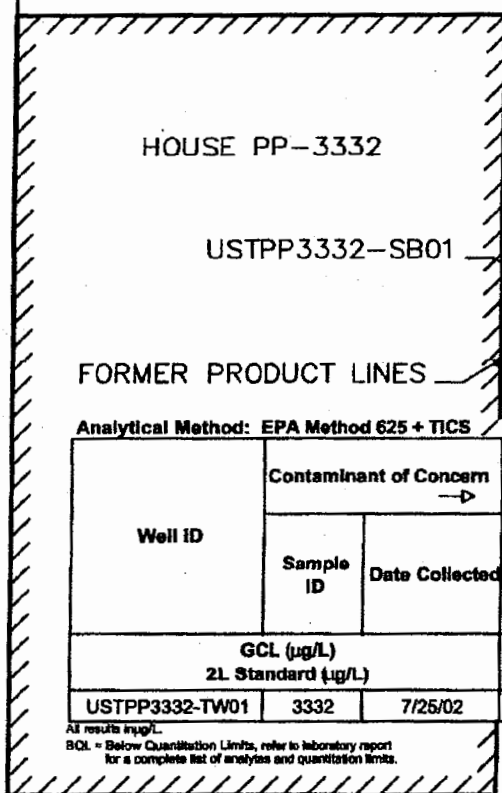
FIGURE

5A

202044-5A



APPROX. 100 FEET TO ONSLOW DRIVE



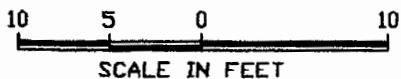
Analytical Method: EPA Method 625 + TICS

Well ID	Contaminant of Concern		Phenanthrene	All Other Target Analytes
	Sample ID	Date Collected		
GCL (µg/L)			410	Varies
2L Standard (µg/L)			210	Varies
USTPP3332-TW01	3332	7/25/02	12	BQL

All results in µg/L.
BQL = Below Quantitation Limits, refer to laboratory report for a complete list of analyses and quantitation limits.

LEGEND

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

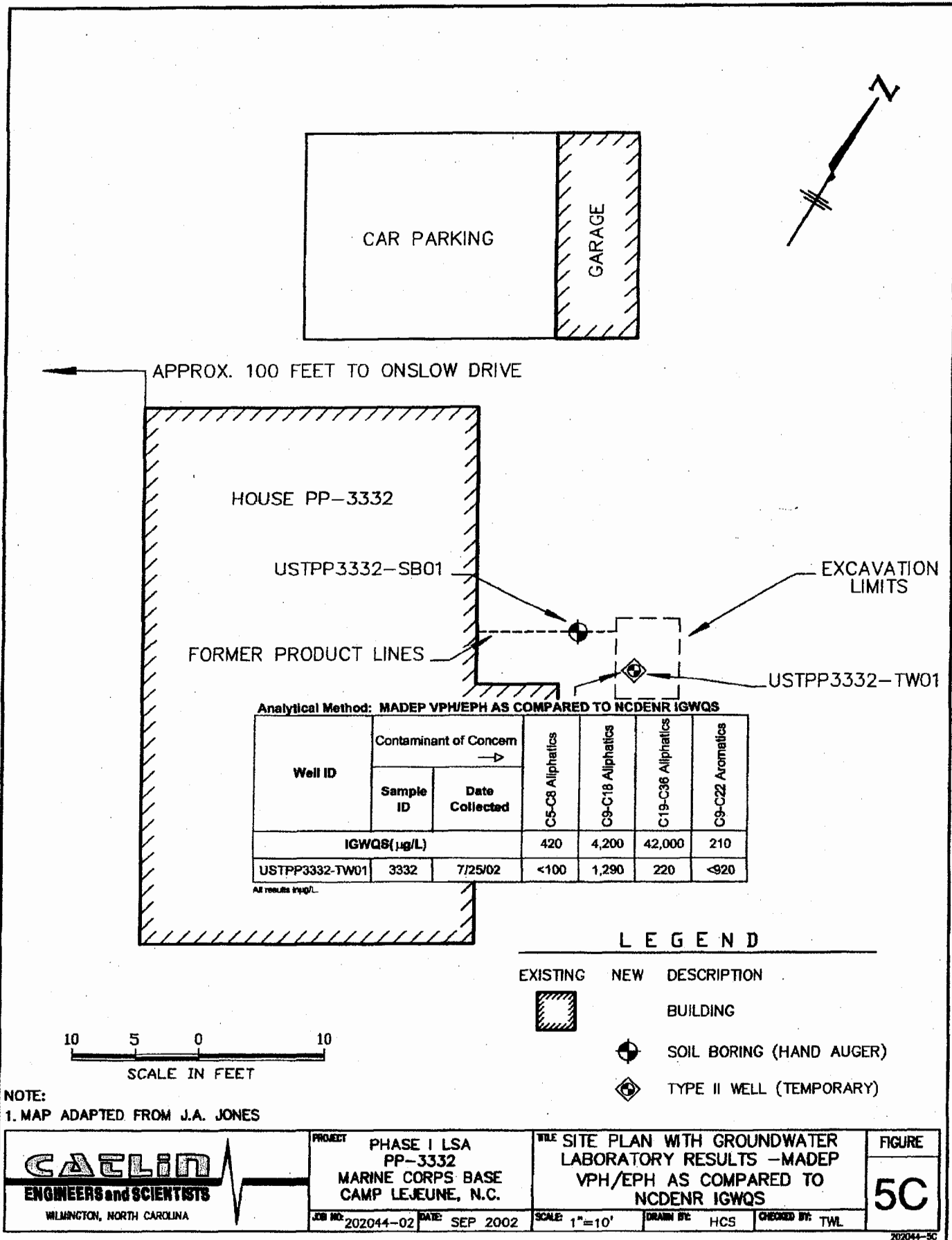


NOTE:

1. MAP ADAPTED FROM J.A. JONES

WILMINGTON, NORTH CAROLINA	PROJECT PHASE I LSA PP-3332 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 625 + TICS	FIGURE 5B
	JOB NO: 202044-02	DATE: SEP 2002	SCALE: 1" = 10'

202044-5B



B. RISK CHARACTERIZATION

Limited Site Assessment Risk Classification and Land Use Form

Part I - Groundwater/Surface Water/Vapor Impacts

High Risk

1. *Has the release contaminated any water supply well including any used for non-drinking purposes?* YES NO

According to I&E/EMD/EQB, the MCB samples the raw water supply wells semi-annually and no contaminants were reported in the latest sampling event. No information provided indicates a water supply well has been contaminated as a result of the release.

2. *Is a water supply well used for drinking water located within 1,000 feet of the source area of the discharge or release?* YES NO

There are no water supply wells located within 1,000 feet of the source area.

3. *Is a water supply well not used for drinking water (e.g., irrigation, washing cars, industrial cooling water, filling swimming pools) located within 250 feet of the source area of the release?* YES NO

There are no water supply wells located within 1,000 feet of the source area of the release.

4. *Does groundwater within 500 feet of the source area of the release have the potential for future use (there is no other source of water supply other than the groundwater)?* YES NO

No. There are an adequate number of locations for additional water supply wells to be installed on other portions of the base.

5. *Do vapors from the release pose a threat of explosion because of accumulation of the vapors in a confined space or pose any other serious threat to public health, public safety or the environment?* YES NO
If YES describe.

No. No evidence of accumulations have been reported in the reference document or during this investigation.

6. *Are there any other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment?* YES NO
If YES describe.

No. Review of available previous environmental reports and data collected during this investigation does not provide evidence to suggest other factors that would cause the discharge or release to pose an imminent danger to public health, public safety, or the environment.

Intermediate Risk

7. *Is a surface water body located within 500 feet of the source area of the discharge or release?* YES NO

Yes. The New River lies approximately 300 feet west of the subject site.

If YES, does the maximum groundwater contaminant concentration exceed the surface water quality standards and criteria found in 15A NCAC 2B.0200 by a factor of 10? YES NO

8. *Is the source area of the discharge or release located within an approved or planned wellhead protection area as defined in 42 USC 300h-7(e)?* YES NO
If YES describe.

No. Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB Camp Lejeune has identified wellhead protection areas on the base. Based on the most recent Wellhead Protection Plan Update (2002), the site is not located in a proposed wellhead protection area.

9. *Is the release located in the Coastal Plain physiographic region as designated on a map entitled "Geology of North Carolina" published by the Department in 1985?* YES NO

As identified in the Geologic Map of North Carolina (North Carolina of Natural Resources and Community Development 1985), the subject site lies within the Coastal Plain Physiographic Province. Potential impacts to deeper aquifers are unknown.

If YES, is the source area of the release located in an area in which there is recharge to an unconfined or semi-confined deeper aquifer that is being used or may be used as a source of drinking water? YES NO
If YES describe

Aquifers below the surficial aquifer in the area of PP-3350 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.

While there is likely recharge to the unconfined surficial aquifer at the Base, this aquifer is not used for water supply in the vicinity of the subject site. Deeper aquifers may obtain a portion of recharge from the surficial aquifer at the Base; however, the amount of recharge provided by the surficial aquifer is expected to be substantially limited due to the presence of confining units.

10. *Do the levels of groundwater contamination for any contaminant exceed the gross contamination levels established by the Department?*

YES NO

Groundwater sample results were well below established GCLs and 2L Standards.

Part II - Land Use

Property Containing Source Area of Release

The questions below pertain to the property containing the source area of the release.

1. *Does the property contain one or more primary or secondary residences (permanent or temporary)?*
Describe.

YES NO

Yes. The site includes a single-family residence used as base housing for officers and their families.

2. *Does the property contain a school, daycare center, hospital, playground, park, recreation area, church, nursing home, or other place of public assembly?*
Describe.

YES NO

No.

3. *Does the property contain a commercial (e.g., retail, warehouse, office/business space, etc.) or industrial (e.g., manufacturing, utilities, industrial research and development, chemical/petroleum bulk storage, etc.) enterprise, an inactive commercial or industrial enterprise, or is the land undeveloped?*
Describe.

YES NO

No. As previously mentioned, the subject property is utilized for residential (military housing) purposes.

4. *Do children visit the property?* YES NO
Explain.

Yes. Since the site is located in a residential area, children may visit the subject area.

- Is access to the property reliably restricted consistent with its use (e.g., by fences, security personnel or both)?* YES NO
Explain.

No. As previously mentioned, the site is located in a military residential area. There is no security fence around the former tank location.

5. *Do pavement, buildings, or other structures cap the contaminated soil?* YES NO
Describe.

No. The site is located in a grassy area.

If YES, what mechanisms are in place or can be put into place to ensure that the contaminated soil will remain capped in the foreseeable future?

6. *What is the zoning status of the property?*

The MCB Camp Lejeune is not subject to local or county zoning requirements.

7. *Is the use of the property likely to change in the next 20 years?* YES NO
Explain.

No. The designated use of the military housing on the Base is not likely to change in the foreseeable future.

Property Surrounding Source Area of Release

The questions below pertain to the area within 1500 feet of the source area of the release (excludes property containing source area of the release):

1. *What is the distance from the source area of the release to the nearest primary or secondary residence (permanent or temporary)?*

The source area is located within five feet of a primary residence.

2. *What is the distance from the source area of the release to the **nearest** school, daycare center, hospital, playground, park, recreation area, church, nursing home or other place of public assembly?*

There were no places of public assembly identified within a 1,500' radius of the subject site (See Figure 2).

3. *What is the zoning status of properties in the surrounding area?*

As previously stated, MCB Camp Lejeune is not subject to local or county zoning requirements. The surrounding property has been developed for military support purposes.

4. *Briefly characterize the use and activities of the land in the surrounding area.*

The surrounding properties are developed and used as base housing for officers and their families.

C. RECEPTOR INFORMATION

1. **Water Supply Wells**
(Refer to Table 5 and Figure 1)

As shown on Figure 1 and Table 5, there were no water supply wells located within 1,500 feet of subject site.

2. **Public Water Supplies**

Are public water supplies available within 1,500 feet of the source area of the release?

YES NO

If YES, where is the location of the nearest public water lines and the source(s) of the public water supply (indicate on map). Describe.

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

3. **Surface Water**

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

4. Wellhead Protection Areas

As discussed earlier, 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 of Natural Resources and Community Development 1985), the subject site lies within the Coastal Plain Physiographic Province. Potential impacts to deeper aquifers are unknown, though; minimal impact to surficial groundwater was revealed.

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

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

6. Subsurface Structures

(Refer to Figure 3)

Municipal sanitary sewer line enters the residence near the eastern corner of the residence, east of the source area. Water enters the residence near the southeastern corner of the structure. Underground power, cable and telephone enter the residence to the 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.

TABLE 1
SITE HISTORY
UST SYSTEM INFORMATION

UST PP-3350

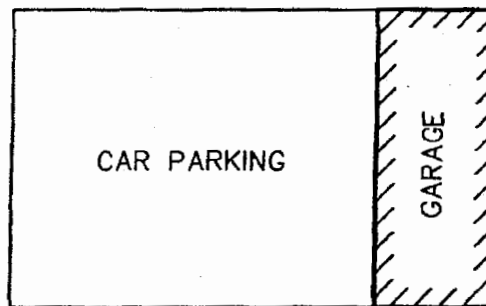
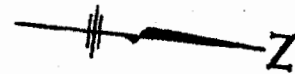
UST ID Number	Product (gasoline, diesel, jet fuel, etc.)	Capacity (gallons)	Date Installed (m/dd/yy)	Date Permanently Closed (P) or Still in Use* (C) (m/dd/yy)	Was Release Associated With UST System? (Yes/No)
PP-3350	Fuel Oil*	285	Unknown	(P) 9/6/01	Yes

* UST was used strictly for residential heating purposes

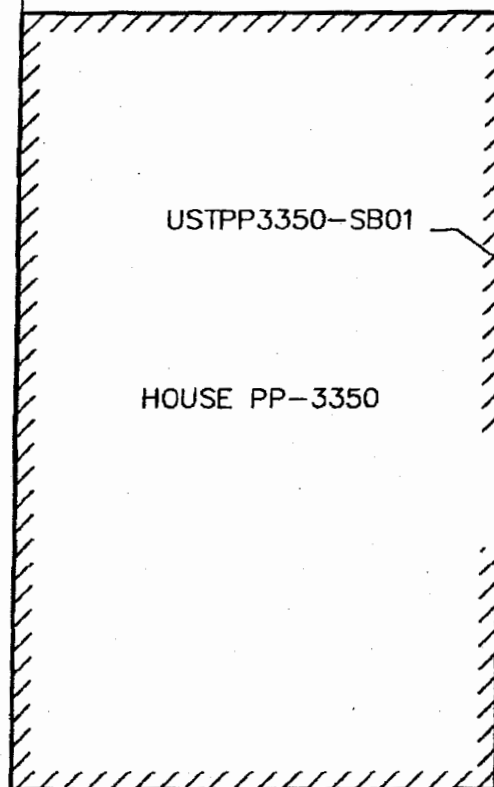
* Still in use means not permanently closed.

TABLE 2
SITE HISTORY
UST OWNER/OPERATOR INFORMATION
UST PP-3350

UST ID Number	Name of Owner or Operator	Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	Owner or Operator?
PP-3350	Commanding General Marine Corps Base Camp Lejeune, NC	Unknown to 9/6/01	Owner and Operator
Address		Telephone Number	
I&E/EMD/EQB PSC 20004 Marine Corps Base, Camp Lejeune, NC 28542		910-451-5068	



APPROX. 100 FEET TO JONES STREET



Analytical Method: EPA 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)			
3350	7/22/02	2 - 3	BQL

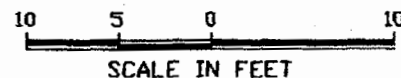
HOUSE PP-3350

EXCAVATION

USTPP3350-TW01

LEGEND

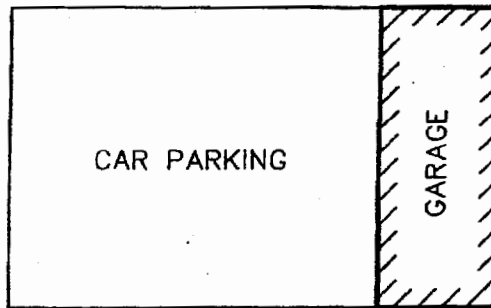
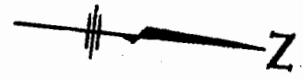
EXISTING	NEW	DESCRIPTION
		BUILDING
		SOIL BORING (HAND AUGER)
		TYPE II WELL (TEMPORARY)



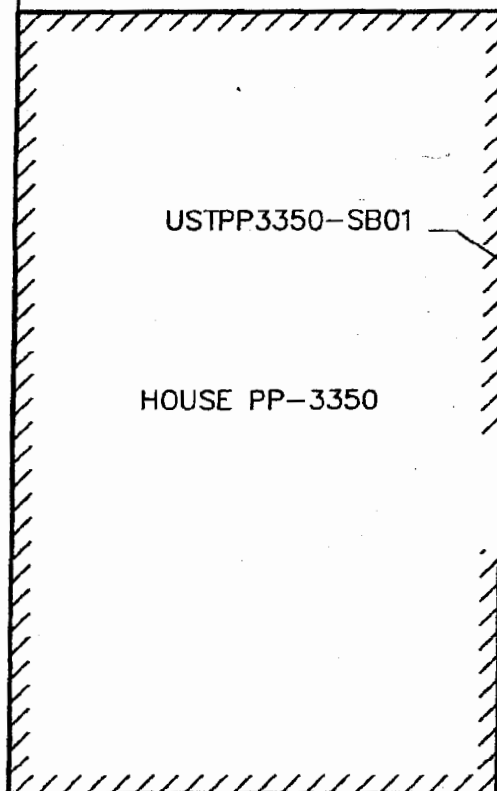
NOTE:

1. MAP ADAPTED FROM J.A. JONES

CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT	PHASE I LSA PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE		SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8260B/5035		FIGURE			
	JOB NO.	202047-02	DATE	AUG 2002	SCALE	1"=10'	DRAWN BY:	HCS	CHECKED BY:	TWL
202047-02-4A										



← APPROX. 100 FEET TO JONES STREET



Analytical Method: EPA 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)		
3350	7/22/02	2 - 3	BQL

HOUSE PP-3350

EXCAVATION

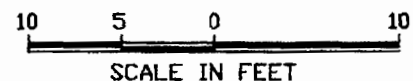
USTPP3350-TW01

LEGEND

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

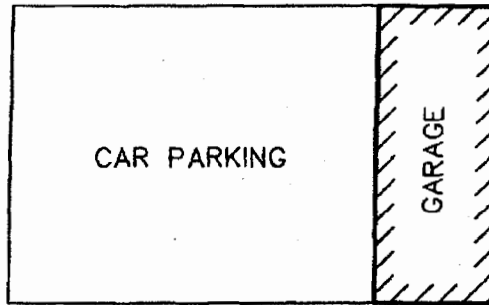
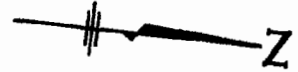
NOTE:

1. MAP ADAPTED FROM J.A. JONES

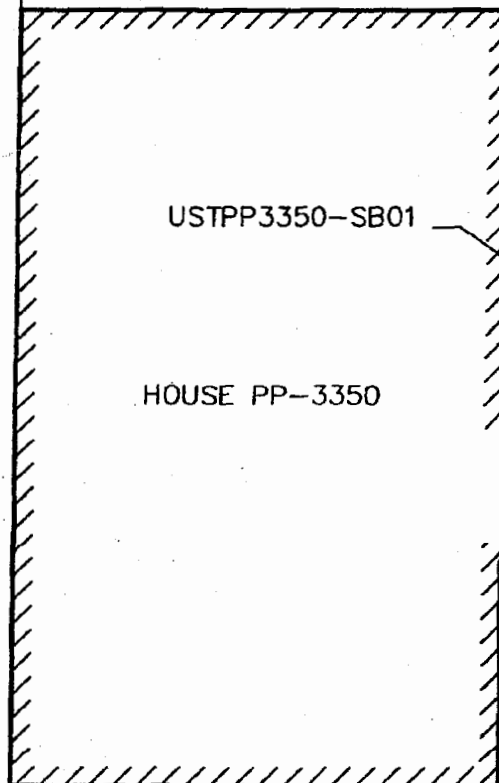


CATLIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT	PHASE I LSA PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	FILE	SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8270		FIGURE	
	JOB NO.	202047-02	DATE	AUG 2002	SCALE	1"=10'	DRAWN BY: HCS CHECKED BY: TWL

202047-02-48



APPROX. 100 FEET TO JONES STREET



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

Sample ID	Contaminant of Concern →		C8-C8 Aliphatics	C9-C18 Aliphatics	C19-C38 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
3350	7/22/02	2-3	<10	<20	<10	<20

Health based level >100%
Considered immobile

LEGEND

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

10 5 0 10

SCALE IN FEET

NOTE:

1. MAP ADAPTED FROM J.A. JONES

CAELIN
ENGINEERS and SCIENTISTS

WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3350
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 202047-02 DATE AUG 2002

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

SCALE 1"=10'

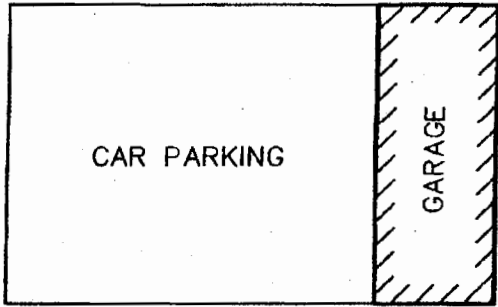
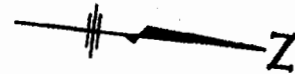
DRAWN BY: HCS

CHECKED BY: TWL

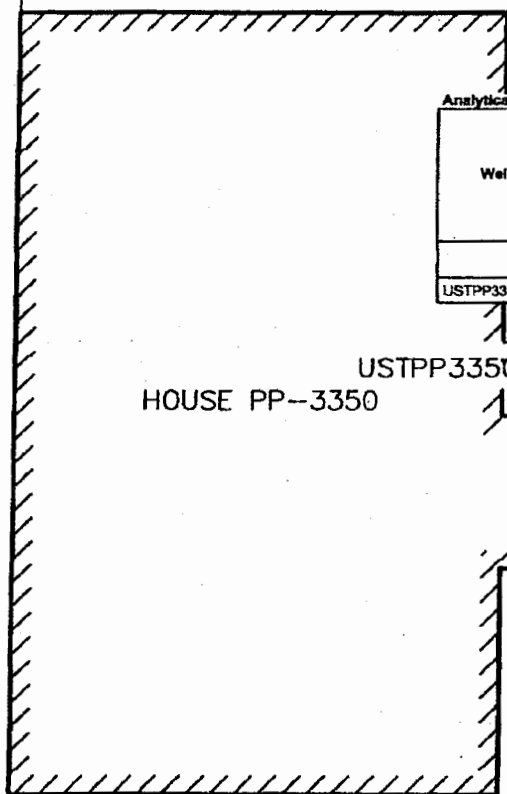
FIGURE

4C

202047-02-4C



← APPROX. 100 FEET TO JONES STREET



Analytical Method: EPA Method 602 + Xylenes + IPE + MTBE

Well ID	Contaminant of Concern →		Benzene	Diisopropyl ether	Ethylbenzene	MTBE	Toluene	Total Xylenes
	Sample ID	Date Collected						
GCL (µg/L)			5,000	70,000	29,000	200,000	257,500	87,500
2L Standard (µg/L)			1	70	29	200	1,000	530
USTPP3350-TW01	3350	7/25/02	<1	<1	13	<2	<1	46

USTPP3350-SB01

HOUSE PP-3350

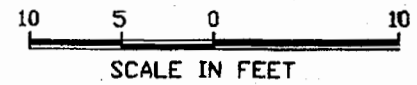
EXCAVATION

USTPP3350-TW01

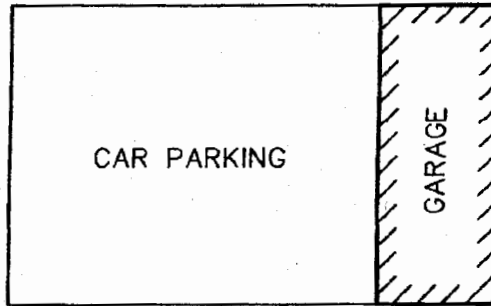
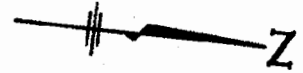
LEGEND

- | | | |
|----------|-----|--------------------------|
| EXISTING | NEW | DESCRIPTION |
| | | BUILDING |
| | | SOIL BORING (HAND AUGER) |
| | | TYPE II WELL (TEMPORARY) |

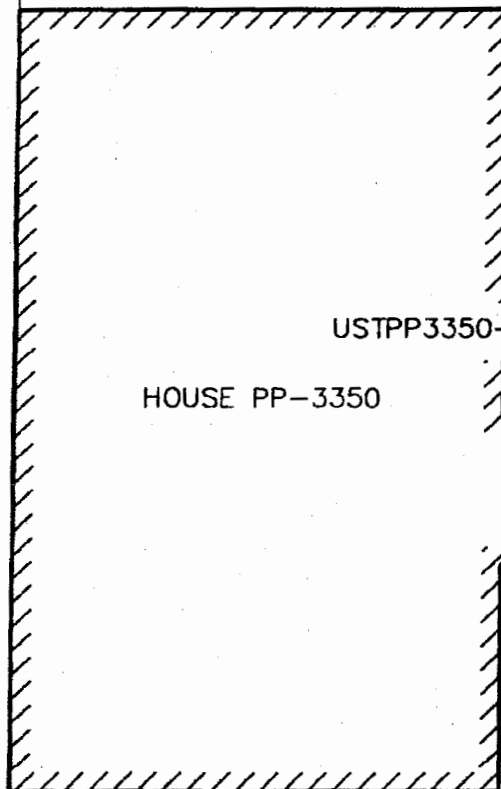
NOTE:
1. MAP ADAPTED FROM J.A. JONES



 CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT	PHASE I LSA PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE	SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 602 + XYLENES + IPE + MTBE		FIGURE	5A			
JOB NO.	202047-02	DATE	AUG 2002	SCALE	1"=10'	DRAWN BY:		HCS	CHECKED BY:	TWL
202047-02-5A										



← APPROX. 100 FEET TO JONES STREET



Analytical Method: EPA Method 825 + TICS

Well ID	Contaminant of Concern →		Naphthalene	Phenanthrene	All Other Compounds
	Sample ID	Date Collected			
GCL (µg/L)			15,500	410	
2L Standard (µg/L)			21	210	Varies
USTPP3350-TW01	3350	7/25/02	30	12	BQL

BQL = Below Quantitation Limit
Shaded area indicates concentration above 2L Standard

USTPP3350-SB01

HOUSE PP-3350

EXCAVATION

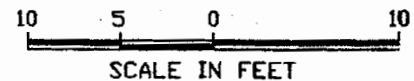
USTPP3350-TW01

LEGEND

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

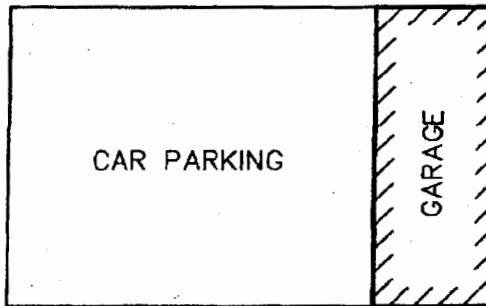
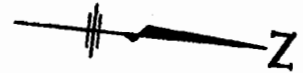
NOTE:

1. MAP ADAPTED FROM J.A. JONES

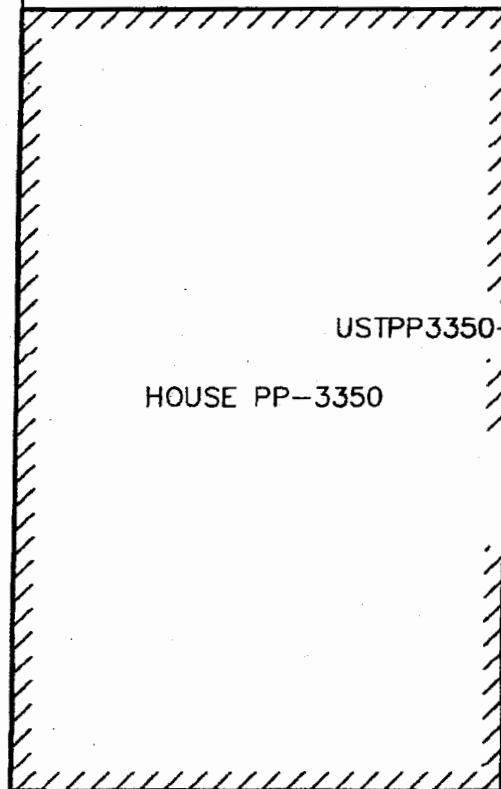


CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT PHASE I LSA PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 625 + TICS	FIGURE 5B
	JOB NO. 202047-02 DATE: AUG 2002	SCALE 1"=10'	DRAWN BY: HCS CHECKED BY: TWL

202047-02-5B



← APPROX. 100 FEET TO JONES STREET



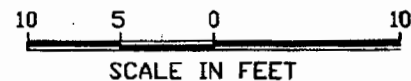
Analytical Method: MADEP VPH/EPH AS COMPARED TO NCDENR IGWQS

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C8-C22 Aromatics
	Sample ID	Date Collected				
IGWQS (µg/L)			420	4,200	42,000	210
USTPP3350-TW01	3350	7/25/02	<100	330	<100	960

Shaded area indicates concentration above IGWQS.

LEGEND

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



NOTE:

1. MAP ADAPTED FROM J.A. JONES

CAELIN
ENGINEERS and SCIENTISTS

WILMINGTON, NORTH CAROLINA

PROJECT PHASE I LSA
PP-3350
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 202047-02 DATE AUG 2002

TITLE SITE PLAN WITH
GROUNDWATER LABORATORY RESULTS
MADEP VPH/EPH AS COMPARED
TO NCDENR IGWQS

SCALE 1"=10'

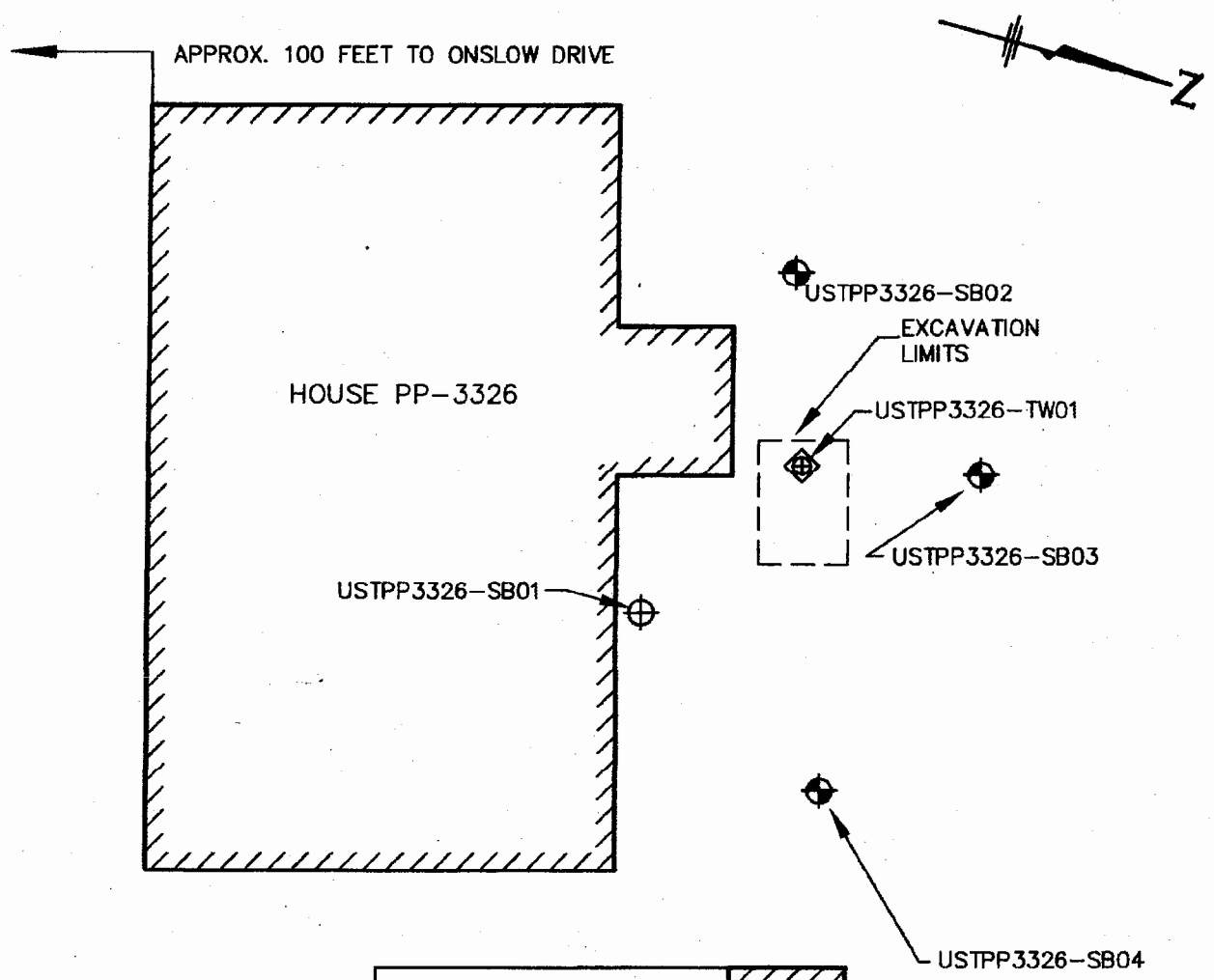
DRAWN BY: HCS

CHECKED BY: TWL

FIGURE

5C

202047-02-5C



LEGEND

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

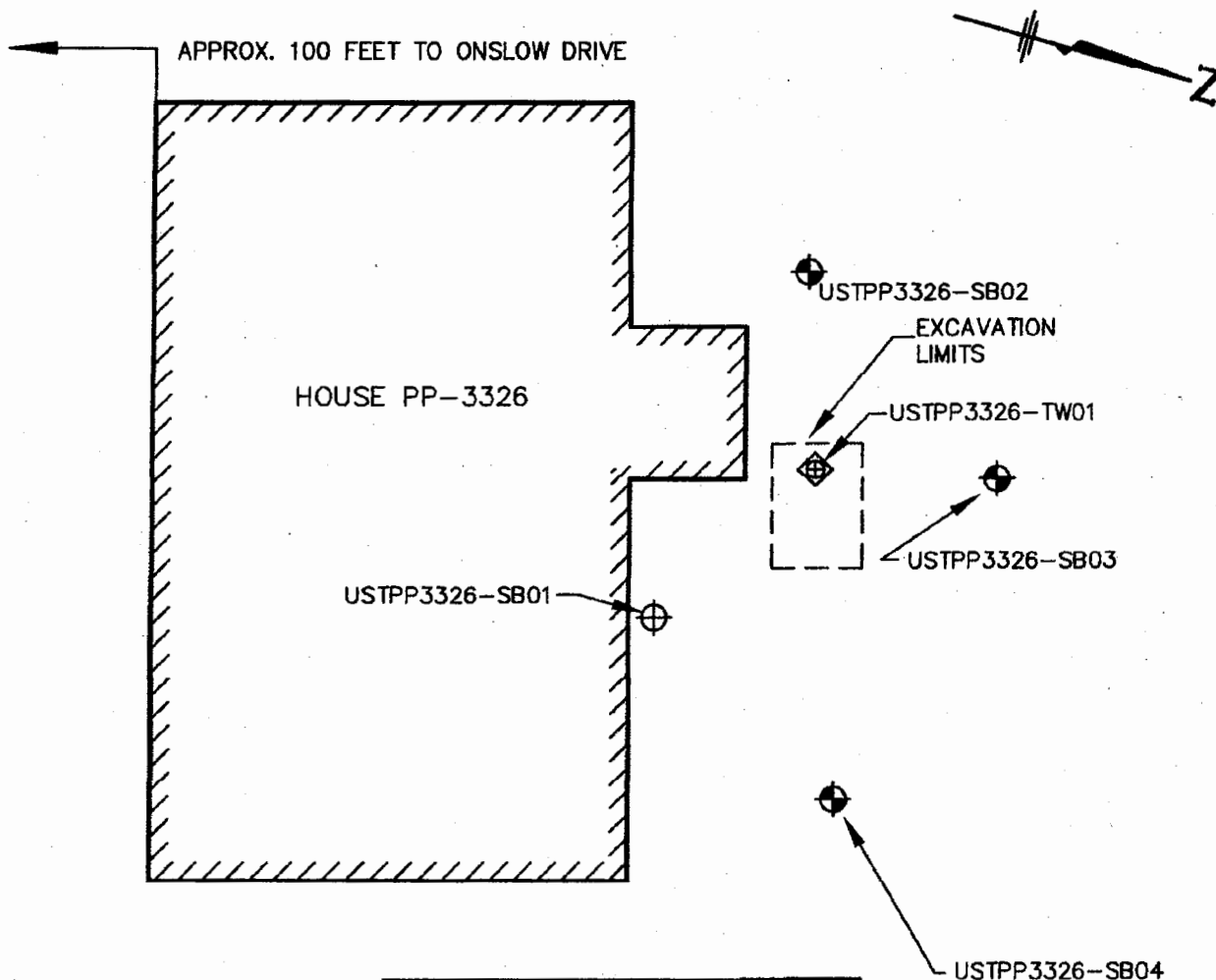
Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern		Methylene Chloride	Toluene	4-Isopropyltoluene	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)				
Residential MSCC (mg/kg)			85	3,200	NE	Varies
Industrial/Commercial MSCC (mg/kg)			783	82,000	NE	Varies
Soil to Groundwater MSCC (mg/kg)			0.02	7	NE	Varies
USTPP3326-SB01 (1-2)	7/22/02	1 - 2	0.03*	0.012	BQL	BQL
USTPP3326-SB02 (0-1)	3/24/03	0-1	<1.2	<0.25	9	BQL
USTPP3326-SB03 (0-1)	3/24/03	0-1	<0.025	<0.0062	<0.0062	BQL
USTPP3326-SB04 (0-1)	3/24/03	0-1	<0.024	<0.0059	<0.0059	BQL
USTPP3326-SB04D (0-1)	3/24/03	0-1	<0.024	<0.0059	<0.0059	BQL

All results in mg/kg.
 *Compound was detected in laboratory method blank.
 NE - None Established

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

 WILMINGTON, NORTH CAROLINA	PROJECT S.A.R. PP-3326 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8260B/5035		FIGURE 4A
	JOB NO: 203012-01	DATE: MAY 2003	SCALE: 1"=10'	DRAWN BY: HCS CHECKED BY: MEM



Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern		Benzolic Acid	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)		
Residential MSCC (mg/kg)			62,571	Varies
Industrial/Commercial MSCC (mg/kg)			1,635,200	Varies
Soil to Groundwater MSCC (mg/kg)			112	Varies
USTPP3326-SB01 (1-2)	7/22/02	1 - 2	<0.72	BQL
USTPP3326-SB02 (0-1)	3/24/03	0-1	0.38 J	BQL
USTPP3326-SB03 (0-1)	3/24/03	0-1	<0.77	BQL
USTPP3326-SB04 (0-1)	3/24/03	0-1	0.29 J	BQL

NOTE:

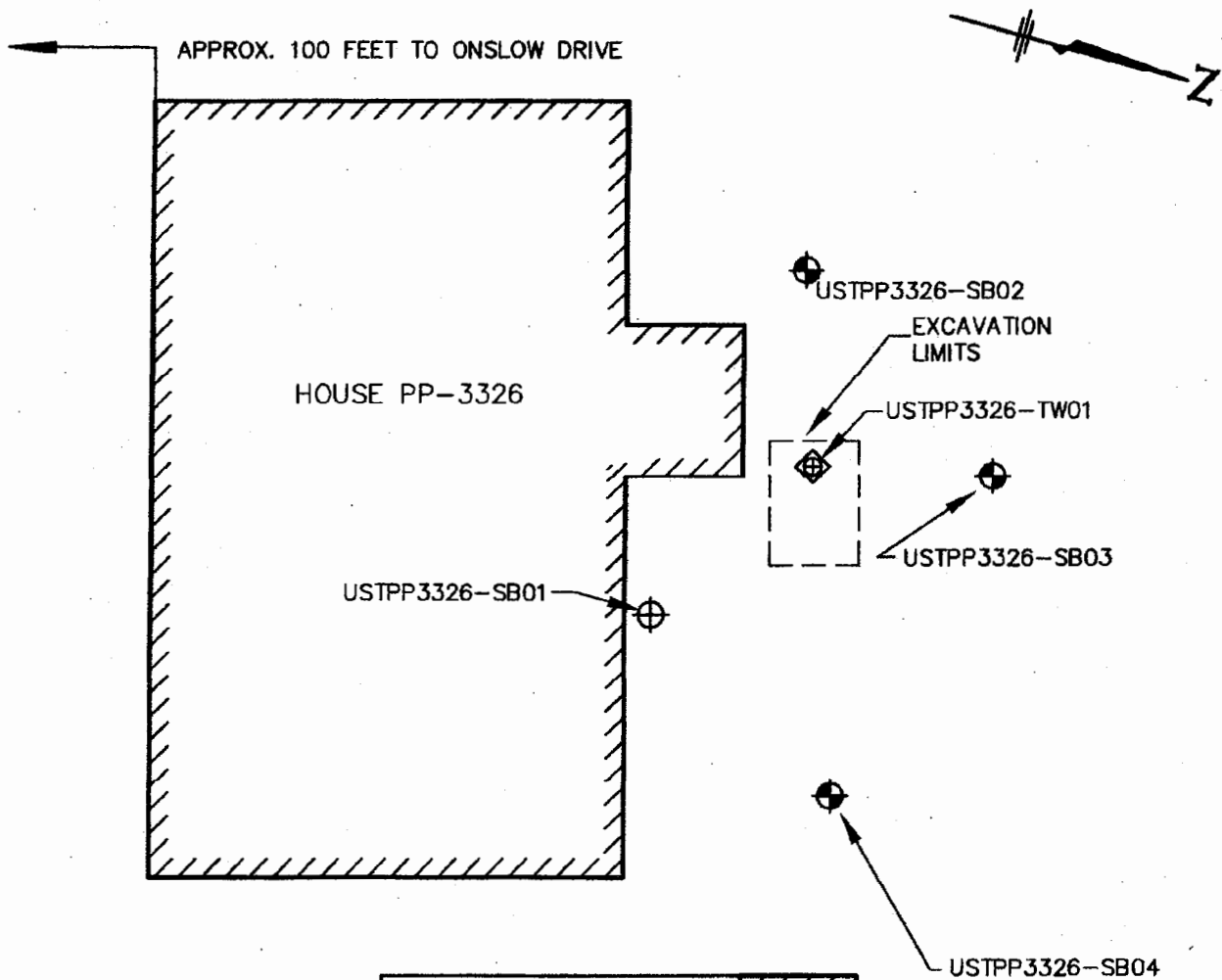
1. MAP ADAPTED FROM J.A. JONES

All results in mg/kg.

J = Detected below the quantitation limit

CALLIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT S.A.R. PP-3326 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS EPA METHOD 8270		FIGURE 4B
	JOB NO. 203012-01	DATE MAY 2003	SCALE 1"=10'	DRAWN BY: HCS CHECKED BY: MEM

203012-01-04B



10 5 0 10
SCALE IN FEET

LEGEND

EXISTING NEW DESCRIPTION



BUILDING



SOIL BORING (HAND AUGER)



TYPE II WELL (TEMPORARY)

CAR PARKING

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	#	12,284
Soil to Groundwater MSCC (mg/kg)			72	3,255	##	34
USTPP3326-SB01 (1-2)	7/22/02	1 - 2	<10	<20	<10	<20
USTPP3326-SB02 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3326-SB03 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3326-SB04 (0-1)	3/24/03	0-1	<10	<20	<10	<20

Health based level >100%

Considered immobile

All results in mg/kg.

NOTE:

1. MAP ADAPTED FROM J.A. JONES

CAELIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT
S.A.R.
PP-3326
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO: 203012-01 DATE: MAY 2003

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

SCALE: 1"=10'

DRAWN BY: HCS

CHECKED BY: MEM

FIGURE

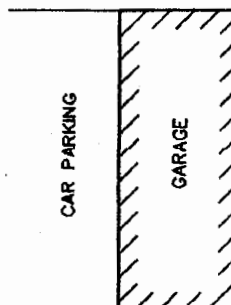
4C

203012-01-04C

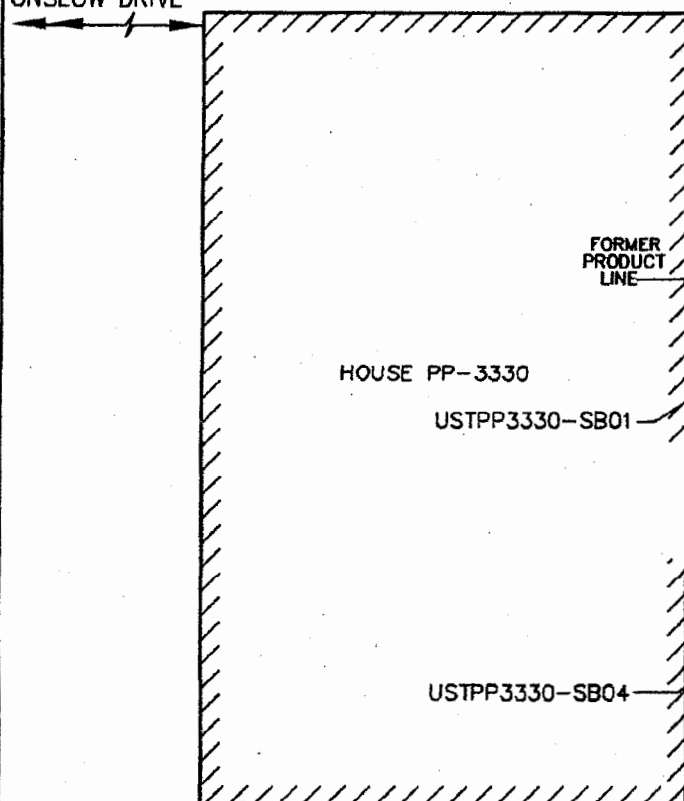
Analytical Method: EPA Method 8260B/5035

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
ON SLOW DRIVE



10 5 0 10
SCALE IN FEET

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

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

CATLIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT
PP-3330
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 203010-41 DATE: APR 2003

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

SCALE: 1"=10' DRAWN BY: WHW CHECKED BY: MDM

FIGURE

4A

20243-01-04A

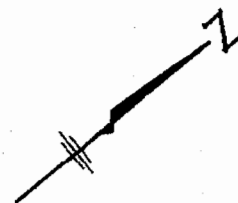
Analytical Method: EPA Method 8270

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

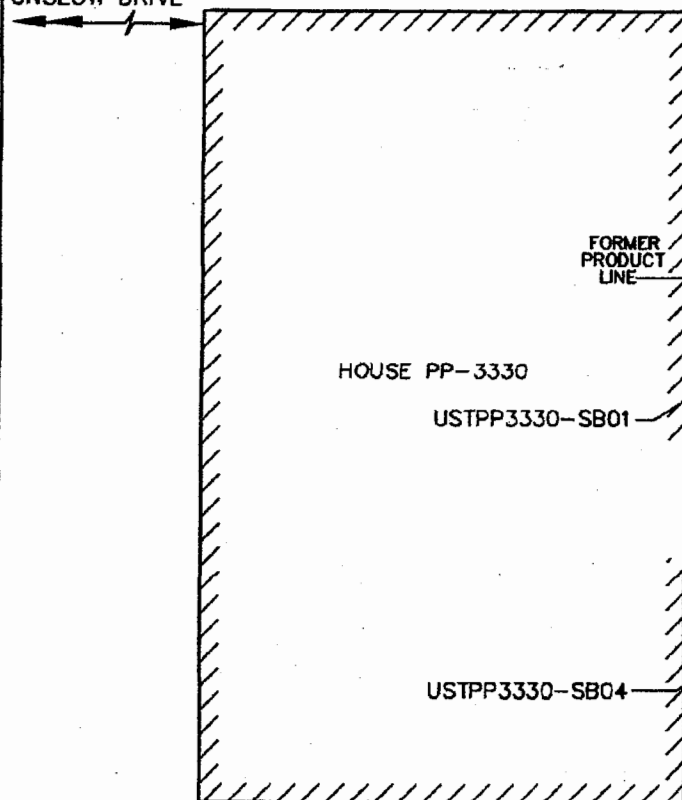
All results in mg/kg.

CAR PARKING

GARAGE



±100' TO
ONSLOW DRIVE



10 5 0 10
SCALE IN FEET

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
	JOB NO: 203010-41	DATE: APR 2003	SCALE: 1"=10'

4B

202043-01-046

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

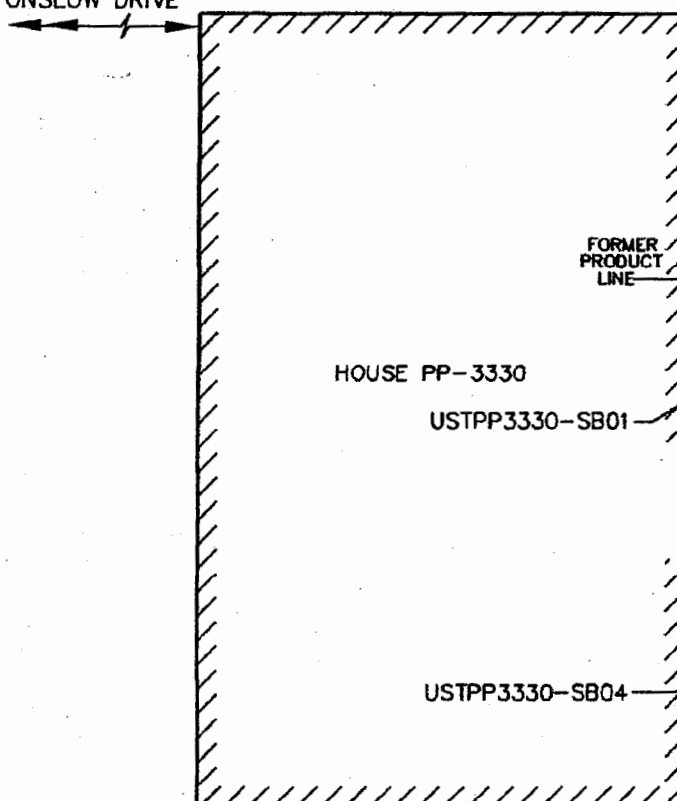
Sample ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Date Collected	Sample Depth (ft. BGS)				
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264
Soil to Groundwater MSCC (mg/kg)			72	3,255	##	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.

CAR PARKING

GARAGE

±100' TO
ON SLOW DRIVE



10 5 0 10
SCALE IN FEET

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

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

CAELIN
ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT
PP-3330
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO. 203010-41

DATE: APR 2003

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

SCALE: 1"=10'

DRAWN BY: WHW

CHECKED BY: MDM

FIGURE

4C

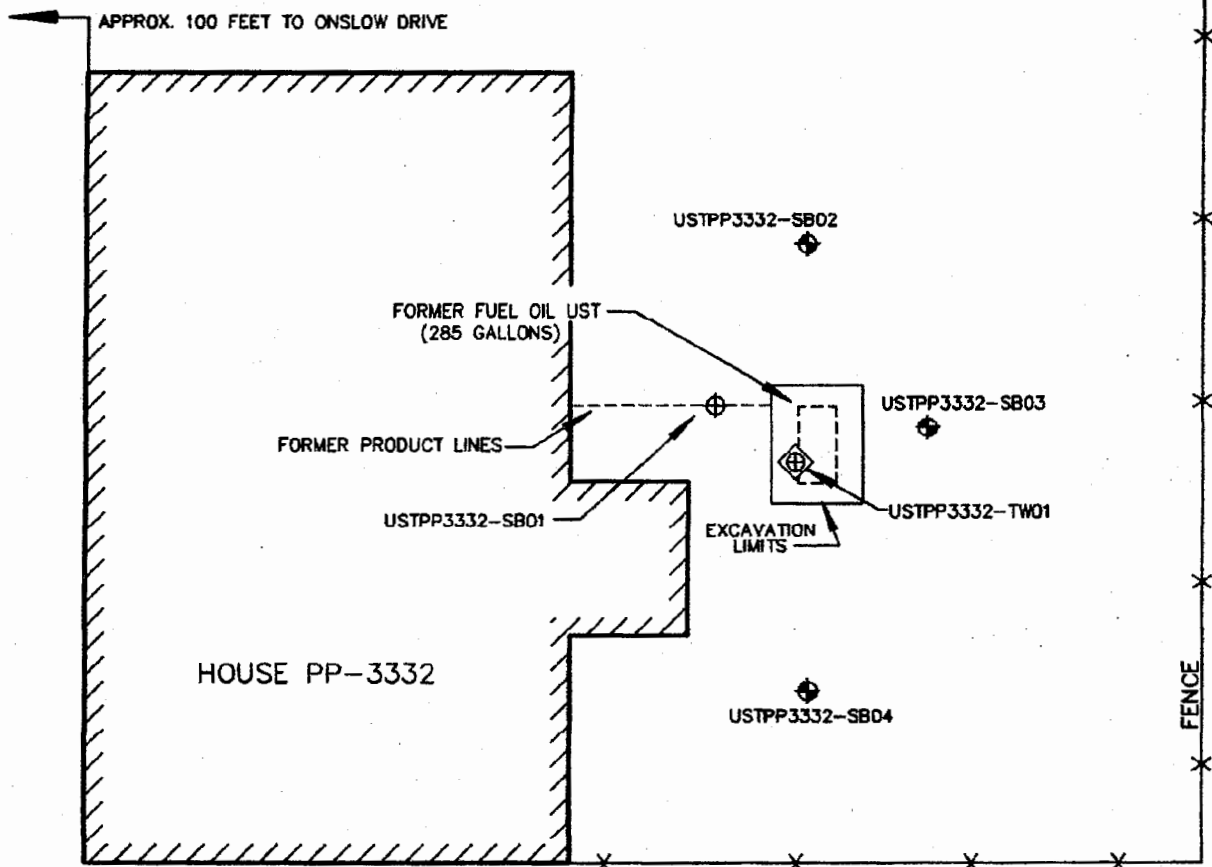
202043-41-048

Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern		Toluene	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)		
Residential MSCC (mg/kg)			3,200	Varies
Industrial/Commercial MSCC (mg/kg)			82,000	Varies
Soil to Groundwater MSCC (mg/kg)			7	Varies
USTPP3331-SB01 (3-4)	7/22/02	3 - 4	0.0058	BQL
USTPP3332-SB02 (1-2)	3/24/03	1-2	<0.0061	BQL
USTPP3332-SB03 (1-2)	3/24/03	1-2	<0.0056	BQL
USTPP3332-SB04 (1-2)	3/24/03	1-2	<0.0054	BQL
USTPP3332-SB04D (1-2)	3/24/03	1-2	<0.0054	BQL

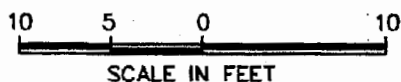
All results in mg/kg.

CAR PARKING



LEGEND

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



NOTE:

1. MAP ADAPTED FROM J.A. JONES

WILMINGTON, NORTH CAROLINA	PROJECT PP-3332 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS -EPA METHOD 8260B/5035	FIGURE 4A
	JOB NO. 203016-41 DATE MAY 2003	SCALE 1"=10'	DRAWN BY WHW CHECKED BY MEM

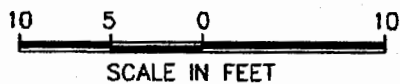
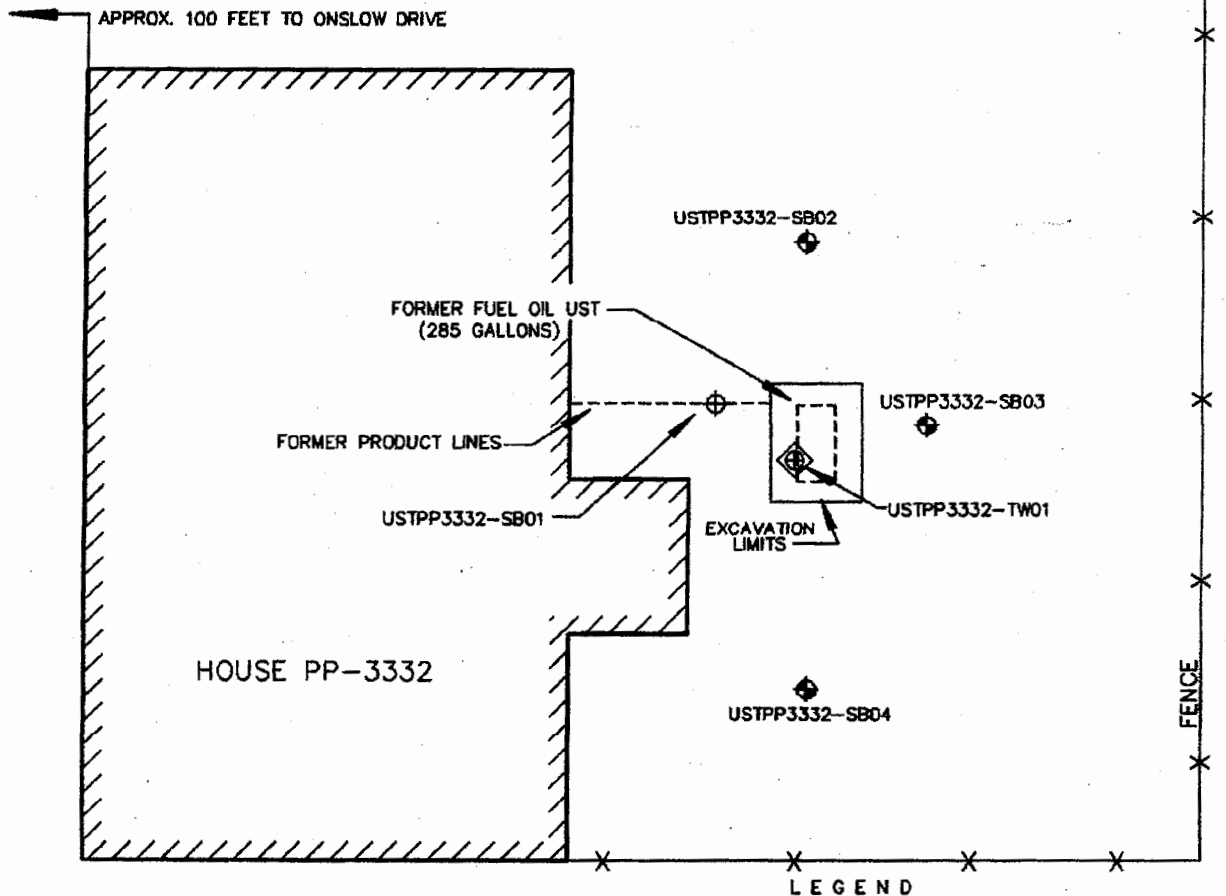
Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern		Benzene Add	All Other Target Analytes
	Date Collected	Sample Depth (ft. BGS)		
Residential MSCC (mg/kg)			62,571	Varies
Industrial/Commercial MSCC (mg/kg)			1,635,200	Varies
Soil to Groundwater MSCC (mg/kg)			112	Varies
USTPP3332-SB01 (3-4)	7/22/02	3 - 4	7.1	BQL
USTPP3332-SB02 (1-2)	3/24/03	1-2	0.64 J	BQL
USTPP3332-SB03 (1-2)	3/24/03	1-2	0.38 J	BQL
USTPP3332-SB04 (1-2)	3/24/03	1-2	0.61 J	BQL

All results in mg/kg.

J = Detected below the quantitation limit.

CAR PARKING



NOTE:

1. MAP ADAPTED FROM J.A. JONES

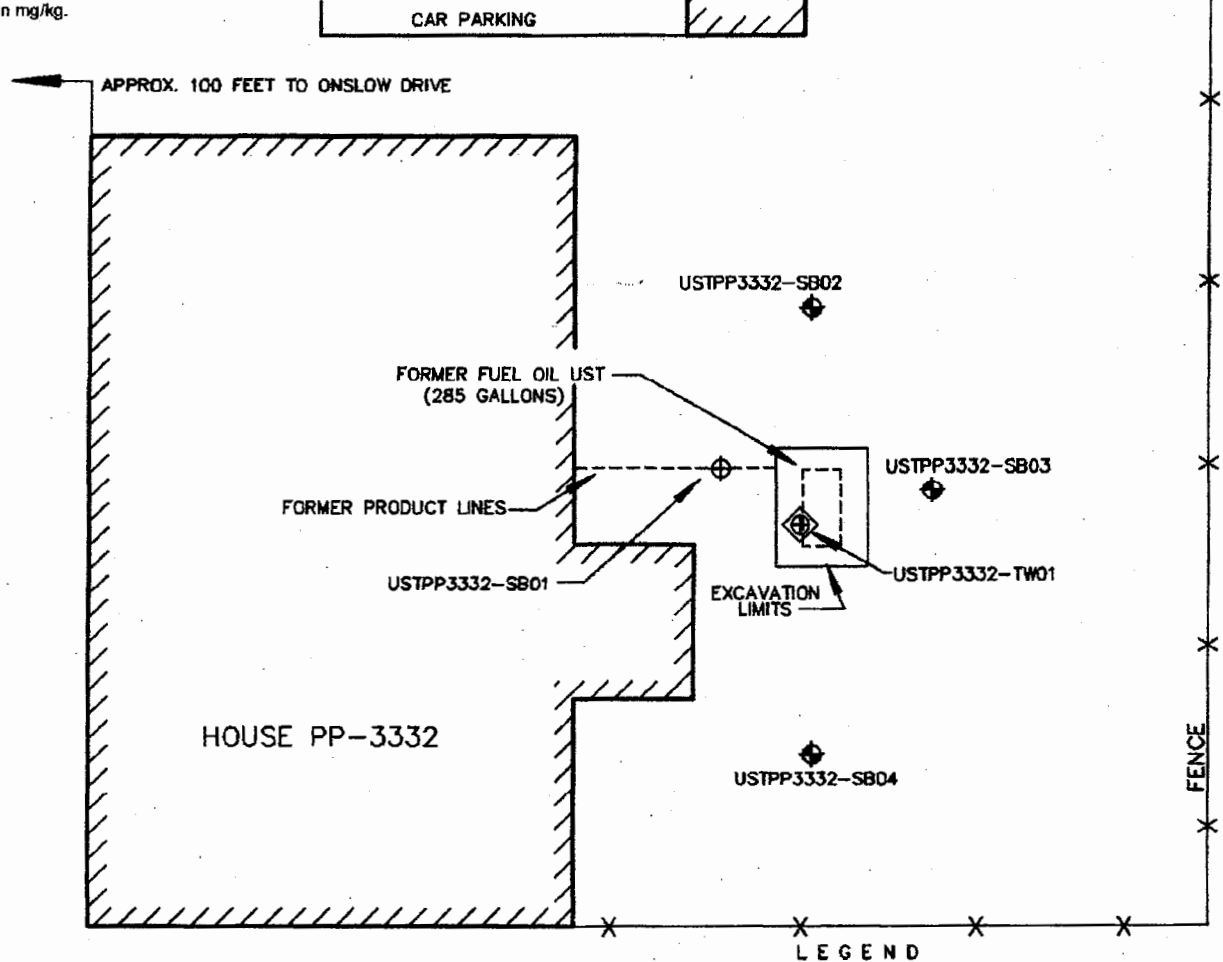
 WILMINGTON, NORTH CAROLINA	PROJECT PP-3332 MARINE CORPS BASE CAMP LEJEUNE, N.C. JOB NO: 203016-41 DATE: MAY 2003	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS -EPA METHOD 8270 SCALE: 1"=10' DRAWN BY: WHW CHECKED BY: MEM	FIGURE 4B
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203016-41-048

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

Sample ID	Contaminant of Concern →		C6-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
USTPP3332-SB01 (3-4)	7/22/02	3-4	<10	<20	<10	<20
USTPP3332-SB02 (1-2)	3/24/03	1-2	<10	<20	<10	<20
USTPP3332-SB03 (1-2)	3/24/03	1-2	<10	<20	<10	<20
USTPP3332-SB04 (1-2)	3/24/03	1-2	<10	<20	<10	<20

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



10 5 0 10
SCALE IN FEET

NOTE:

1. MAP ADAPTED FROM J.A. JONES

CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT PP-3332 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. 203016-41	DATE MAY 2003	SCALE 1"=10'

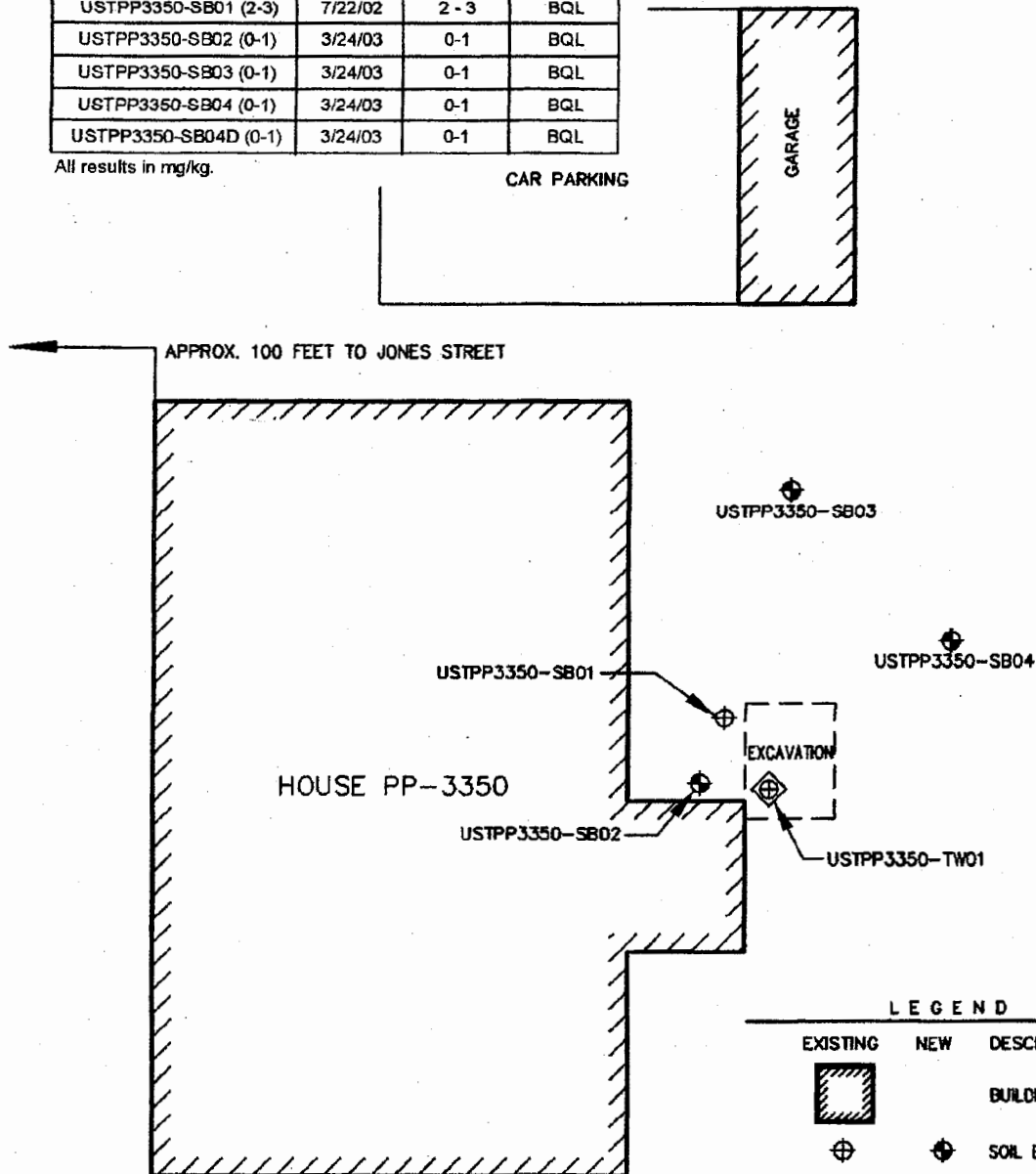
203016-41-04C

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
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	BQL
USTPP3350-SB02 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB03 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB04 (0-1)	3/24/03	0-1	BQL
USTPP3350-SB04D (0-1)	3/24/03	0-1	BQL

All results in mg/kg.

CAR PARKING

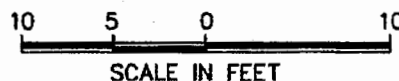


LEGEND

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

NOTE:

1. MAP ADAPTED FROM J.A. JONES



 WILMINGTON, NORTH CAROLINA	PROJECT PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS - EPA METHOD 8260B/5035	FIGURE 4A
	JOB NO. 203011-41	DATE MAY 2003	SCALE 1"=10'
			CHECKED BY MEM

203011-41-04A

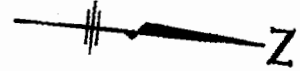
Analytical Method: EPA Method 8270

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

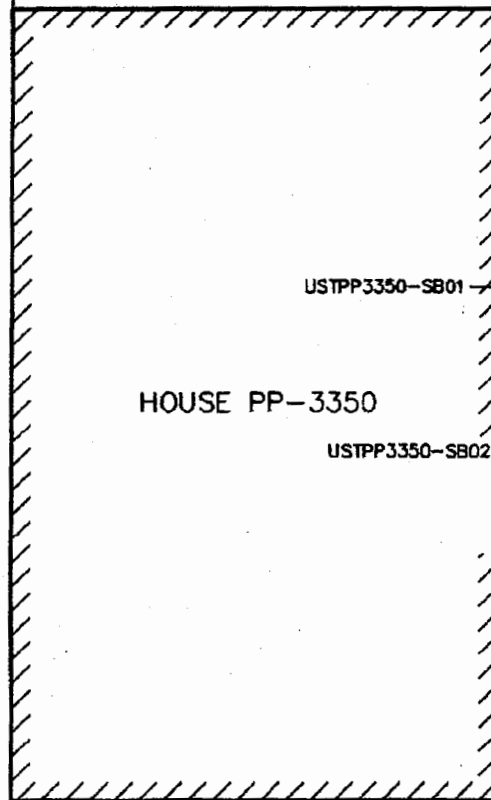
All results in mg/kg.
J = Detected below the quantitation limit.

CAR PARKING

GARAGE



APPROX. 100 FEET TO JONES STREET

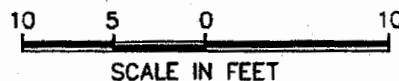


LEGEND

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

NOTE:

1. MAP ADAPTED FROM J.A. JONES



 WILMINGTON, NORTH CAROLINA	PROJECT PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN WITH SOIL LABORATORY RESULTS - EPA METHOD 8270	FIGURE 4B
	JOB NO. 203011-41	DATE MAY 2003	SCALE 1"=10'

203011-41-00

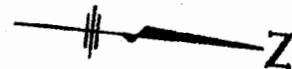
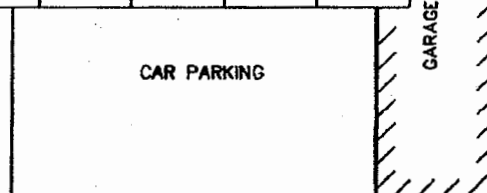
Analytical Method: MADEP EPH/VPH AS COMPARED TO NCDENR MSCCs

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
USTPP3350-SB01 (2-3)	7/22/02	2 - 3	<10	<20	<10	<20
USTPP3350-SB02 (0-1)	3/24/03	0-1	<10	<20	<10	<30
USTPP3350-SB03 (0-1)	3/24/03	0-1	<10	<20	<10	<20
USTPP3350-SB04 (0-1)	3/24/03	0-1	<10	<20	<10	<20

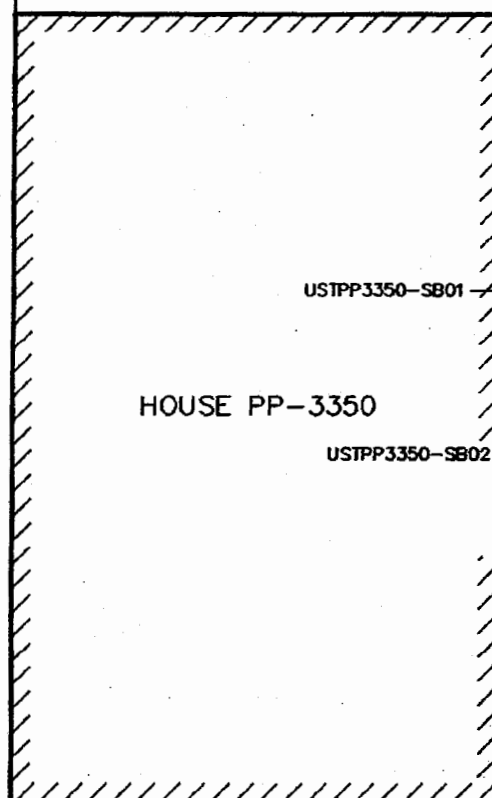
Health based level >100%

Considered immobile

All results in mg/kg.



← APPROX. 100 FEET TO JONES STREET



LEGEND

EXISTING NEW DESCRIPTION



BUILDING



SOIL BORING (HAND AUGER)



TYPE II WELL (TEMPORARY)

NOTE:

1. MAP ADAPTED FROM J.A. JONES



	PROJECT	PP-3350 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE	SITE PLAN WITH SOIL LABORATORY RESULTS - MADEP EPH/VPH AS COMPARED TO NCDENR MSCCs		FIGURE	4C		
	JOB NO.	203011-41	DATE	MAY 2003	SCALE	1"=10'		DRAWN BY	WHW

203011-41-04C

**SHAW ENVIRONMENTAL POL IMPACTED SOIL REMOVAL ACTIONS
DATA AND FIGURES**

FINAL
POL IMPACTED SOIL REMOVAL ACTIONS
PARADISE POINT and CAMP JOHNSON, MCB CAMP LEJEUNE,
NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY

Contract No. N62470-02-D-3260

Task Order 023

Naval Facilities Engineering Command
6506 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, VA 23508

Prepared by:

Shaw Environmental, Inc.

11560 Great Oaks Way, Suite 500

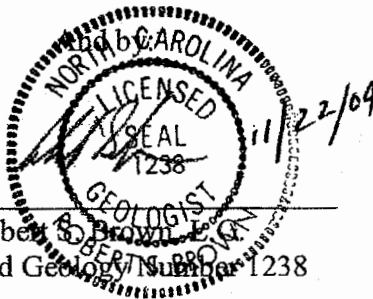
Alpharetta, GA 30022



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Project Manager



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Program Manager



Robert S. Brown, P.E.
Licensed Geologist Number 1238

Shaw Project No. 102420
November 2004

2.0 REMEDIAL ACTIVITIES

2.1 REMEDIAL ALTERNATIVE

Based on findings of soil assessment activities at each site, it was determined that the limits of hydrocarbon contamination at each site had been delineated. Soil contamination was assumed to be limited to the areas adjacent to the sidewalls of the former tank basin. Because of the relative small quantity of contaminated soil, on-site treatment was not practical for this project. Therefore, soil excavation and disposal was determined to be the most cost-effective technology for remediation of POL contaminated soils at each site. The remedial approach at each site was to excavate and dispose petroleum contaminated soil in the vicinity of the former USTs, as defined by Catlin's soil assessment report and the Soil Removal Action Work Plan for each site.

2.2 SITE REMEDIATION CHRONOLOGY

The following activities were completed during implementation of the soil removal action:

- All excavation activities were completed using a mini excavator.
- Removal of POL contaminated soil at House PP-3326 over an approximate area of 186 ft² to a depth of 5 bls (35 cy).
- Removal of POL contaminated soil at House PP-3330 over an approximate area of 144 ft² to a depth of 5 feet bls (27 cy).
- Removal of POL contaminated soil at House PP-3332 over an approximate area of 156 ft² to a depth of 5 feet bls (29 cy).
- Removal of POL contaminated soil at House PP-3350 over an approximate area of 36 ft² to a depth of 5 feet bls (7 cy)
- Abandonment of Monitoring Well M230-MW1 at Building M-230
- Removal of POL contaminated soil at Building M-230 over an approximate area of 176 ft² to a depth of 11 feet bls (72 cy).
- Collection of confirmation and disposal soil samples.
- Restoration of affected areas.
- Disposal of contaminated soil at an appropriate facility.

Following completion of initial excavation activities, sidewall and floor confirmation soil samples were collected for TPH-DRO and TPH-GRO analysis. If analytical results exceeded 10 mg/kg a second confirmation soil sample was collected and analyzed for MADEP

EPH/VPH. In addition, the soil sample with the highest OVA-FID reading from each excavation was also analyzed for VOCs (Method 8260) and SVOCs (Method 8270). The remedial objectives were based on soil contaminant concentrations that exceeded the State Residential MSCCs for VOCs, SVOCs and MADEP EPH/VPH. Soils were disposed of at a permitted, in-State Non-Hazardous RCRA Subtitle D disposal facility.

April 26-27, 2004: Site Preparation. Equipment and personnel currently working at Camp Lejeune performed this remedial project. The initial site preparation activities included:

- Acquiring dig permits and proper safety forms.
- Examining each site to determine access to the proposed excavation area.
- Delineation of each job site perimeter and work zones.
- Location of all utilities within the project area.
- Placement of a mini-excavator into the excavation area.
- Designating a soil staging area.
- Placement of temporary fence/barricades surrounding each work area.
- Procurement of required equipment and materials.

Setting up an exclusion zone and implementing erosion and sedimentation control measures, such as silt fence and hay bale placement, were not necessary for these field activities.

Prior to excavation activities a local utility locator, contracted by Shaw, identified and marked known utilities within each work zone.

Project kick-off and Health & Safety Meeting. All site personnel were informed of the project objectives. Site hazards and contaminants of concern were discussed.

April 28, 2004: Soil Removal, House PP-3326. During excavation activities the sidewall of the excavation was screened with a Flame Ionization Detector (OVA-FID). Field measurements ranged from 0 ppm to 364 ppm. The original soil removal area was excavated in one day. Since the excavations were taking place within a residential area, the contaminated soil was transported by dump truck to a secured area and covered while awaiting disposal. The initial excavation area was approximately 64-ft² (8 ft x 8 ft) to a depth of 5 feet bls.

Based on visual observation of stained soil and elevated OVA-FID readings the excavation was expanded approximately six feet on either side of the excavation and one foot on the side

away from the house. The dimensions of the final excavation were approximately 20 feet x 9 feet x 5 feet deep (33 cy). Four sidewall samples were collected for TPH-DRO/GRO analysis. The final excavated area is shown in **Figure 2-1** and a series of photographs are provided in **Appendix A**.

Groundwater and some product were observed in the bottom of the excavation. The fluids were recovered using a vacuum recovery truck. Because groundwater was encountered in the bottom of the excavation, a confirmation soil sample was not collected from the bottom of the excavation.

Routine air monitoring in the breathing zone was performed during excavation activities using an OVA-FID to monitor for the presence of volatile hydrocarbons. No readings were detected in the breathing zone above the ambient level of 0.0 parts per million (ppm); therefore no upgrade in protective equipment was required.

April 29, 2004: Soil Removal, House PP-3330. During excavation activities the sidewall of the excavation was screened with an OVA-FID. Field measurements ranged from 0 ppm to 20 ppm. No visible soil staining or hydrocarbon odors were observed during excavation activities. Excavated soil was transported to a secure area and covered while awaiting disposal. The excavated area is shown in **Figure 2-2** and a series of photographs are provided in **Appendix A**. An approximate area of 144-ft² (12 ft x 12 ft) was excavated to a depth of 5 feet bls (27 cy). Groundwater was not observed in the bottom of the excavation. Four sidewall samples and one bottom sample were collected for TPH-DRO/GRO analysis.

Routine air monitoring in the breathing zone was performed during excavation activities using an OVA-FID to monitor for the presence of volatile hydrocarbons. No readings were detected above the ambient level of 0.0 ppm; therefore no upgrade in protective equipment was required.

April 30, 2004: Site Restoration, Houses PP-3326 and PP-3330. The excavations at House PP-3326 and PP-3330 were backfilled and compacted in 2 feet lifts. Locator tape was placed 2 feet above the underground utilities (electrical and telephone) identified during excavation activities. Final restoration was completed by placing sod on the backfilled excavation.

May 6, 2004: Soil Removal, Houses PP-3332 and PP-3350. During excavation activities the sidewall of the excavation was screened with an OVA-FID. Field measurements ranged from 0 ppm to 20 ppm. No visible soil staining or hydrocarbon odors were observed during

excavation activities. Excavated soil was transported by dump truck to a secured area and covered while awaiting disposal. The excavated areas are shown in **Figures 2-3 and 2-4**. Photographs are provided in **Appendix A**. At House PP-3332 an approximate area of 156-ft² (12 ft x 13 ft) was excavated to a depth of 5 feet bls (30 cy). At House PP-3350 an approximate area of 36-ft² (6 ft x 6 ft) was excavated to a depth of 5 feet bls (7 cy). Groundwater was observed in the bottom of the excavation at House PP-3332. Four sidewall samples and one bottom sample were collected for TPH-DRO/GRO analysis from each excavation.

Routine air monitoring in the breathing zone was performed during excavation activities using an OVA-FID to monitor for the presence of volatile hydrocarbons. No readings were detected above the ambient level of 0.0 parts per million (ppm); therefore no upgrade in protective equipment was required.

May 7, 2004: Houses PP-3332 and PP-3350 Site Restoration. The excavations at House PP-3332 and PP-3350 were backfilled and compacted in 2 foot lifts. Final restoration was completed by placing sod on the backfilled excavations.

May 10, 2004: Camp Johnson Building M-230 Excavation. Monitoring Well M230-MW1 was properly abandoned by a North Carolina registered driller on April 30, 2004. A copy of the monitoring well abandonment form is provided in **Appendix B**. Excavation activities removed soil (as well as the abandoned monitoring well) in a 5 foot radius around the monitoring well to a total depth of 8 feet bls. Four sidewall samples and one bottom sample were collected for TPH-DRO/GRO analysis from the excavation.

May 20-21, 2004: Camp Johnson Building M-230 Additional Excavation. Based on TRPH-GRO/DRO analytical results exceeding 10 mg/kg in two sidewall samples and the floor sample, the excavation was extended an additional 2.5 feet around the monitoring well (15 feet total diameter) and an additional 3 feet deep (11 feet total depth). At the conclusion of the additional excavation work, two confirmation sidewall soil samples and one floor soil sample were collected. The samples were analyzed for VOCs (Method 8260), SVOCs (Method 8270) and MADEP EPH/VPH.

May 26, 2004: Paradise Point Soil Confirmation Sample Collection Houses PP-3326, PP-3330, PP-3332, and PP-3350. Using a hand auger, confirmation soil samples were collected approximately two feet from each excavation sidewall and a floor sample was collected from the center of each excavation. The samples were collected from a depth of seven feet bls. A

floor sample was not collected at House PP-3326 because groundwater was encountered at a depth of five feet bls during excavation activities. All the soil samples were analyzed for MADEP EPH/VPH. In addition, the soil sample displaying the highest OVA-FID reading from each excavation was analyzed for VOCs (Method 8260) and SVOCs (Method 8270).

Transport and Disposal of Contaminated Soil. A total of 254 tons of soil was loaded onto trucks and transported and disposed of by ES&J Enterprises. ES&J Enterprise operates a State-permitted TPHC recycling facility located in Autryville, North Carolina. Manifests were obtained from ES&J Enterprises and are included in **Appendix C**.

The Safety Meeting Reports, Job Safety Analyses Forms, Excavation Inspection Report, and field notes are presented in **Appendix D**.

3.0 POST EXCAVATION SOIL SAMPLE ANALYTICAL RESULTS

3.1 NORTH CAROLINA REGULATORY STANDARDS

The remedial action cleanup criteria for the Paradise Point and Camp Johnson soils were based on the NCDENR Maximum Soil Contaminant Concentrations for Residential Soil Cleanup Levels established in the April 2001 guidelines.

3.2 CONFIRMATION SAMPLING

Following initial excavation activities, confirmation soil samples were collected and sent to an off-site laboratory for TPH-DRO and TPH-GRO analysis. When analytical results exceeded 10 mg/kg, additional soil removal was completed and an additional set of confirmation samples were collected. These confirmation soil samples were analyzed for MADEP EPH/VPH, EPA Method 8260B, and EPA Method 8270 analysis according to the Sampling and Analysis Plan, *Appendix B of the Soil Removal Action Work Plan for Paradise Point POL Remedial Measures Houses PP-3326, PP-3330, PP-3332, PP-3350 and Building M-230, dated April 2004*. The following sections present analytical results from each of the excavations.

3.2.1 House PP-3326

Analytical results indicated that TPH-DRO and TPH-GRO were detected at concentrations above 10 mg/kg in soil samples 3326-NW-001 (30,700 mg/kg, TPH-DRO; 676 mg/kg, TPH-GRO) and 3326-EW-003 (61.7 mg/kg, TPH-DRO). **Table 3.1** presents TPH-GRO/DRO analytical results.

Analytical results indicated that some VOC and SVOC constituents were detected at very low concentrations in soil sample 3326-WW-004. The concentrations of these constituents were, however, below North Carolina's Residential MSCCs. Only 2-methylnaphthalene (3.14 mg/kg) was detected at a concentration slightly above the Soil-to-Groundwater MSCC (3.0 mg/kg). **Table 3.2** presents VOC and SVOC analytical results.

Analytical results indicated that some MADEP EPH/VPH carbon ranges were detected at concentrations in soil samples 3326-NW-001, 3326-SW-002 and 3326-WW-004. The C9-C18 Aliphatics concentration (18,100 mg/kg) exceeded the Residential MSCC in sample 3326-WW-004. The C9-C22 Aromatics concentration exceeded the Residential MSCC in samples 3326-NW-001 (3,429 mg/kg) and 3326-WW-004 (4,183 mg/kg). **Table 3.3** presents

MADEP EPH/VPH analytical results. **Table 3.13** presents a summary table of the MADEP EPH/VPH analytical results. The laboratory analytical reports are provided in **Appendix E**.

3.2.2 House PP-3330

Analytical results indicated that TPH DRO and TPH-GRO were detected at concentrations above 10 mg/kg in soil samples 3330-NW-001 (78.9 mg/kg, TPH-DRO), 3330-SW-002 (4,970 mg/kg, TPH-DRO) and 3330-F-005 (16,200 mg/kg, TPH-DRO; 99.5 mg/kg, TPH-GRO). **Table 3.1** presents TPH-GRO/DRO analytical results.

Analytical results did not detect any VOC or SVOC constituents above the method reporting limit in soil sample 3330-SW-002. The method reporting limit was below both North Carolina's Residential MSCCs as well as the Soil-to-Groundwater MSCCs for all the constituents in each analytical method with the exception of benzo(a)pyrene. **Table 3.4** presents VOC and SVOC analytical results.

Analytical results indicated that some MADEP EPH/VPH carbon ranges were detected at concentrations in soil samples 3330-NW-001, 3330-WW-004, and 3330-F-005. The C9-C22 Aromatics concentration exceeded the Residential MSCC in samples 3330-NW-001 (769 mg/kg) and 3330-WW-004 (9,120 mg/kg). The C9-C18 Aliphatics concentration exceeded the Residential MSCC in sample 3330-WW-004 (11,400 mg/kg). **Table 3.5** presents MADEP EPH/VPH analytical results. **Table 3.13** presents a summary table of the MADEP EPH/VPH analytical results. The laboratory analytical reports are provided in **Appendix E**.

3.2.3 House PP-3332

Analytical results indicated that TPH DRO and TPH-GRO were detected at concentrations above 10 mg/kg in soil samples 3332-NW-001 (16.1 mg/kg, TPH-DRO), 3332-SW-002 (3,720 mg/kg, TPH-DRO), 3332-WW-004 (17.4 mg/kg, TPH-DRO) and 3332-F-005 (13,500 mg/kg, TPH-DRO; 130 mg/kg, TPH-GRO). **Table 3.1** presents TPH-GRO/DRO analytical results.

Analytical results indicated that some VOC and SVOC constituents were detected at very low concentrations in soil sample 3332-SW-002. The concentrations of these constituents were, however, below North Carolina's Residential MSCCs. Only 2-methylnaphthalene (14.1 mg/kg) and naphthalene (4.52 mg/kg) were detected at concentrations above their respective Soil-to-Groundwater MSCCs (2-methylnaphthalene, 3.0 mg/kg; and naphthalene, 0.58 mg/kg). **Table 3.6** presents VOC and SVOC analytical results.

Analytical results indicated that some MADEP EPH/VPH carbon ranges were detected at concentrations in soil samples 3332-NW-001, 3332-SW-002, 3332-WW-004, and 3332-F-005. The C9-C22 Aromatics concentration exceeded the Residential MSCC in samples 3332-NW-001 (5,438 mg/kg), 3332-SW-002 (1,848 mg/kg), and 3332-F-005 (1,232 mg/kg). The C9-C18 Aliphatics concentration exceeded the Residential MSCC in sample 3332-NW-001 (14,600 mg/kg). **Table 3.7** presents MADEP EPH/VPH analytical results. **Table 3.13** presents a summary table of the MADEP EPH/VPH analytical results. The laboratory analytical reports are provided in **Appendix E**.

3.2.4 House PP-3350

Analytical results indicated that TPH DRO and TPH-GRO were detected at concentrations above 10 mg/kg in soil samples 3350-EW-003 (83.3 mg/kg, TPH-DRO), 3350-WW-004 (68.8 mg/kg, TPH-DRO) and 3350-F-005 (16,800 mg/kg, TPH-DRO). **Table 3.1** presents TPH-GRO/DRO analytical results.

Analytical results did not detect any VOC or SVOC constituents above the method reporting limit in soil sample 3350-WW-004. The method reporting limit was below both North Carolina's Residential MSCCs as well as the Soil-to-Groundwater MSCCs for all the constituents in each analytical method with the exception of benzo(a)pyrene. **Table 3.8** presents VOC and SVOC analytical results.

Analytical results indicated that some MADEP EPH/VPH carbon ranges were detected at concentrations in soil samples 3350-NW-001, 3350-SW-002, 3350-EW-003, 3350-WW-004, and 3350-F-005. The C9-C22 Aromatics concentration exceeded the Residential MSCC in samples 3350-NW-001 (512 mg/kg), 3350-SW-002 (1,207 mg/kg), and 3350-F-005 (2,850 mg/kg). **Table 3.9** presents MADEP EPH/VPH analytical results. **Table 3.13** presents a summary table of the MADEP EPH/VPH analytical results. The laboratory analytical reports are provided in **Appendix E**.

3.2.5 Building M-230

Analytical results indicated that TPH DRO and TPH-GRO were detected at concentrations above 10 mg/kg in soil samples M230-NW-001 (71.1 mg/kg, TPH-DRO), M230-WW-004 (63 mg/kg, TPH-DRO) and M230-F-005 (341 mg/kg, TPH-DRO). **Table 3.1** presents TPH-GRO/DRO analytical results.

4.0 SUMMARY AND CONCLUSIONS

Approximately 130 tons of POL contaminated soil was removed to eliminate a source of petroleum contamination from four locations at Paradise Point. An additional 95 tons of POL contaminated soil was removed from one location at Camp Johnson. The soil contained elevated levels of constituents of fuel oil. The following conclusions have been developed based on results from the remedial action:

- The remedial action was successful in removing a majority of soil contaminated with petroleum hydrocarbons in the unsaturated zone at each location. However, confirmation soil sample analytical results indicate some hydrocarbon constituents continue to persist at concentrations above the Residential NCDENR soil cleanup levels at the Paradise Point sites.
- House PP-3326: Soil samples from the sidewall adjacent to the house (3326-NW-001) and the sidewall to the left (as you face the house) (3326-WW-004) exceeded Residential MSCCs for at least one constituent.
- House PP-3330: Soil samples from the sidewall adjacent to the house (3330-NW-001) and the sidewall to the left (as you face the house) (3330-WW-004) exceeded Residential MSCCs for at least one constituent.
- House PP-3332: Soil samples from the sidewall adjacent to the house (3330-NW-001), the sidewall farthest from the house (3332-WW-002) and the floor sample (3332-F-005, 5 feet bls) exceeded Residential MSCCs for at least one constituent.
- House PP-3350: Soil samples from the sidewall adjacent to the house (3350-NW-001), the sidewall on the other side of the excavation (3350-SW-002) and the floor sample (3350-F-005, 5 feet bls) exceeded Residential MSCCs for at least one constituent.
- Because of the proximity of the houses to the excavation, additional soil removal is not possible in the direction of the house.
- Building M-230: Only Floor sample M230-F-005 detected any hydrocarbon constituents (benzo(a)pyrene) above Residential MSCCs. This sample was collected from an approximate depth of 11 feet bls.

- Additional soil removal activities are required at locations that exceeded Residential MSCCs with the exception of those locations that are adjacent to the house.

Table 3-13 Summary of MADEP-EPH/VPH Analytical Results

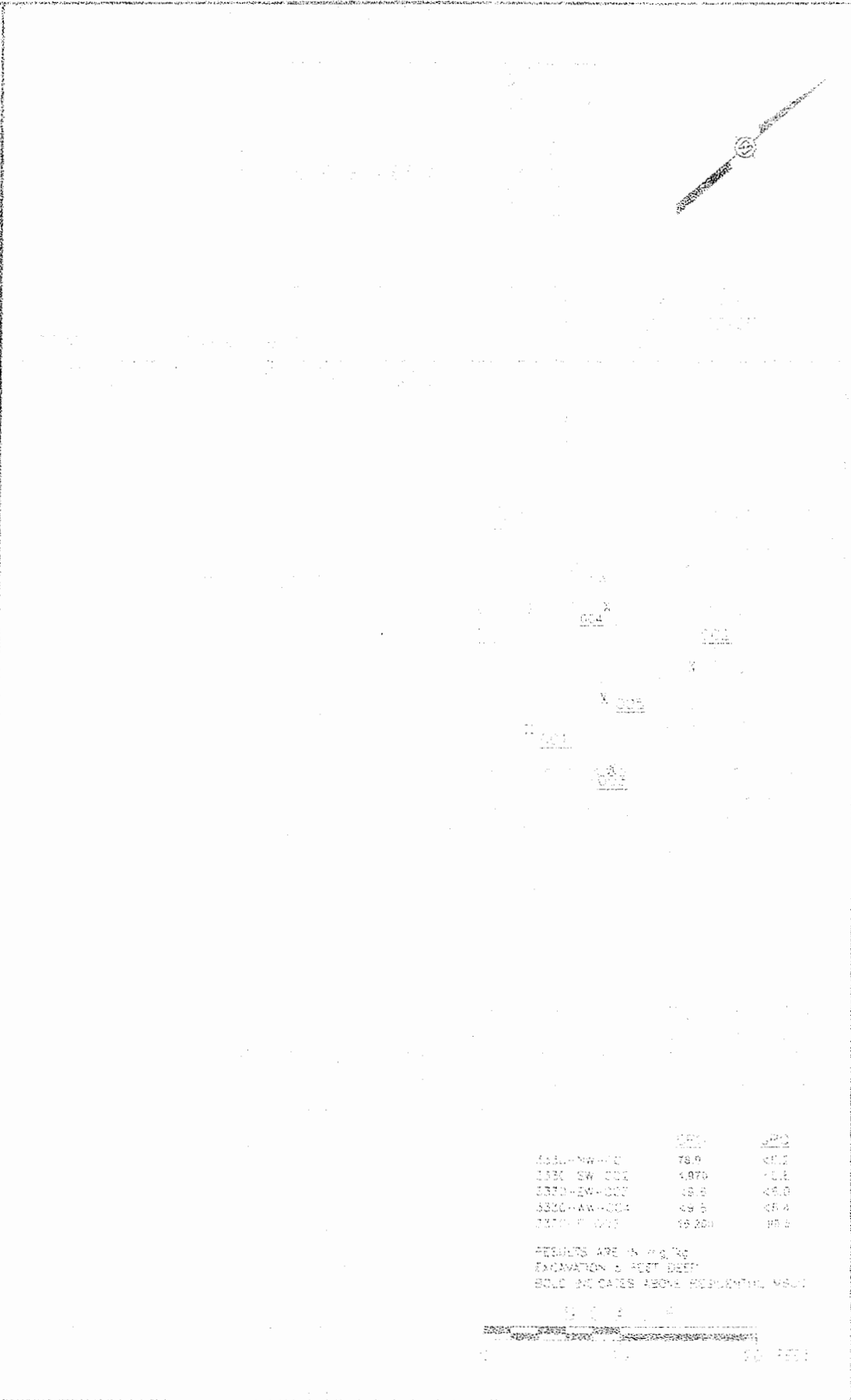
Client Name: Shaw E & I, Inc
 Project Name: Camp Lejeune-Paradise Point 3351
 Site Location:

Laboratory Name: Accutest Southeast
 NC Certification # (Lab): 575
 Sample Matrix: Soil

Sample Information and Analytical Results House PP-3326									
Method for Ranges: MADEP-EPH/VPH		Sample Identification		3326-NW-		3326-SW-		3326-EW-	
Hydrocarbon Ranges		Residential		001		002		003	
Units of Measure		Industrial		001		002		003	
C9-C18 Aliphatics	mg/kg	9,386	245,280	3,255	4,220	11.6	<8.3	<8.3	3326-F-005
C19-C36 Aliphatics	mg/kg	93,860	#	#	765	8.6	<8.3	<8.3	
C9-C22 Aromatics (Unadj.)	mg/kg	469	12,264	34	<8.2	<8.2	<8.3	<8.3	
C5-C8 Aliphatics	mg/kg	939	24,528	72	<220	<4.3	<4.4	<4.4	
Sample Information and Analytical Results House PP-3330									
Method for Ranges: MADEP-EPH/VPH		Sample Identification		3330-NW-		3330-SW-		3330-EW-	
Hydrocarbon Ranges		Residential		001		002		003	
Units of Measure		Industrial		001		002		003	
C9-C18 Aliphatics	mg/kg	9,386	245,280	3,255	1,910	<8.4	<8.4	<8.9	3330-F-005
C19-C36 Aliphatics	mg/kg	93,860	#	#	695	<8.4	<8.4	<8.9	415
C9-C22 Aromatics (Unadj.)	mg/kg	469	12,264	34	<8.2	<8.4	<8.4	<8.9	108
C5-C8 Aliphatics	mg/kg	939	24,528	72	<6.9	<4.5	<4.5	<4.8	149
Sample Information and Analytical Results House PP-3332									
Method for Ranges: MADEP-EPH/VPH		Sample Identification		3332-NW-		3332-SW-		3332-EW-	
Hydrocarbon Ranges		Residential		001		002		003	
Units of Measure		Industrial		001		002		003	
C9-C18 Aliphatics	mg/kg	9,386	245,280	3,255	7,180	<7.9	7,180	<7.9	3332-F-005
C19-C36 Aliphatics	mg/kg	93,860	#	#	2,510	<7.9	1,300	<7.9	2,850
C9-C22 Aromatics (Unadj.)	mg/kg	469	12,264	34	<8.2	<7.9	<7.9	<7.9	612
C5-C8 Aliphatics	mg/kg	939	24,528	72	<4.10	<4.3	<9.0	<4.3	<4.20
Sample Information and Analytical Results House PP-3350									
Method for Ranges: MADEP-EPH/VPH		Sample Identification		3350-NW-		3350-SW-		3350-EW-	
Hydrocarbon Ranges		Residential		001		002		003	
Units of Measure		Industrial		001		002		003	
C9-C18 Aliphatics	mg/kg	9,386	245,280	3,255	717	2,000	<8.2	<8.2	3350-F-005
C19-C36 Aliphatics	mg/kg	93,860	#	#	108	<400	<8.2	<8.2	2,210
C9-C22 Aromatics (Unadj.)	mg/kg	469	12,264	34	<5.2	<20.7	4.8	8.7	325
C5-C8 Aliphatics	mg/kg	939	24,528	72	<19	<280	<4.3	<3.8	<4.70
Sample Information and Analytical Results Building M-230									
Method for Ranges: MADEP-EPH/VPH		Sample Identification		M230-NW-		M230-SW-		M230-F-005	
Hydrocarbon Ranges		Residential		001		004			
Units of Measure		Industrial		001		004			
C9-C18 Aliphatics	mg/kg	9,386	245,280	3,255	33.5	<7.2	83.8	<7.2	
C19-C36 Aliphatics	mg/kg	93,860	#	#	43.7	<7.2	49.2	<7.2	
C9-C22 Aromatics (Unadj.)	mg/kg	469	12,264	34	34.5	<7.2	42.4	<7.2	
C5-C8 Aliphatics	mg/kg	939	24,528	72	<3.7	<4.1	<4.2	<4.2	

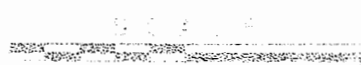
IMAGE	X-REF	OFFICE	DRAWING
		Alpharetta, Ga	NUMBER
			102420-F102.2R

DATE: 11/27/98
 DRAWING NUMBER: 102420-F102.2R



102420-F102.2R	78.0	102420-F102.2R
102420-F102.2R	10.0	102420-F102.2R
102420-F102.2R	10.0	102420-F102.2R
102420-F102.2R	10.0	102420-F102.2R
102420-F102.2R	10.0	102420-F102.2R

RESULTS ARE IN %
 EXCAVATION 5 FEET DEEP
 BOLD INDICATES ABOVE RESIDENTIAL VALUE



 Shaw Environmental, Inc. 1000 Peachtree Street, N.E. Atlanta, Georgia 30309 (404) 525-1000 FAX (404) 525-1001 WWW.SHAWENV.COM		PROJECT NO. 102420 SHEET NO. 102420-F102.2R DATE 11/27/98 DRAWN BY J. J. JONES CHECKED BY J. J. JONES APPROVED BY J. J. JONES	REVISIONS NO. DATE BY 1 11/27/98 J. J. JONES 2 11/27/98 J. J. JONES
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DATE: 1/11/04
REVISION: 1/11/04

	PC	MC
3332-BA-001	16.1	22.1
3332-SA-002	3.720	18.6
3332-S40-003	3.170	23.8
3332-BA-004	19.4	23.8
3332-SW-005	17.4	23.8
3332-P-006	12.500	120

RESULTS ARE IN 01/04
EXCAVATION 5 FEET DEEP
BOLD APPROVES (EQUA RESIDENTIAL) NSP

ATLANTIC DIVISION		DATE: 1/11/04	
PROJECT: 102420-FIG7. NR		DRAWN BY: [Signature]	
CHECKED BY: [Signature]		DATE: 1/11/04	
APPROVED BY: [Signature]		DATE: 1/11/04	

REVISIONS	
NO.	DESCRIPTION
1	INITIALS: [Signature]
2	DATE: 1/11/04
3	BY: [Signature]
4	DATE: 1/11/04
5	BY: [Signature]

APPENDIX B

LABORATORY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION FROM DECEMBER 2005 SAMPLING EVENT

Mr. Mike Cree
Osage of Virginia
4800A Colley Avenue
Norfolk VA 23508-2037

Report Number: G649-8

Client Project: GEI04-04 CLNC PP

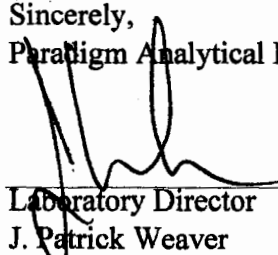
Dear Mr. Cree:

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

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

Thank you for using Paradigm Analytical Labs for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

1/3/06

Date

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3326-001
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	79
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	99

* = 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: g649-8-1a

Reviewed By: RJ

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3326-004
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	86
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	48 (mg/Kg)
C ₉ -C ₁₂ Aliphatics**	290 (mg/Kg)
C ₉ -C ₁₀ Aromatics**	460 (mg/Kg)
Surrogate % Recovery - PID	460***
Surrogate % Recovery - FID	930***

* = 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.

***= High surrogate recovery due to matrix interference

Lab Info: g649-8-2a

Reviewed By: SN

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3330-001
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	79
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	99
Surrogate % Recovery - FID	100

* = 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: g649-8-3a

Reviewed By: RNV

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3330-004
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	82
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	< 10 (mg/Kg)
C ₉ -C ₁₂ Aliphatics**	< 10 (mg/Kg)
C ₉ -C ₁₀ Aromatics**	< 10 (mg/Kg)
Surrogate % Recovery - PID	97
Surrogate % Recovery - FID	97

* = 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: g649-8-4a

Reviewed By: RL

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3332-001
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
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	97
Surrogate % Recovery - FID	98

* = 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: g649-8-5a

Reviewed By: PN

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3332-002
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	86
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	100
Surrogate % Recovery - FID	100

* = 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: g649-8-6a

Reviewed By: RV

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3332-005
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	80
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	< 10 (mg/Kg)
C ₉ -C ₁₂ Aliphatics**	40 (mg/Kg)
C ₉ -C ₁₀ Aromatics**	30 (mg/Kg)
Surrogate % Recovery - PID	130
Surrogate % Recovery - FID	160***

* = 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.

***= High surrogate recovery due to matrix interference

Lab Info: g649-8-7a

Reviewed By: PNP

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3350-001
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	85
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	< 10 (mg/Kg)
C ₉ -C ₁₂ Aliphatics**	< 10 (mg/Kg)
C ₉ -C ₁₀ Aromatics**	< 10 (mg/Kg)
Surrogate % Recovery - PID	100
Surrogate % Recovery - FID	100

* = 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: g649-8-8a

Reviewed By:

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3350-002
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
Dry Weight	89
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	100
Surrogate % Recovery - FID	99

* = 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: g649-8-9a

Reviewed By:

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3350-005
Sample Matrix	Soil
Collection Option (for Soil)*	2
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/14/05
Date Analyzed	12/20/05
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	100
Surrogate % Recovery - FID	99

* = 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: g649-8-10a

Reviewed By: 2nd

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 10/31/05PID Initial Calibration Date: 10/31/05

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/L)	%RSD or CCC	Method of Quantitation
C ₅ -C ₈ Aliphatics	40	7.9	Calibration Factor
	1000		
	2000		
	3000		
	4000		
C ₉ -C ₁₂ Aliphatics	10	1.00	Linear Regression
	250		
	500		
	750		
	1000		
C ₉ -C ₁₀ Aromatics	10	16.20	Calibration Factor
	250		
	500		
	750		
	1000		

Calibration Check Date: 12/19/05

Calibration Check

Range	Levels (µg/L) (mg/Kg)	RPD
C ₅ -C ₈ Aliphatics	2000 200	6.6
C ₉ -C ₁₂ Aliphatics	500 50	-7.6
C ₉ -C ₁₀ Aromatics	500 50	7.1

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 10/31/05PID Initial Calibration Date: 10/31/05

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/L)	%RSD or CCC	Method of Quantitation
C ₅ -C ₈ Aliphatics	40	7.9	Calibration Factor
	1000		
	2000		
	3000		
	4000		
C ₉ -C ₁₂ Aliphatics	10	1.00	Linear Regression
	250		
	500		
	750		
	1000		
C ₉ -C ₁₀ Aromatics	10	16.20	Calibration Factor
	250		
	500		
	750		
	1000		

Calibration Check Date: 12/20/05

Calibration Check

Range	Levels (µg/L) (mg/Kg)		RPD
C ₅ -C ₈ Aliphatics	2000	200	8.6
C ₉ -C ₁₂ Aliphatics	500	50	-7.8
C ₉ -C ₁₀ Aromatics	500	50	6.9

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3326-001
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/23/05
Dry Weight	79.1
Dilution Factor	1:1
C ₉ -C ₁₈ Aliphatics*	350 (mg/Kg)
C ₁₉ -C ₃₆ Aliphatics*	120 (mg/Kg)
C ₁₁ -C ₂₂ Aromatics*	57 (mg/Kg)
Aliphatic Surrogate % Recovery	83
Aromatic Surrogate % Recovery	110
Fractionation Surrogate 1 % Recovery	75

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-1D

Reviewed By: RV

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3326-004
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/28/05
Dry Weight	86
Dilution Factor	100:5
C ₉ -C ₁₈ Aliphatics*	12000 (mg/Kg)
C ₁₉ -C ₃₈ Aliphatics*	1400 (mg/Kg)
C ₁₁ -C ₂₂ Aromatics*	4300 (mg/Kg)
Aliphatic Surrogate % Recovery	NA
Aromatic Surrogate % Recovery	NA
Fractionation Surrogate 1 % Recovery	NA

Comments:

* = Excludes any surrogates or internal standards.

NA = Non-applicable, surrogate diluted out.

Lab info: G649-8-2D

Reviewed By: END

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3330-001
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/27/05
Dry Weight	78.8
Dilution Factor	1:1
C ₉ -C ₁₈ Aliphatics*	74 (mg/Kg)
C ₁₉ -C ₃₆ Aliphatics*	38 (mg/Kg)
C ₁₁ -C ₂₂ Aromatics*	< 10 (mg/Kg)
Aliphatic Surrogate % Recovery	100
Aromatic Surrogate % Recovery	86
Fractionation Surrogate 1 % Recovery	78

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-3D

Reviewed By: END

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3330-004
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/23/05
Dry Weight	82.2
Dilution Factor	1:1
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	84
Aromatic Surrogate % Recovery	76
Fractionation Surrogate 1 % Recovery	60

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-4D

Reviewed By: *SW*

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3332-001
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/23/05
Dry Weight	80.4
Dilution Factor	1:1
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	76
Aromatic Surrogate % Recovery	68
Fractionation Surrogate 1 % Recovery	73

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-5D

Reviewed By: RW

EPH (Allphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3332-002
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/23/05
Dry Weight	86.3
Dilution Factor	1:1
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	91
Aromatic Surrogate % Recovery	85
Fractionation Surrogate 1 % Recovery	83

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-6D

Reviewed By: END

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3332-005
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/19/05
Date Analyzed	12/28/05
Dry Weight	79.7
Dilution Factor	5:1
C ₉ -C ₁₈ Aliphatics*	830 (mg/Kg)
C ₁₉ -C ₃₆ Aliphatics*	110 (mg/Kg)
C ₁₁ -C ₂₂ Aromatics*	280 (mg/Kg)
Aliphatic Surrogate % Recovery	95
Aromatic Surrogate % Recovery	110
Fractionation Surrogate 1 % Recovery	87

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-7D

Reviewed By: RMF

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3350-001
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/20/05
Date Analyzed	12/29/05
Dry Weight	85.1
Dilution Factor	1:1
C ₉ -C ₁₈ Aliphatics*	27 (mg/Kg)
C ₁₉ -C ₃₆ Aliphatics*	< 10 (mg/Kg)
C ₁₁ -C ₂₂ Aromatics*	< 10 (mg/Kg)
Aliphatic Surrogate % Recovery	110
Aromatic Surrogate % Recovery	100
Fractionation Surrogate 1 % Recovery	110

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-8D

Reviewed By: RL

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3350-002
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/20/05
Date Analyzed	12/29/05
Dry Weight	89
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	120
Aromatic Surrogate % Recovery	120

Comments:

* = Excludes any surrogates or internal standards.

Sample did not require fractionation.

Lab info: g649-8-9d

Reviewed By: EW

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Osage of Virginia

Project Name: GEI04-04 CLNC PP

Sample Information and Analytical Results	
Sample Identification	PP3350-005
Sample Matrix	Soil
Date Collected	12/14/05
Date Received	12/15/05
Date Extracted	12/28/05
Date Analyzed	12/29/05
Dry Weight	82.7
Dilution Factor	1:1
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	110
Aromatic Surrogate % Recovery	80
Fractionation Surrogate 1 % Recovery	83

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G649-8-10G

Reviewed By:

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 12/28/05

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/mL)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	24.90	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₆ Aliphatics	8	15.4	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	9.8	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 12/29/05

Calibration Check

Range	Levels (µg/mL)	RPD
C ₉ -C ₁₈ Aliphatics	120	18.7
C ₁₉ -C ₃₆ Aliphatics	160	10.7
C ₁₁ -C ₂₂ Aromatics	340	8.8

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 09/13/05

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/mL)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	3.80	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₆ Aliphatics	8	3.8	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	7.9	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 12/27/05

Calibration Check

Range	Levels (µg/mL)	RPD
C ₉ -C ₁₈ Aliphatics	120	-9.7
C ₁₉ -C ₃₆ Aliphatics	160	-7.9
C ₁₁ -C ₂₂ Aromatics	340	-0.3

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 09/13/05

Calibration Ranges and Limits

Range	MDL (2/2004) (µg/L)	ML (µg/L)	RL (µg/L)	RL (mg/Kg)
C ₉ -C ₁₈ Aliphatics	3.84	12.2	100	10
C ₁₉ -C ₃₈ Aliphatics	0.57	1.8	100	10
C ₁₁ -C ₂₂ Aromatics	4.54	14.4	100	10

Calibration Concentration Levels

Range	Levels (µg/mL)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	3.80	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₈ Aliphatics	8	3.8	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	7.9	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 12/22/05

Calibration Check

Range	Levels (µg/mL)	RPD
C ₉ -C ₁₈ Aliphatics	120	7.6
C ₁₉ -C ₃₈ Aliphatics	160	5.8
C ₁₁ -C ₂₂ Aromatics	340	-7.4

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

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

EPH Laboratory Reporting Form

Calibration and QA/QC Information

 Initial Calibration Date: 12/28/05

Calibration Ranges and Limits

Range	MDL (2/2004) ($\mu\text{g/L}$)	ML ($\mu\text{g/L}$)	RL ($\mu\text{g/L}$) (mg/Kg)	
C ₉ -C ₁₈ Aliphatics	3.84	12.2	100	10
C ₁₉ -C ₃₆ Aliphatics	0.57	1.8	100	10
C ₁₁ -C ₂₂ Aromatics	4.54	14.4	100	10

Calibration Concentration Levels

Range	Levels ($\mu\text{g/mL}$)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	24.90	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₆ Aliphatics	8	15.4	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	9.7	Calibration Factor
	85		
	170		
	340		
	680		

 Calibration Check Date: 12/28/05

Calibration Check

Range	Levels ($\mu\text{g/mL}$)	RPD
C ₉ -C ₁₈ Aliphatics	120	20.8
C ₁₉ -C ₃₆ Aliphatics	160	13.1
C ₁₁ -C ₂₂ Aromatics	340	10.6

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 12/28/05

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/mL)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	24.90	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₆ Aliphatics	8	15.4	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	9.8	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 12/29/05

Calibration Check

Range	Levels (µg/mL)	RPD
C ₉ -C ₁₈ Aliphatics	120	18.7
C ₁₉ -C ₃₆ Aliphatics	160	10.7
C ₁₁ -C ₂₂ Aromatics	340	8.8

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

List of Reporting Abbreviations and Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantitation Limit

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL = Reporting Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

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

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

MI34.092205.2

PARADIGM ANALYTICAL LABORATORIES, INC.

5500 Business Drive, Wilmington, NC 28405

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

COC# 52965

Chain-of Custody Record & Analytical Request

Page 1 of 1

Client: OSAGE OF VA Project ID: GEF04-04 C4C PP Date: 12-14-05 Report To: MIKE CRETE

Address: 4800 A COLLEGE AVE Contact: MIKE CRETE Turnaround: MTT

Address: NORFOLK, VA 23508 Phone: 757 440-0400 Job Number: _____

Quote #: _____ Fax: 757 440-0411 P.O. Number: _____ Invoice To: MIKE CRETE

Sample ID	Date	Time Matrix	Preservatives		Analyses				Comments: Please specify any special reporting requirements
			METHANOL		VPH	HPH			
PP3326-001	12-14-05	1330 S			2	1			G649-8
PP3326-004		1340 S			2	1			
PP3330-001		1305 S			2	1			
PP3330-004		1315 S			2	1			
PP3332-001		1240 S			2	1			
PP3332-002		1245 S			2	1			
PP3332-005		1255 S			2	1			
PP3350-001		1200 S			2	1			
PP3350-002		1210 S			2	1			
PP3350-005	12-14-05	1210 S			2	1			
Requisitioned By	Date	Time	Received By	Date	Time	Temperature	State Certification Requested	SEE REVERSE FOR TERMS AND CONDITIONS	
<u>J. W. H. - 25</u>	<u>12-14-05</u>	<u>1545</u>	<u>J. W. H. - 25</u>	<u>12/15/05</u>	<u>0925</u>	<u>2.3 C</u>	NC SC Other		

ORIGINAL

APPENDIX C

LABORATORY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION FROM FEBRUARY 2006 SAMPLING EVENT

Mr. Chris Murray
Sovereign Consulting
606 Thimble Shoals Rd.
Suite A1
Newport-News VA 23606
Report Number: G650-30
Client Project: NV012

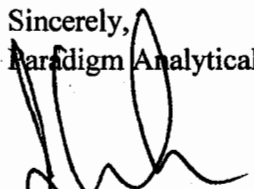
Dear Mr. Murray:

Enclosed are the results of the analytical services performed under the referenced project. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

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

Thank you for using Paradigm Analytical Labs for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

2/21/06
Date

Results for Volatiles

by GC 602

Client Sample ID: Method Blank

Analyzed By: MJC

Client Project ID:

Date Collected:

Lab Sample ID: VBLK3022006B

Date Received:

Lab Project ID:

Matrix: Water

Analyte	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flags
Benzene	BQL	1.00	0.316	1	2/20/2006	
Diisopropyl ether (DIPE)	BQL	1.00	0.294	1	2/20/2006	
Ethylbenzene	BQL	1.00	0.299	1	2/20/2006	
Methyl-tert butyl ether (MTBE)	BQL	2.00	0.588	1	2/20/2006	
Toluene	BQL	1.00	0.302	1	2/20/2006	
m/p-Xylene	BQL	2.00	0.608	1	2/20/2006	
o-Xylene	BQL	2.00	0.596	1	2/20/2006	

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.8	102

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

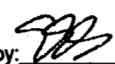
Control Limits for QC Check / Laboratory Control Spike

Method: 602 Spike[ppb]: 10
 Instrument : gc3
 Filename : 022006\024r0101.txt

Compound	ppb	Q(%)	QC Limits		P _s (%)	LCS Limits	
			Lower	Upper		Lower	Upper
Benzene	10.5	105.1	77.0	123.0	105	39	150
Chlorobenzene	10.4	104.0	80.5	119.5	104	55	135
1,2-Dichlorobenzene	10.2	101.8	68.0	132.0	102	37	154
1,3-Dichlorobenzene	10.3	103.1	72.5	127.5	103	50	141
1,4-Dichlorobenzene	10.5	105.0	69.5	130.5	105	42	143
• Diisopropyl ether	10.7	106.7	43.1	156.9	107	30	170
Ethylbenzene	10.6	105.5	63.0	137.0	106	32	160
• MTBE	10.5	104.7	46.8	153.2	105	35	165
Toluene	10.6	105.6	77.5	127.0	106	46	148
• m,p-Xylene	21.0	105.2	11.2	188.8	105	D	239
• o-Xylene	10.9	109.0	47.6	152.4	109	36	164

Flags :

- + = out of QC limits.
- = lab generated limits.
- D = Detected

Reviewed by: 

Control Limits for MS-MSD

Method: 602 Spike[ppb]: 10
Instrument : GC3
Sample : 022006\039r0101.txt
MS : 022006\040r0101.txt
MSD : 022006\041r0101.txt

Compound	µg/L			P(%)		P Limits	
	Sam.	MS	MSD	MS	MSD	Lower	Upper
Benzene	3.4	14.0	14.0	107	108	39	150
Chlorobenzene	ND	10.6	10.5	106	105	55	135
1,2-Dichlorobenzene	5.2	18.6	18.3	104	101	37	154
1,3-Dichlorobenzene	2.2	12.9	12.8	107	104	50	141
1,4-Dichlorobenzene	ND	10.3	10.1	103	101	42	143
• Diisopropyl ether	ND	11.0	10.6	110	108	30	170
Ethylbenzene	19.1	29.7	29.5	107	104	32	160
• MTBE	ND	11.2	11.1	108	107	35	165
Toluene	3.9	17.2	16.1	133	122	48	148
• m,p-Xylene	13.7	34.5	34.2	104	102	D	239
• o-Xylene	10.3	24.0	22.3	137	120	36	164

Flags :

- + = out of QC limits.
- = lab generated limits.
- D = Detected
- ND = None Detected

Reviewed by: 

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Sovereign Consulting

Project Name: NV012

Sample Information and Analytical Results	
Sample Identification	USTPP3326-TW01
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	02/17/06
Date Received	02/20/06
Date Extracted	02/20/06
Date Analyzed	02/20/06
Dry Weight	
Dilution Factor	1
C ₅ -C ₈ Aliphatics**	< 100 (µg/L)
C ₉ -C ₁₂ Aliphatics**	620 (µg/L)
C ₉ -C ₁₀ Aromatics**	710 (µg/L)
Surrogate % Recovery - PID	110
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: g650-30-1d

Reviewed By: 

VPH Laboratory Reporting Form

Calibration and QA/QC Information

FID Initial Calibration Date: 02/11/06PID Initial Calibration Date: 02/11/06

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/L)	%RSD or CCC	Method of Quantitation
C ₅ -C ₈ Aliphatics	40	10.8	Calibration Factor
	1000		
	2000		
	3000		
	4000		
C ₉ -C ₁₂ Aliphatics	10	0.99	Linear Regression
	250		
	500		
	750		
	1000		
C ₉ -C ₁₀ Aromatics	10	19.30	Calibration Factor
	250		
	500		
	750		
	1000		

Calibration Check Date: 02/20/06

Calibration Check

Range	Levels (µg/L) (mg/Kg)		RPD
C ₅ -C ₈ Aliphatics	2000	200	0.7
C ₉ -C ₁₂ Aliphatics	500	50	3.0
C ₉ -C ₁₀ Aromatics	500	50	-4.2

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Sovereign Consulting

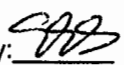
Project Name: NV012

Sample Information and Analytical Results	
Sample Identification	USTPP3326-TW01
Sample Matrix	Water
Date Collected	02/17/06
Date Received	02/20/06
Date Extracted	02/21/06
Date Analyzed	02/21/06
Dry Weight	
Dilution Factor	1:1
C ₉ -C ₁₈ Aliphatics*	< 100 (ug/L)
C ₁₉ -C ₃₈ Aliphatics*	< 100 (ug/L)
C ₁₁ -C ₂₂ Aromatics*	640 (ug/L)
Aliphatic Surrogate % Recovery	75
Aromatic Surrogate % Recovery	73
Fractionation Surrogate 1 % Recovery	96

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G650-30-11

Reviewed By: 

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 12/28/05

Calibration Ranges and Limits

Range	MDL (2/2004) ($\mu\text{g/L}$)	ML ($\mu\text{g/L}$)	RL ($\mu\text{g/L}$)	RL (mg/Kg)
C ₉ -C ₁₈ Aliphatics	3.84	12.2	100	10
C ₁₉ -C ₃₆ Aliphatics	0.57	1.8	100	10
C ₁₁ -C ₂₂ Aromatics	4.54	14.4	100	10

Calibration Concentration Levels

Range	Levels ($\mu\text{g/mL}$)	%RSD or CCC	Method of Quantitation
C ₉ -C ₁₈ Aliphatics	6	24.90	Calibration Factor
	30		
	60		
	120		
	240		
C ₁₉ -C ₃₆ Aliphatics	8	15.4	Calibration Factor
	40		
	80		
	160		
	320		
C ₁₁ -C ₂₂ Aromatics	17	9.8	Calibration Factor
	85		
	170		
	340		
	680		

Calibration Check Date: 02/21/06

Calibration Check

Range	Levels ($\mu\text{g/mL}$)	RPD
C ₉ -C ₁₈ Aliphatics	120	16.7
C ₁₉ -C ₃₆ Aliphatics	160	1.0
C ₁₁ -C ₂₂ Aromatics	340	8.0

MDL = Method Detection Limit

ML = Minimum Limit

RL = Reportable Limit

RPD = Relative Percent Difference

%RSD = Percent Relative Standard Deviation

CCC = Correlation Coefficient of Curve

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTPP3326-TW01
Client Project ID: NV012
Lab Sample ID: G650-30-1H
Lab Project ID: G650-30

Analyzed By: MRC
Date Collected: 2/17/2006 12:30
Date Received: 2/20/2006
Date Extracted: 2/20/2006
Matrix: Water

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Acenaphthene	3.30	10.0	1.22	1	2/21/2006	J
Acenaphthylene	BQL	10.0	1.12	1	2/21/2006	
Anthracene	BQL	10.0	1.75	1	2/21/2006	
Benzo[a]anthracene	BQL	10.0	1.36	1	2/21/2006	
Benzo[a]pyrene	BQL	10.0	1.27	1	2/21/2006	
Benzo[b]fluoranthene	BQL	10.0	1.43	1	2/21/2006	
Benzo[g,h,i]perylene	BQL	10.0	4.57	1	2/21/2006	
Benzo[k]fluoranthene	BQL	10.0	1.09	1	2/21/2006	
Bis(2-chloroethoxy)methane	BQL	10.0	1.11	1	2/21/2006	
Bis(2-chloroethyl)ether	BQL	10.0	1.09	1	2/21/2006	
Bis(2-chloroisopropyl)ether	BQL	10.0	1.57	1	2/21/2006	
Bis(2-ethylhexyl)phthalate	BQL	10.0	1.33	1	2/21/2006	
4-bromophenyl phenyl ether	BQL	10.0	1.99	1	2/21/2006	
Butylbenzylphthalate	BQL	10.0	1.53	1	2/21/2006	
2-Chloronaphthalene	BQL	10.0	1.25	1	2/21/2006	
2-Chlorophenol	BQL	10.0	4.22	1	2/21/2006	
4-Chloro-3-methylphenol	BQL	10.0	3.26	1	2/21/2006	
4-Chlorophenyl phenyl ether	BQL	10.0	1.42	1	2/21/2006	
Chrysene	BQL	10.0	1.11	1	2/21/2006	
Dibenzo[a,h]anthracene	BQL	10.0	4.87	1	2/21/2006	
Di-n-Butylphthalate	BQL	10.0	1.65	1	2/21/2006	
1,2-Dichlorobenzene	BQL	10.0	1.25	1	2/21/2006	
1,3-Dichlorobenzene	BQL	10.0	1.24	1	2/21/2006	
1,4-Dichlorobenzene	BQL	10.0	1.20	1	2/21/2006	
3,3'-Dichlorobenzidine	BQL	20.0	4.10	1	2/21/2006	
2,4-Dichlorophenol	BQL	10.0	3.75	1	2/21/2006	
Diethylphthalate	BQL	10.0	1.48	1	2/21/2006	
Dimethylphthalate	BQL	10.0	1.04	1	2/21/2006	
2,4-Dimethylphenol	BQL	10.0	9.25	1	2/21/2006	
Di-n-octylphthalate	BQL	10.0	1.16	1	2/21/2006	
4,6-Dinitro-2-methylphenol	BQL	50.0	3.71	1	2/21/2006	
2,4-Dinitrophenol	BQL	50.0	4.20	1	2/21/2006	
2,4-Dinitrotoluene	BQL	10.0	1.52	1	2/21/2006	
2,6-Dinitrotoluene	BQL	10.0	1.41	1	2/21/2006	
Diphenylamine *	BQL	10.0	1.53	1	2/21/2006	
Fluoranthene	BQL	10.0	1.41	1	2/21/2006	
Fluorene	6.10	10.0	1.22	1	2/21/2006	J
Hexachlorobenzene	BQL	10.0	1.22	1	2/21/2006	
Hexachlorobutadiene	BQL	10.0	1.58	1	2/21/2006	
Hexachlorocyclopentadiene	BQL	20.0	20.0	1	2/21/2006	
Hexachloroethane	BQL	10.0	1.58	1	2/21/2006	
Indeno(1,2,3-c,d)pyrene	BQL	10.0	4.57	1	2/21/2006	

**Results for Semivolatiles
by GCMS 625**

Client Sample ID: USTPP3326-TW01
Client Project ID: NV012
Lab Sample ID: G650-30-1H
Lab Project ID: G650-30

Analyzed By: MRC
Date Collected: 2/17/2006 12:30
Date Received: 2/20/2006
Date Extracted: 2/20/2006
Matrix: Water

Compound	Result ug/L	RL ug/L	MDL ug/L	Dilution Factor	Date Analyzed	Flag
Isophorone	BQL	10.0	1.27	1	2/21/2006	
Naphthalene	125	10.0	1.08	1	2/21/2006	
Nitrobenzene	BQL	10.0	1.32	1	2/21/2006	
2-Nitrophenol	BQL	10.0	3.52	1	2/21/2006	
4-Nitrophenol	BQL	50.0	3.17	1	2/21/2006	
N-Nitrosodi-n-propylamine	BQL	10.0	1.87	1	2/21/2006	
Pentachlorophenol	BQL	50.0	2.83	1	2/21/2006	
Phenanthrene	5.50	10.0	1.38	1	2/21/2006	J
Phenol	BQL	10.0	3.38	1	2/21/2006	
Pyrene	BQL	10.0	2.08	1	2/21/2006	
1,2,4-Trichlorobenzene	BQL	10.0	1.33	1	2/21/2006	
2,4,6-Trichlorophenol	BQL	10.0	2.92	1	2/21/2006	

	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.3	83
2-Fluorophenol	10	8.3	83
Nitrobenzene-d5	10	8.7	87
Phenol-d6	10	8.2	82
2,4,6-Tribromophenol	10	8.4	84
4-Terphenyl-d14	10	9.3	93

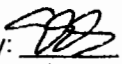
Comments:

* N-Nitrosodiphenylamine is reported as the breakdown product Diphenylamine.

Flags:

BQL = Below Quantitation Limits.

J = Detected below the quantitation limit.

Reviewed By: 

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTPP3326-TW01

Client Project ID: NV012

Lab Sample ID: G650-30-1H

Lab Project ID: G650-30

Sample Wt/Vol: 500 ML

Dilution: 1

Analyzed By: MRC

Date Collected: 2/17/2006 12:30

Date Received: 2/20/2006

Date Extracted: 2/20/2006

Date Analyzed: 2/21/2006

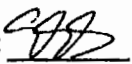
Matrix: Water

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	Trimethylbenzene, Isomer of	6.41			216
2	2-Methylnaphthalene	9.67	000091-57-6	99	145
3	1-Methylnaphthalene	9.83	000090-12-0	99	112
4	Dimethylbenzene, Isomer of	4.85			104
5	Ethylmethylbenzene, Isomer of	6.00			66.8
6	Dimethylbenzene, Isomer of	5.15			62
7	Ethylidimethylbenzene, Isomer of	7.13			61.4
8	Unknown	8.17			49.2
9	Dimethylnaphthalene, Isomer of	10.79			46.5
10	Dimethylnaphthalene, Isomer of	10.68			38.7

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: 

List of Reporting Abbreviations and Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantitation Limit

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL = Reporting Limit

RPD = Relative Percent Difference

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

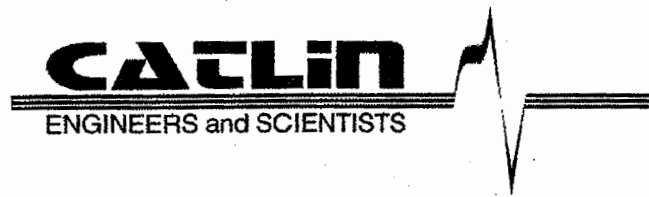
Special Notes:

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

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

APPENDIX D

WELL CONSTRUCTION AND ABANDONMENT RECORDS



Post Office Box 10279
Wilmington, NC 28404-0279
Telephone: (910) 452-5861
Fax: (910) 452-7563

February 27, 2006

North Carolina Department of Environment and Natural Resources
Division of Water Quality
Attn: Information Management
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Re: NC Well Construction and/or Abandonment Record(s)
PP-3326
Camp Lejeune, North Carolina
CATLIN Project No. 206-004

To Whom It May Concern:

CATLIN Engineers and Scientists (CATLIN) recently constructed and/or abandoned well(s) at the above referenced site. Attached to this letter are completed North Carolina Well Construction Records and/or North Carolina Well Abandonment Records with associated Figure(s) for the above referenced site located at in Camp Lejeune, North Carolina.

If you have any questions or require any additional information, please feel free to contact us at (910) 452-5861.

Sincerely,

Michael E. Mason, P.E.
Project Manager

Enclosures

cc: Commanding General, Attn: Director I&E/EMD/EQB (1 copy)
Sovereign Consulting Inc. (1 copy)

S:\GINT\PROJECTS\206-004_PP3326.GPJ, NC WELL LETTER

WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Bobbie Fowler CERTIFICATION # 2869
WELL CONTRACTOR COMPANY NAME CATLIN Engineers & Scientists PHONE # (910) 452-5861
STATE WELL CONSTRUCTION PERMIT # 2869 ASSOCIATED WO PERMIT # N/A
(if applicable) (if applicable)

PP3326-TW01

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION: (Show sketch of the location below)

Nearest Town: Camp Lejeune County: Onslow

(Road Name and Numbers, Community, Subdivision, Lot No., Zip Code)

3. OWNER: Commanding General MCB

Address: Attn: I&E/ EMD/ EQB/ PSC Box 20004
(Street or Route No.)

Camp Lejeune NC 28542-0004
City or Town State Zip Code

Area code - Phone number

4. DATE DRILLED: 2/14/2006

5. TOTAL DEPTH: 12

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing _____ FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires
a variance in accordance with 15A NCAC 2C.0118

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): Surficial Aquifer

12. DISINFECTION: Type N/A Amount N/A

13. CASING: Depth Diameter Wall Thickness Material
From 0 To 0 ft. 1 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____
From _____ To _____ ft. _____ in. _____

14. GROUT: Depth Material Method
From _____ To _____ ft. _____
From 0 To 0.3 ft. _____

15. SCREEN: Depth Diameter Slot Size Material
From 0 To 12 ft. 1 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____ in. _____

16. SAND/GRAVEL PACK: Depth Size Material
From 0.3 To 12 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____

17. REMARKS: _____

Topographic/Land Setting
☐ Ridge ☐ Slope ☐ Valley ☒ Flat
(check appropriate box)
Latitude/Longitude of well location

(degrees*/minutes*/seconds")

Latitude/longitude source: ☐ GPS ☒ Topo. map
(check box)

DEPTH
From To

DRILLING LOG
Formation Description

SEE
ATTACHED

LOCATION SKETCH

Show direction and distance in miles from at least
two State Roads or County Roads. Include road
numbers and common road names.

SEE
ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL
CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

DATE

Submit original to Division of Water Quality, Groundwater Section, 1636 Mail Service Center - Raleigh, NC
27699-1636 Phone No. (919) 733-3221, within 30 days.

Modified from:
GW-1 REV.07/2001

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS
206-004
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 206-004	STATE: NC	COUNTY: Onslow	LOCATION: Camp Lejeune
PROJECT NAME: P P-3326		LOGGED BY:	WELL ID:
		DRILLER: Bobbie Fowler	PP3326-TW01
		CREW: Anthony Chance	
NORTHING:	EASTING:	BORING LOCATION: See Map	
SYSTEM: N/A		T.O.C. ELEV.:	
DRILL MACHINE: Power Probe	METHOD: Direct Push	0 HOUR DTW:	BORING DEPTH: 12.0
START DATE: 02/14/06	FINISH DATE: 02/14/06	24 HOUR DTW:	WELL DEPTH: 12.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
6in	6in	6in	6in								
0.0									0.0	LAND SURFACE	0.0
	D	P	D	P							1" Sch. 40 PVC
4.0											
	D	P	D	P			SP			Natural Material	1" Slot .010 Sch. 40 PVC
8.0											
	D	P	D	P							
12.0									12.0	Boring Terminated at Depth 12.0 ft	12.0

CATLIN BORING LOG 206-004 PP3326 GEL TEST GOT 02/27/06

 Bentonite Pellets  #2 Medium Sand

WELL ABANDONMENT RECORD**PP3326-TW01**WELL CONTRACTOR: Steven V. Hudson
WELL CONTRACTOR CERTIFICATION #: 21611. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION: (Show a sketch of the location on back of form)

Nearest Town: Camp Lejeune County: Onslow

(Road Name and Numbers, Community, Subdivision, Lot No.)

Quadrangle No. _____

3. OWNER: Commanding General MCB4. ADDRESS: Attn: I&E/ EMD/ EQB/ PSC Box 20004

(degrees*/minutes*/seconds")

Latitude/longitude source: ☐ GPS ☒ Topo. map
(check box)Camp Lejeune, NC 28542-00045. TOPOGRAPHY: draw, slope, hilltop, valley, (flat)
(circle one)4. TOTAL DEPTH: 12 ft. DIAMETER: 1 in.

5. CASING REMOVED:

	<u>feet</u>	<u>diameter</u>
Casing	<u>0 ft.</u>	<u>1 in.</u>
Screen	<u>12 ft.</u>	<u>1 in.</u>

6. DISINFECTION: N/A
(Amount of 70% hypochlorite used)

7. SEALING MATERIAL:

<u>Neat Cement</u>	<u>Sand Cement</u>
bags of cement _____	bags of cement _____
gallons of water _____	gallons of water _____

<u>Other</u>	
Type material _____	<u>Granular Bentonite</u>
Amount _____	<u>0.5 Bags (~20 lbs.)</u>

8. EXPLAIN METHOD REPLACEMENT OF MATERIAL

Pulled well and backfilled hole w/bentseal Hydrated
w/~two gallons water.9. DATE WELL ABANDONED 2/20/2006

I do hereby certify that this well was abandoned in accordance with 15A NCAC 2C, well construction standards, and that a copy of the record has been provided to the well owner.

Signature of person abandoning the well _____

Date 2-27-06

WELL LOCATION: Draw a location sketch on the reverse of this sheet, showing the direction and distance of the well to at least two (2) nearby reference points such as roads, intersections and streams. Identify roads with State Highway road identification numbers.

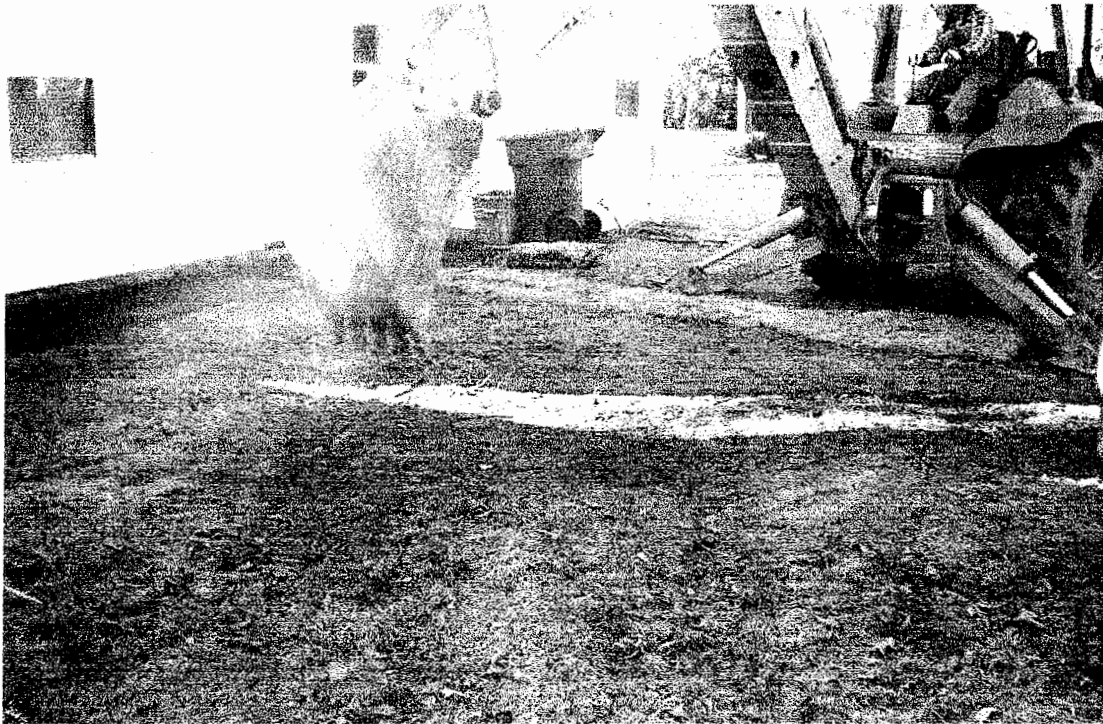
WELL DIAGRAM: Draw a detailed sketch of the well showing total depth, depth and diameter of screens remaining in the well, gravel interval, intervals of casing perforations, and depths and types of fill materials used:

SEE
ATTACHED

SEE ATTACHED

Submit original to the Division of Water Quality, Attn: Information Management - 1617 Mail Service Center - Raleigh, NC 27699-1617, Phone No. (919) 733-7015, and one copy to the owner within 30 days from completion of abandonment.

APPENDIX E
PHOTOGRAPHS AND FIELD NOTES



PP3326 – Prior to Excavation Activities



PP3326 – After Excavation Activities



PP3326 – Site Restoration Activities



PP3326 – Temporary Well Installation

2/10/2000

PP 3326 Remedial Action

On Site: Sovereign Consulting Inc. - Theresa Ellerstein
Chris Murley
P+F Environmental - Bryant Pridgen
Johnny Laughlinhouse

0800 - Tailgate H&S Meeting, talked to homeowner
- Set up curb protection

0830
- Site Walkover
- Moved Equipment into place

0900 - Began site excavation, slight odor at 3-4 ft

0915 - Backhoe tooth hooked water line
- Searched for water emergency cut off
- Cut off not available
- Contacted Public Works Dept.

0930 - Used pump to keep water away from excavation and building structures
- Public works arrived onsite and called his plumbers out to site

1000 - Kept pumping the excavation out

1015 - Public works plumbers arrived on site

1030 - cut water line off

1130 - water line repaired

1200 - continued excavation of sidewalk 004

1210 - loaded dump truck

1300 - went to get backfill for excavation

1400 - collected grab sample from sidewalk 004

o approximately 3 feet BGS - no petroleum in the soils, excavated b/t 5-15 tons of soil

1430 - backfilled excavation, compacted 2 ft lifts

1500 - site restoration, wrapping, ordered sod

for placement onsite the following Monday

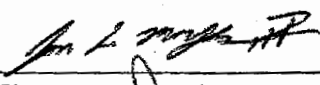
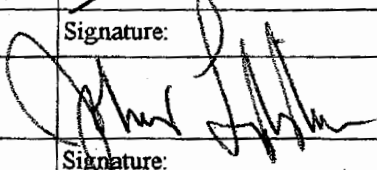
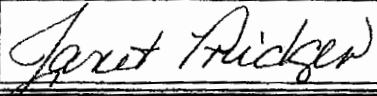
sent truck to get weighed at base scales

1530 - stopped working

APPENDIX F
SOIL DISPOSAL MANIFESTS

Marine Corps Base, Camp Lejeune Non-Hazardous Waste Shipping Document

Document #: 05937

Site: <u>DP 3326 Camp LEJEUNE NA</u>		NV008		Page 1 of 1
Generator's Name & Mailing Address: <u>COMMANDING GENERAL AC/S, I&E (EMD) MARINE CORPS BASE PSC BOX 20004 CAMP LEJEUNE, NC 28542-0004</u>		US EPA ID Number: <u>NC6170022580</u>		
Generator's Telephone #: <u>(910) 451-1482</u>				
Transporter's Name, Mailing Address & Telephone Number: <u>P+ F Environmental 8549 Mill Branch Rd Rocky Mount NC 27803 (252) 212-8012</u>		US EPA ID Number: <u>NC00000890</u>		
Destination's Name, Mailing Address & Telephone Number: <u>P+ F ENVIRONMENTAL SPEIGHT CHAPEL RD WHITAKER NC 27891 (252) 443-4083</u>		US EPA ID Number: <u>58052016</u>		
Waste Shipping Name and Description	Containers		Total Quantity	Units
	Number	Type		
TPA Contaminated Soil, Non Hazardous	001	DT	42.360	GROSS
			23.620	TARE
			18.740	NET
			9.37	TONS
Container/Tag Number: <u>Lab:</u>		Profile #:		
Additional Information and Discrepancy Indication: <u>CDL # NC358624 TRK # P-101 TAG # ZB12294</u>				
GENERATOR'S STATEMENT: The materials described above on this shipping document are not subject to federal regulations for proper disposal of hazardous waste. The determination of non-hazardous waste and the information on this form are based on the analysis provided by:				
Printed/Typed Name	Signature:		Date:	
<u>Jon A. Myles, II</u>			<u>2/10/06</u>	
Transporter's Name	Signature:		Date:	
<u>Johnny LAUGHINGHOUSE</u>			<u>2/10/06</u>	
Accepting Facility	Signature:		Date:	
<u>P+ F Environmental, Inc.</u>			<u>2/10/06</u>	

Return Original form to Generator