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May 27, 2003

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

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

Re: **FINAL** Leaking Underground Storage Tank (LUST)
Phase II Limited Site Assessment
AS-142
Marine Corps Air Station
New River, North Carolina

Navy Contract No. N62470-01-D-3009
Delivery Order No. 0044
CATLIN Project No. 202-068

Dear Mr. Conway:

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

Phase II Limited Site Assessment
AS-142
March 26, 2003

EMD Comments (5/2/2003)

1. **Cover Sheet**
   - **Above date, incident number is listed as "pending"; while below date, incident number is listed as 23297.**

   Acknowledged. The cover sheet has been revised.

2. **Purpose of Investigation**
   - **1st paragraph - Italicize *Guidelines for Assessment...***

   Revised per comment.

   - **2nd paragraph - Delete "investigation" after Phase I LSA**

   Revised per comment.

   - **4th paragraph, 2nd sentence - Insert comma after "sample". Consider a better word than "detected" (perhaps exhibited?).**

   Sentence has been revised to read better. Revised per comment.

   - **5th paragraph, 2nd sentence - Replace "realized" with "discovered". Insert comma after CSFF.**

   Revised per comment. Revised per comment.

3. **Section A**
   - **Site Location: Marine Corps Air Station New River**
   - **Nearest City/Town: Jacksonville**
   - **Phone: use area code 910 for property occupant**

   Acknowledged. The above listed changes have been made to the text.

4. **Section B**
   - **Italicized section - It states that there is no surface water within 500', but what about the ditch identified in Figures 5A-E?**

   The ditch is not considered "surface water". Surface waters are defined in G.S. 143-215.77. A definition of surface waters is included in Section 2.0 of the 2001 Guidelines.

5. **Section D**
   - **References - Nothing contained in Appendix A, delete reference.**

   Our reports are set up to conform as closely as possible to the Report Formats included in the "Guidelines for Assessment and Corrective Action" prepared by the North Carolina Underground Storage Tank Section, effective July 1, 2001. We have chosen to follow these guidelines in order to streamline the State review process based on our experience with the local regulators. The reference to Appendix A has been deleted per your comment, however, we feel we should keep the empty Appendices.

   - **Subsection 1, first paragraph - Isn't groundwater flow to the southeast? Delete "and free product." Replace 2nd "measured" with "detected" or "encountered".**

   Revised per comment. Revised per comment. Revised per comment.

6. **Section E**

- **Subsection 1, second paragraph - Sidewall misspelled.**

Acknowledged.

- **Subsection 2, first paragraph, second sentence - Replace "detected" with "present".**

Based on a telephone conversation with our laboratory, Paradigm Analytical Laboratories, the more correct word is "detected".

- **Subsection 2, second paragraph, first sentence - Replace "bailer" with "bailers".**

Revised per comment.

- **Subsection 2, fourth paragraph, last sentence - Consider replacing "to not be" with "un(representative)".**

The sentence has been revised to read "not to be representative".

- **Subsection 2, EPA Method 601 - Last sentence duplicates references under paragraph heading. (Similar comment for Methods 602, 504.1, VPH and 6020.)**

Reference in paragraph heading has been eliminated for all laboratory methods.

- **Subsection 2, EPA Method 601 - Cis-1,2-Dichloroethene misspelled in second sentence.**

Revised per comment.

- **Subsection 2, EPA Method 602 - Replace "indicates" with "indicate" in first sentence. Replace "detected" with "present" in first sentence. Delete second "at a concentration of" in third sentence. Insert commas around "however" in second to last sentence.**

Revised per comment. See previous comment concerning "detected". Revised per comment. Revised per comment.

- **Subsection 2, EPA Method 504.1 - Why was this testing method used?**

Per the 2001 Guidelines, EPA Method 504.1 should be used for identifying EDB initially and at closure.

- **Subsection 2, EPA Method VPH - Include duplicate sample results.**

Duplicate sample results have been added per comment.

- **Subsection 3 - Include MW-01.**

Revised per comment.

7. **Section H**
   - **References - Table 1 is included in Appendix F. Could not find Table 2.**

Reference has been changed to only Appendix F.

- **Italicized section - Replace "In accordance with" with "From" in first sentence. Replace "(UST)" with "(AST)" in second sentence.**

Acknowledged. The above listed changes have been made to the text.

8. **Tables**
   - **Why are Tables labeled as 4A, 4B, etc.? I would delete Table 4D and use 4E instead.**

The report format for a L.S.A. as established by the 2001 Guidelines, lists Table 4 for groundwater laboratory results. We have chosen to report each laboratory method as a separate table, hence, the 4A, 4B, etc. The VPH laboratory results are reported as C_5-C_8, C_9-C_{12} and C_9-C_{10} and are tabulated as reported by the laboratory. The IGWQS are listed as C_5-C_8, C_9-C_{18}, C_{19}-C_{36} and C_9-C_{22} which do not correspond to how the laboratory reports are structured. We have chosen to report the lab results as one table and compare the results to the IGWQS in another table. For sites where we test for both VPH and EPH, laboratory results have to be combined in order to compare the results to the IGWQS.

9. **Figures**
   - **Usually the results are listed separately next to each well.**

We chose to include the results in one table for this report.

10. **Appendices A and B**
    - **There is nothing here. Why even include empty appendices?**

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

11. **Appendix F**
    - **Table 4 should probably be included under well construction data.**

Revised per comment.

- **May need to include Site Map with 1500' boundary.**

We have chosen not to include this figure.

- **Soil analytical results map included, but what about groundwater results?**

The Groundwater Analytical Results Map has been added to Appendix F.

- **Table 1-1 and 1-2 are not applicable.**

These tables include the well construction information for wells MW-9, MW-21, MW-24 and DW-6.

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

Sincerely,

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

Attachments: Final Phase II LSA

cc: Mr. Roger R. Marce, Jr. - Code AQ 13 Contracts (correspondence only)
Commanding General, Attn: Director I&E/EMD/EQB (2 copies)

202068_LSA final ltr

LEAKING UNDERGROUND STORAGE TANK (LUST)
PHASE II LIMITED SITE ASSESSMENT REPORT

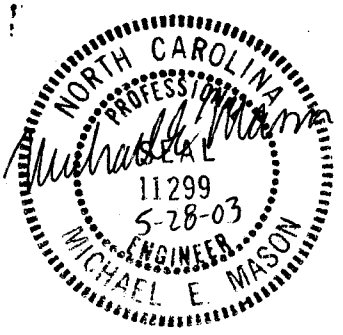
FOR

AS-142

MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA

MAY 27, 2003

NCDENR INCIDENT NO. 23297
CONTRACT NO. N62470-01-D-3009
DELIVERY ORDER NO. 0044
CATLIN PROJECT NO. 202-068



PREPARED BY:

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

LIST OF ACRONYMS

2000 Guidelines	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater
2001 Guidelines	Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section (Effective July 1, 2001)
2L GWQS	NCAC T15A:02L Groundwater Quality Standards
ARO	Asheville Regional Office
AS	Air Sparge
AST	Aboveground Storage Tank
BDL	Below Detection Limit
BN	Base/Neutral (extractables)
BNA	Base/Neutral/Acid (extractables)
BQL	Below Quantitation Limit
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Corrective Action Plan
CATLIN	CATLIN Engineers and Scientists (Formerly RC&A)
CFR	Code of Federal Regulations
Cr	Chromium
CSA	Comprehensive Site Assessment
CNP	Carbon Nitrogen Phosphorous
CPT	Cone Penetrometer Test
DEM	Division of Environmental Management
DIPE	Diisopropyl Ether
DO	Dissolved Oxygen
DOD	Department of Defense
DPT	Direct Push Technology
DWQ	Division of Water Quality
DWM	Division of Waste Management
DTW	Depth to Water
EAD	Environmental Affairs Department
EDB	Ethylene di-bromide
EMD	Environmental Management Division
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
EQB	Environmental Quality Branch
Fe	Iron
FID	Flame Ionization Detector
FOD	Foreign Object Debris
FRO	Fayetteville Regional Office
FT	Feet
GCL	Gross Contaminant Level
GIS	Geographic Information System
GPS	Global Positioning System

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

PID	Photo Ionization Detector
PQL	Practical Quantitation Limit
PVC	Polyvinyl chloride
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
Res	Residential
ROI	Radius of Influence
RRO	Raleigh Regional Office
SOW	Scope of Work
STGW	Soil-to-Groundwater
SVE	Soil Vapor Extraction
SVOC	Semi Volatile Organic Compound
TDHF	Toxicologically Defined Hydrocarbons Fractions
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
TKN	Total Kjeldahl Nitrogen
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
US	United States
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons
WaRO	Washington Regional Office
WiRO	Wilmington Regional Office
WSRO	Winston-Salem Regional Office

PURPOSE OF INVESTIGATION

This document provides data to fulfill the initial site assessment and risk characterization requirements in accordance with 15A NCAC 2L .0115(c)(4). Accordingly, this document has been formatted to conform with the *Guidelines for Assessment and Corrective Action* effective July 1, 2001 (Guidelines). The purpose of the field activities was to collect the necessary information allowing DENR to classify the level of risk resulting from the release.

Previous investigations at the site include a UST removal and closure performed by J.A. Jones Environmental Services Company (J. A. Jones) and a Phase I LSA performed by Law Engineering and Environmental Services, Inc. (LAW).

The results of these investigations indicate the following:

The release or discharge of petroleum has apparently impacted groundwater at the site. Through laboratory analysis of soil samples, collected during the Phase I investigation, contaminant concentration levels were found to be above the lowest MSCC for several parameters on the respective compound lists. A groundwater sample collected from the monitoring well installed during the Phase I LSA investigation, exhibited three compounds greater than the 2L GWQS. In particular, benzene was detected at a concentration greater than 10 times the 2L GWQS, triggering the need for this Phase II LSA investigation.

As part of this investigation, four monitoring wells were proposed to be installed and sampled in accordance with the NCDENR requirements for a Phase II LSA. However, during the site visit for utility location prior to drilling, it was discovered that this site was within the study area of another site, the Campbell Street Fuel Farm, and there were existing wells in the immediate vicinity of the AS-142 project site in locations that fulfilled the requirements for the Phase II LSA investigation.

Consequently, CATLIN gauged and collected groundwater samples for laboratory analysis from one upgradient Type II well (MW-19), three downgradient Type II wells (MW-21, MW-24, and MW-?) and from one Type III well (DW-6) located immediately downgradient of the former tank basin. These wells were selected based on water table contours included in the Corrective Action Plan (CAP) for the Campbell Street Fuel Farm and UST System AS-143 dated July 22, 1994. Receptor information, land use and other necessary information was obtained from the previous Phase I LSA report and utilized in preparation of this Phase II LSA report.

PHASE II LIMITED SITE ASSESSMENT REPORT

A. SITE IDENTIFICATION

DATE OF REPORT: May 27, 2003
Facility ID: N/A UST Incident Number (if known): 23297
Site Name: AS-142
Site Location: Marine Corps Air Station New River
Nearest City/Town: Jacksonville County: Onslow

UST Owner: Commanding General – MCB Camp Lejeune
I&E/EMD/EQB
Address: PSC 20004
MCB Camp Lejeune, NC 28542 Phone: (910) 451-5068

UST Operator: Same as above
Address: Same as above Phone: Same as above

Property Owner: Same as above
Address: Same as above Phone: Same as above

Property Occupant: Gas station operating from AS-143; Contact: Fuels Officer
Address: Campbell Street, MCAS, New River, NC Phone: (910) 876-0416

Consultant/Contractor: CATLIN Engineers and Scientists
Address: 220 Old Dairy Road, Wilmington, North Carolina 28405 Phone: (910) 452-5861

Release Information

Date Discovered: December 12, 2000
Longitude: N 36° 43' 6" **Latitude:** W 77° 27' 6"
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (e.g. Piping/UST):
UST and/or associated piping is suspected

Sizes and contents of UST system(s) from which the release occurred:
The subject UST was a 10,000-gallon gasoline tank. The UST system included approximately 70 feet of piping and a fuel dispensing island.

I, **Michael E. Mason** (a Professional Engineer/Licensed Geologist **(circle one)** for CATLIN Engineers and Scientists, do certify that the information contained in this report is correct and accurate to the best of my knowledge.

(Please Affix Seal and Signature)

B. RISK CHARACTERIZATION

(Refer to Appendix F)

According to the Phase I LSA investigation conducted by LAW and the subsequent report dated March 29, 2002 the following has been concluded:

"The site does not meet the criteria for Intermediate or High Risk Classification. There is no surface water within 500 feet of the site. There are no water supply wells within 1,500 feet of the site. The site is not within a well head protection area. The use of adjoining properties is mostly industrial and most other places of public assembly are located beyond 1,500 feet of the site." (LAW 2002)

LAW concluded in this report that the AS-142 site meets the criteria for designation as a Low Risk site with a land use classification of Industrial/Commercial. A copy of the Risk Characterization questionnaire has been included in Appendix F.

C. RECEPTOR INFORMATION

(Refer to Appendix F)

A receptor survey was conducted by LAW during the Phase I LSA investigation. Please refer to the receptor information provided in Appendix F.

D. SITE GEOLOGY AND HYDROGEOLOGY

(Refer to Appendix F)

Please refer to the site geology and hydrogeology section from the Phase I LSA prepared by LAW. This information has been included in Appendix F.

1. Groundwater Flow Direction

(Refer to Figure 6 and Appendix C)

Groundwater flow at the site is generally towards the southeast (see Figure 6). Depths to groundwater were measured in monitoring wells on February 19, 2003. Depths to groundwater ranged from 2.01 feet below top of well casing in USTAS142-MW01 to 8.89 feet below top of well casing in MW-24 (MW-24 has stick-up well shield). No free product was encountered in any well. See field measurements in Appendix C.

Top of well casing elevations were established based on a survey performed on February 19, 2003. A benchmark elevation (MW-21 top of well casing) was obtained from the Corrective Action Plan report prepared by Baker.

The groundwater flow gradient was calculated between data obtained from monitoring wells USTAS142-MW01 and MW-21. The flow gradient is 0.04 ft/ft.

E. SAMPLING RESULTS

1. Soil Sampling

(Refer to Appendix F)

Historical Soil Sampling – UST Removal and Phase I LSA

As part of UST removal activities, J.A. Jones collected nine soil samples for laboratory testing. Three of the samples collected along the excavation walls and one distribution line sample indicated TPH as gasoline and diesel in excess of State Action Levels.

As a follow up to the soil contamination documented during UST removal, LAW performed field activities and prepared a Phase I Limited Site Assessment. As part of this investigation, four, sidewall soil samples were collected by hand auger along with one soil sample from the former dispenser island. Laboratory analytical results indicated a number of compounds with concentrations in excess of the Soil-to-Groundwater and Residential MSCCs; however, no concentrations were in excess of Industrial/Commercial MSCCs. Applicable sections of the Phase I LSA report are included in Appendix F.

Current Soil Sampling – Phase II LSA

As specified in the 2001 Guidelines, there were no soil samples collected during this Phase II LSA.

2. Groundwater Sampling

(Refer to Tables 4A-4F, Figures 5A-5E, and Appendices D, E, and F)

Historical Groundwater Sampling - Phase I LSA

As part of the LAW assessment activities, one monitoring well USTAS142-MW01 was installed and a groundwater sample obtained for laboratory analysis. The results of the analyses indicated that a number of EPA Method 6210D constituents were detected; however, only benzene and MTBE were detected in excess of their 2L GWQS. Each of these constituent concentrations was below applicable GCLs; however, the benzene concentration was greater than 10 times the 2L GWQS. MADEP VPH analysis revealed only the C_5–C_8 Aliphatics in excess of the IGWQS. The C_5–C_8 hydrocarbon range was detected at a concentration of 1,000 µg/L, which is in excess of the IGWQS of 420 µg/L. GCLs have not been established for MADEP hydrocarbon fractions. Laboratory analysis did not identify concentrations of chromium or lead in excess of the method detection limits. Applicable sections of the Phase I LSA report are included in Appendix F.

Current Groundwater Sampling - Phase II LSA

On December 26, 2002 groundwater samples were collected by CATLIN personnel from four existing monitoring wells (MW-19, MW-21, MW-?, and DW-6) using pre-cleaned, disposable polyethylene bailers in accordance with CATLIN's Standard Methods and Procedures in Appendix D. Monitoring well MW-18 was proposed to be sampled; however, MW-19 was inadvertently sampled instead. Based on a subsequent site visit, MW-18 was determined to have apparently been destroyed during tank removal activities. The groundwater samples were placed in laboratory glassware, labeled, placed immediately on ice in a cooler, and transported under proper chain-of-custody protocol to Paradigm Analytical Laboratories of Wilmington, North Carolina. As indicated in the 2001 Guidelines, the groundwater samples were submitted to the laboratory for analyses by EPA Method 601, EPA Method 602, EDB per EPA Method 504.1, lead per EPA Method 6020, and MADEP VPH. A duplicate groundwater sample (MW-21D) was also collected for QA/QC purposes along with trip blanks and laboratory analyzed per EPA Methods 601 and 602.

Additionally, on February 25, 2003 a groundwater sample was collected from monitoring well MW-24. This well was sampled since monitoring well MW-? was determined to have been sampled by mistake. The MW-24 sample was obtained and handled in accordance with the procedures established in the preceding paragraph and was submitted to the laboratory for analysis per EPA Methods 601, 602, EDB per 504.1, lead per 6020, and MADEP VPH.

Monitoring well MW-? was initially mistaken for monitoring well MW-25 which apparently was destroyed during installation of the groundwater remediation system for the Campbell Street Fuel Farm. Based on information supplied by the Camp Lejeune Environmental Quality Branch, a groundwater recovery trench has been installed on site (see Figure 6) that could prevent downgradient movement of contamination from the former AS-142 tank basin to monitoring well MW-?. It appeared that there was a working pump in RWB-3; however, no further investigation of the remediation system was performed. In addition, there is a drainage ditch between the former tank basin and MW-? that would act to hydraulically isolate this well. Due to these factors, groundwater samples collected from this well were determined not to be representative of conditions associated with the release from AS-142. Monitoring well MW-24 was therefore selected for sampling.

Analytical results for the groundwater samples collected are included in Appendix E. Note that in the laboratory report, the sample identified as MW-18 was actually collected from MW-19 and the sample identified as MW-25 was actually collected from MW-?.

EPA METHOD 601

Laboratory results indicate that only two constituents were identified above laboratory detection levels. Trichloroethene and cis-1,2-Dichloroethene were detected in monitoring well MW-? at concentrations of 3 µg/L and 5 µg/L, respectively. These

compounds are not normally associated with gasoline and as previously stated, samples from this well may not be representative of a release from this UST. Of the two constituents, only trichloroethene is above its respective 2L GWQS of 2.8 µg/L. However, this concentration is well below the GCL for trichloroethene of 2,800 µg/L. Refer to Table 4A and Figure 5A for a listing of laboratory data.

EPA METHOD 602

Results of laboratory analysis indicate that benzene and ethylbenzene were detected above 2L GWQS in groundwater samples collected from monitoring well MW-21, the duplicate MW-21D, and MW-24. Benzene was detected in MW-21 and its duplicate at concentrations of 200 µg/L and 250 µg/L, respectively, and at a concentration of 470 µg/L in the sample from MW-24. Ethylbenzene was detected at a concentration of 110 µg/L in MW-21, 170 µg/L in MW-21D and 220 µg/L in MW-24. These concentrations, however, are well below their respective GCLs of 5,000 µg/L and 29,000 µg/L. Refer to Table 4B and Figure 5B for laboratory data.

EPA METHOD 504.1

Ethylene dibromide (EDB) was not detected in any groundwater samples above laboratory detection limits. The laboratory data is shown in Table 4C and illustrated on Figure 5C.

MADEP VPH

As shown in Tables 4D and 4E and illustrated on Figure 5D, the petroleum toxicologically defined hydrocarbon fraction $C_5 - C_8$ Aliphatics were detected in MW-21 and MW-21D at concentrations of 920 µg/L and 760 µg/L; respectively, which is above the IGWQS of 420 µg/L. The C_9 – C_{22} Aromatics were detected at a concentration of 490 µg/L in MW-21 and at 480 µg/L in MW-21D, which is above the IGWQS of 210 µg/L. In addition, the C_5-C_8 Aliphatics and the C_9-C_{22} Aromatics were detected in MW-24 at concentrations of 2,200 µg/L and 440 µg/L, respectively, which are also in excess of their respective IGWQS. The remaining fractions were either less than the PQLs or less than the applicable IGWQS.

EPA METHOD 6020

Only monitoring well MW-? exhibited lead concentrations in excess of 2L Standards. Extractable lead was detected at a concentration of 27.6 µg/L which is above the 2L Standard of 15 µg/L, but well below the GCL of 15,000 µg/L. As previously stated, samples from this well may not be representative of a release from this UST. Refer to Table 4F and Figure 5E for tabulated laboratory data.

3. Monitoring Well Construction Information
(Refer to Appendix F)

Appendix F contains well construction information for monitoring wells MW-01, MW-19, MW-21, MW-24, and DW-6. These wells were installed prior to this investigation. Information pertaining to the identification or well construction details of MW-? have not been obtained.

F. CONCLUSIONS AND RECOMMENDATIONS

Based on the previous reports, this site meets the criteria for designation as a Low Risk site with a land use classification of Industrial/Commercial. As such, the Industrial/Commercial MSCCs should be applicable for soils along with the GCLs for groundwater.

Based on soil samples collected by LAW as part of the Phase I LSA activities, no laboratory analytical results were in excess of applicable Industrial/Commercial MSCCs. No soil samples were required as part of this investigation.

As part of the LAW Phase I LSA and this investigation, groundwater samples have been obtained from five shallow Type II monitoring wells and from one deeper Type III monitoring well. Based on a review of the laboratory results, contaminants have been detected in excess of the 2L GWQS or IGWQS; however, no contaminant was detected at a concentration in excess of an established GCL.

As previously stated, no soil contamination exists at the site in excess of the applicable MSCCs and no groundwater contamination was detected in excess of established GCLs. Therefore, CATLIN recommends submitting this report to the NCDENR with a request for No Further Action.

G. FREE PRODUCT INVESTIGATION/RECOVERY

Free product accumulations have not been documented or observed at this site.

H. SITE HISTORY
(Refer to Appendix F)

From the LAW report *"The subject UST was installed in November 1994. The UST was last in operation on March 28, 2000 and has been replaced by an aboveground storage tank (AST). J. A. Jones removed the UST on December 12, 2000. The UST was constructed of fiberglass, equipped with an automated monitoring and leak detection system, and buried entirely in ABC stone/gravel basin fill. The UST was replaced because groundwater was reportedly seeping into the tank. However, it was speculated that groundwater seepage was through an ancillary equipment sump. The automated monitoring system had never detected a leak and there did not appear to be any holes or fractures in the UST upon examination after removal. There was no residual product observed within the tank, which was cleaned using a high-pressure washer during removal activities. The J. A. Jones closure report states that the fuel distribution lines were removed during installation of the replacement AST."* Applicable sections of the Phase I LSA report are included in Appendix F.

I. REFERENCES

Baker Environmental Inc., *Corrective Action Plan, Campbell Street Fuel Farm and UST System AS-143 Marine Corps Air Station, New River, Jacksonville, North Carolina,* July 22, 1994.

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

J. A. Jones Environmental Services Company, *UST Closure Report, UST AS-142, MCAS, New River, NC*, 2001.

Law Engineering and Environmental Services, Inc., *Phase I Limited Site Assessment and Recommendation for "No Further Action", Former Gasoline Underground Storage Tank, Building AS-142, Air Station Fuel Farm, Marine Corps Air Station, New River, North Carolina,* March 29, 2002.

North Carolina Department of Environment and Natural Resources, *Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section* (Effective July 1, 2001)

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

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

TABLES

TABLE 4A SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: May 2003 Incident Number and Name: 23297, AS-142 Facility ID#: N/A

Analytical Method: EPA Method 601

Well ID	Contaminant of Concern →		cis-1,2-Dichloroethene	Trichloroethene	All Other Analytes
	Sample ID	Date Collected			
GCL (µg/L) 2L Standard (µg/L)			70,000 70	2,800 2.8	Varies Varies
MW-19	MW-18	12/26/02	<1	<1	BQL
MW-21	MW-21	12/26/02	<1	<1	BQL
MW-21D	MW-21D	12/26/02	<1	<1	BQL
MW-24	MW-24	2/25/03	<1	<1	BQL
MW-?	MW-25	12/26/02	5	3	BQL
DW-6	DW-6	12/26/02	<1	<1	BQL
Trip Blank	Trip Blank	12/26/02	<1	<1	BQL

All results in µg/L.

Shaded areas indicate concentration greater than 2L GWQS.

TABLE 4B SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: May 2003 Incident Number and Name: 23297, AS-142 Facility ID#: N/A

Analytical Method: EPA Method 602

Well ID	Contaminant of Concern →		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	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
MW-19	MW-18	12/26/02	<1	<1	<1	<2	<1	<4
MW-21	MW-21	12/26/02	200	<10	110	87	50	243
MW-21D	MW-21D	12/26/02	250	<10	170	92	110	520
MW-24	MW-24	2/25/03	470	<25	220	<50	290	390
MW-?	MW-25	12/26/02	<1	<1	<1	<2	<1	<4
DW-6	DW-6	12/26/02	<1	<1	<1	<2	<1	<4
Trip Blank	Trip Blank	12/26/02	<1	<1	<1	<2	<1	<4

All results in µg/L.

Shaded areas indicate concentration greater than 2L GWQS.

TABLE 4C SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: May 2003 Incident Number and Name: 23297, AS-142 Facility ID#: N/A

Analytical Method: EPA Method 504.1

Well ID	Contaminant of Concern →		Ethylene Dibromide
	Sample ID	Date Collected	
GCL (µg/L) **2L Standard (µg/L)**			50 0.0004
MW-19	MW-18	12/26/02	<0.02*
MW-21	MW-21	12/26/02	<0.02*
MW-21D	MW-21D	12/26/02	<0.02*
MW-24	MW-24	2/25/03	<0.02*
MW-?	MW-25	12/26/02	<0.02*
DW-6	DW-6	12/26/02	<0.02*

All results in µg/L.

* Quantitation limit is greater than the 2L GWQS.

TABLE 4D SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: May 2003 Incident Number and Name: 23297, AS-142 Facility ID#: N/A

Analytical Method: MADEP VPH

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Sample ID	Date Collected			
MW-19	MW-18	12/26/02	<100	<100	<100
MW-21	MW-21	12/26/02	920	1,400	490
MW-21D	MW-21D	12/26/02	760	1,200	480
MW-24	MW-24	2/25/03	2,200	2,200	440
MW-?	MW-25	12/26/02	<100	<100	<100
DW-6	DW-6	12/26/02	<100	<100	<100

All results in µg/L.

TABLE 4E SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: May 2003 Incident Number and Name: 23297, AS-142 Facility ID#: N/A

Analytical Method: MADEP 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
MW-19	MW-18	12/26/02	<100	<100*	NA	<100*
MW-21	MW-21	12/26/02	920	1,400*	NA	490*
MW-21D	MW-21D	12/26/02	760	1,200*	NA	480*
MW-24	MW-24	2/25/03	2,200	2,200*	NA	440*
MW-?	MW-25	12/26/02	<100	<100*	NA	<100*
DW-6	DW-6	12/26/02	<100	<100*	NA	<100*

All results in µg/L.

* Partial fraction, EPH not analyzed.

Shaded areas indicate concentration greater than the IGWQS.

NA = Not analyzed

TABLE 4F SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: May 2003 Incident Number and Name: 23297, AS-142 Facility ID#: N/A

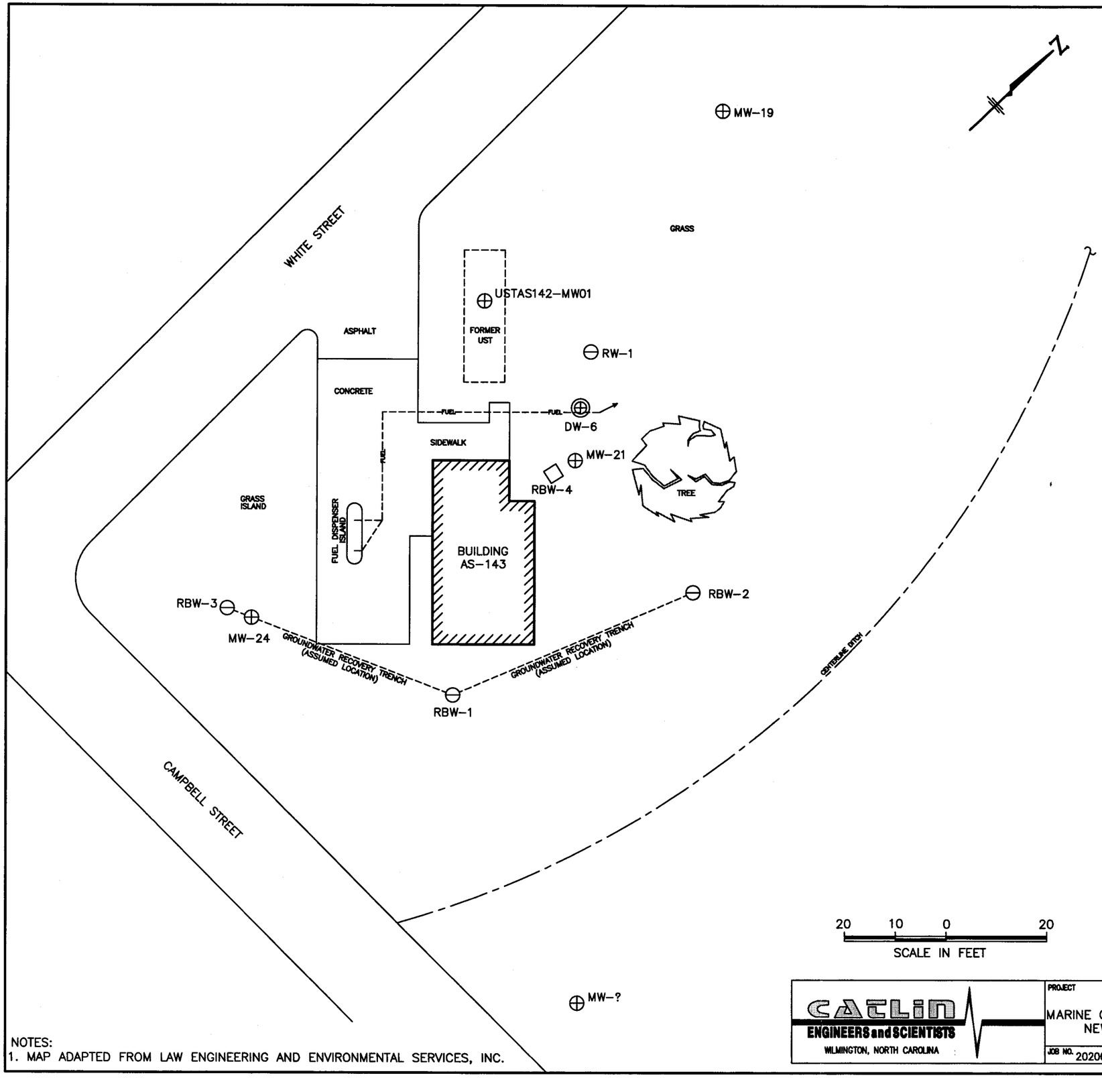
Analytical Method: EPA Method 6020

Well ID	Contaminant of Concern →		Lead,Extractable
	Sample ID	Date Collected	
GCL (µg/L) **2L Standard (µg/L)**			15,000 15
MW-19	MW-18	12/26/02	<5
MW-21	MW-21	12/26/02	<5
MW-21D	MW-21D	12/26/02	<5
MW-24	MW-24	2/25/03	<5
MW-?	MW-25	12/26/02	27.6
DW-6	DW-6	12/26/02	<5

All results in µg/L.

Shaded areas indicate concentration greater than 2L GWQS.

FIGURES



Analytical Method: EPA Method 601

Well ID	Contaminant of Concern → Sample ID	Date Collected	cis-1,2-Dichloroethene	Trichloroethene	All Other Analytes
GCL (µg/L)			70,000	2,800	Varies
2L Standard (µg/L)			70	2.8	Varies
MW-19	MW-18	12/26/02	<1	<1	BQL
MW-21	MW-21	12/26/02	<1	<1	BQL
MW-21D	MW-21D	12/26/02	<1	<1	BQL
MW-24	MW-24	2/25/03	<1	<1	BQL
MW-?	MW-25	12/26/02	5	3	BQL
DW-6	DW-6	12/26/02	<1	<1	BQL
Trip Blank	Trip Blank	12/26/02	<1	<1	BQL

All results in µg/L.
Shaded areas indicate concentration greater than 2L GWQS.

LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE II MONITORING WELL
⊕		TYPE III MONITORING WELL
⊖		RECOVERY WELL

NOTES:
1. MAP ADAPTED FROM LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

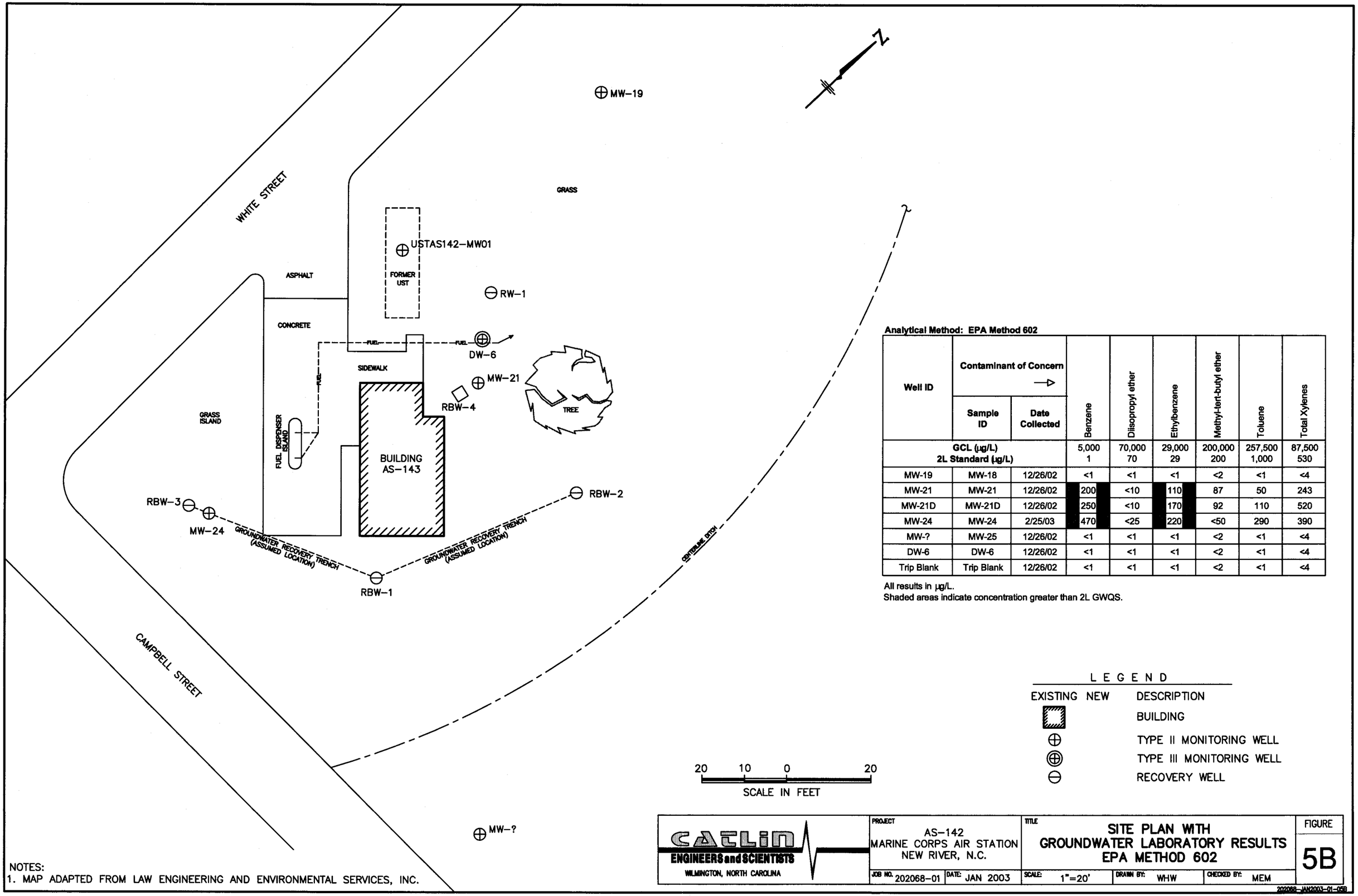
CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: AS-142 MARINE CORPS AIR STATION NEW RIVER, N.C.
JOB NO. 202068-01 | DATE: JAN 2003

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 601
SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: MEM

FIGURE 5A

202068-JAN2003-01-05A



Analytical Method: EPA Method 602

Well ID	Contaminant of Concern → Sample ID	Date Collected	Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
GCL (µg/L) / 2L Standard (µg/L)			5,000 / 1	70,000 / 70	29,000 / 29	200,000 / 200	257,500 / 1,000	87,500 / 530
MW-19	MW-18	12/26/02	<1	<1	<1	<2	<1	<4
MW-21	MW-21	12/26/02	200	<10	110	87	50	243
MW-21D	MW-21D	12/26/02	250	<10	170	92	110	520
MW-24	MW-24	2/25/03	470	<25	220	<50	290	390
MW-?	MW-25	12/26/02	<1	<1	<1	<2	<1	<4
DW-6	DW-6	12/26/02	<1	<1	<1	<2	<1	<4
Trip Blank	Trip Blank	12/26/02	<1	<1	<1	<2	<1	<4

All results in µg/L.
Shaded areas indicate concentration greater than 2L GWQS.

LEGEND

EXISTING	NEW	DESCRIPTION
		BUILDING
⊕		TYPE II MONITORING WELL
⊕		TYPE III MONITORING WELL
⊖		RECOVERY WELL

NOTES:
1. MAP ADAPTED FROM LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

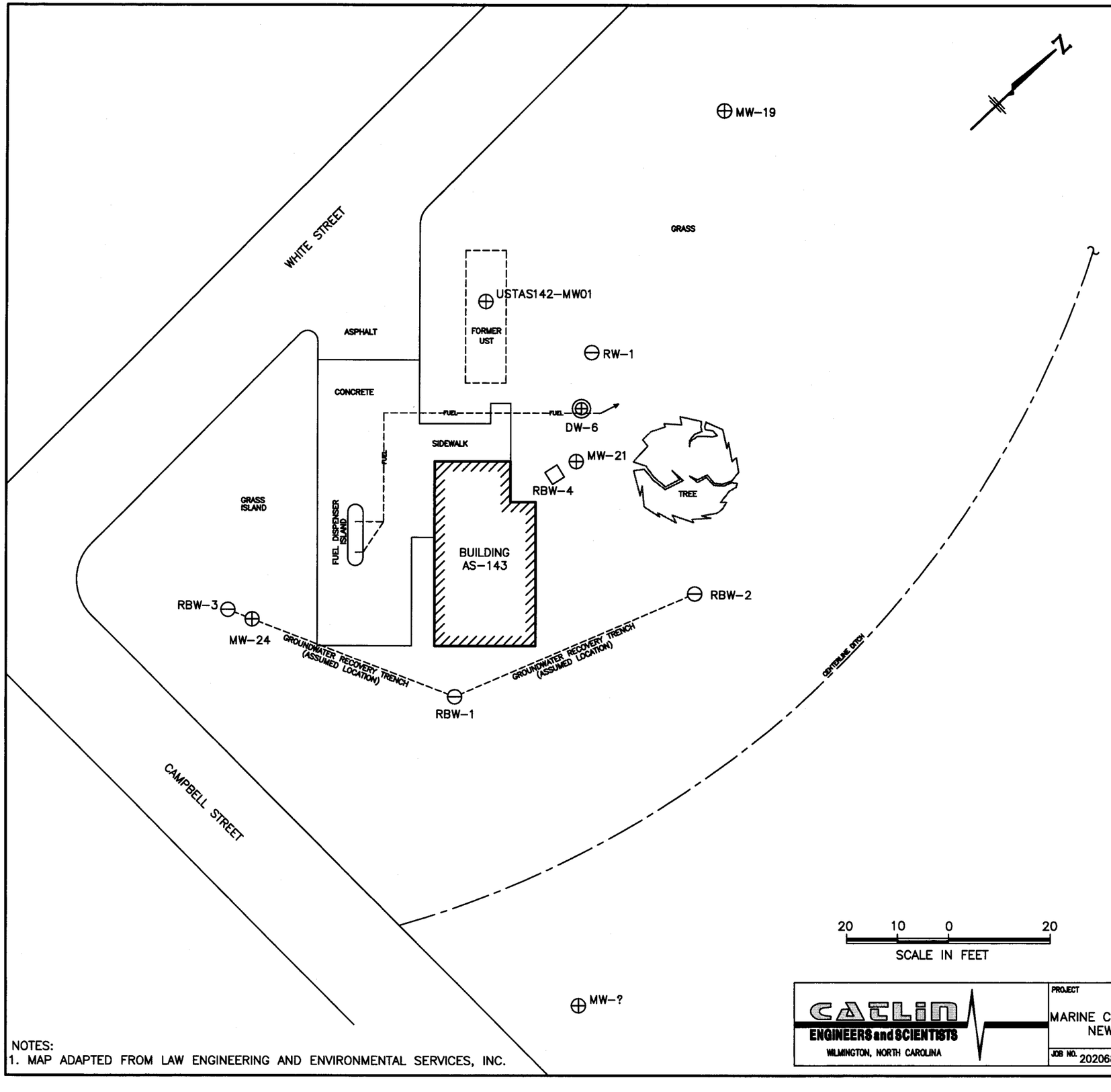
CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: AS-142 MARINE CORPS AIR STATION NEW RIVER, N.C.
JOB NO. 202068-01 | DATE: JAN 2003

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 602
SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: MEM

FIGURE 5B

202068-JAN2003-01-05B



Analytical Method: EPA Method 504.1

Well ID	Contaminant of Concern → Sample ID	Date Collected	Ethylene Dibromide
GCL (µg/L) 2L Standard (µg/L)			50 0.0004
MW-19	MW-18	12/26/02	<0.02*
MW-21	MW-21	12/26/02	<0.02*
MW-21D	MW-21D	12/26/02	<0.02*
MW-24	MW-24	2/25/03	<0.02*
MW-?	MW-25	12/26/02	<0.02*
DW-6	DW-6	12/26/02	<0.02*

All results in µg/L.
* Quantitation limit is greater than the 2L GWQS.

LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE II MONITORING WELL
⊕		TYPE III MONITORING WELL
⊖		RECOVERY WELL

NOTES:
1. MAP ADAPTED FROM LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

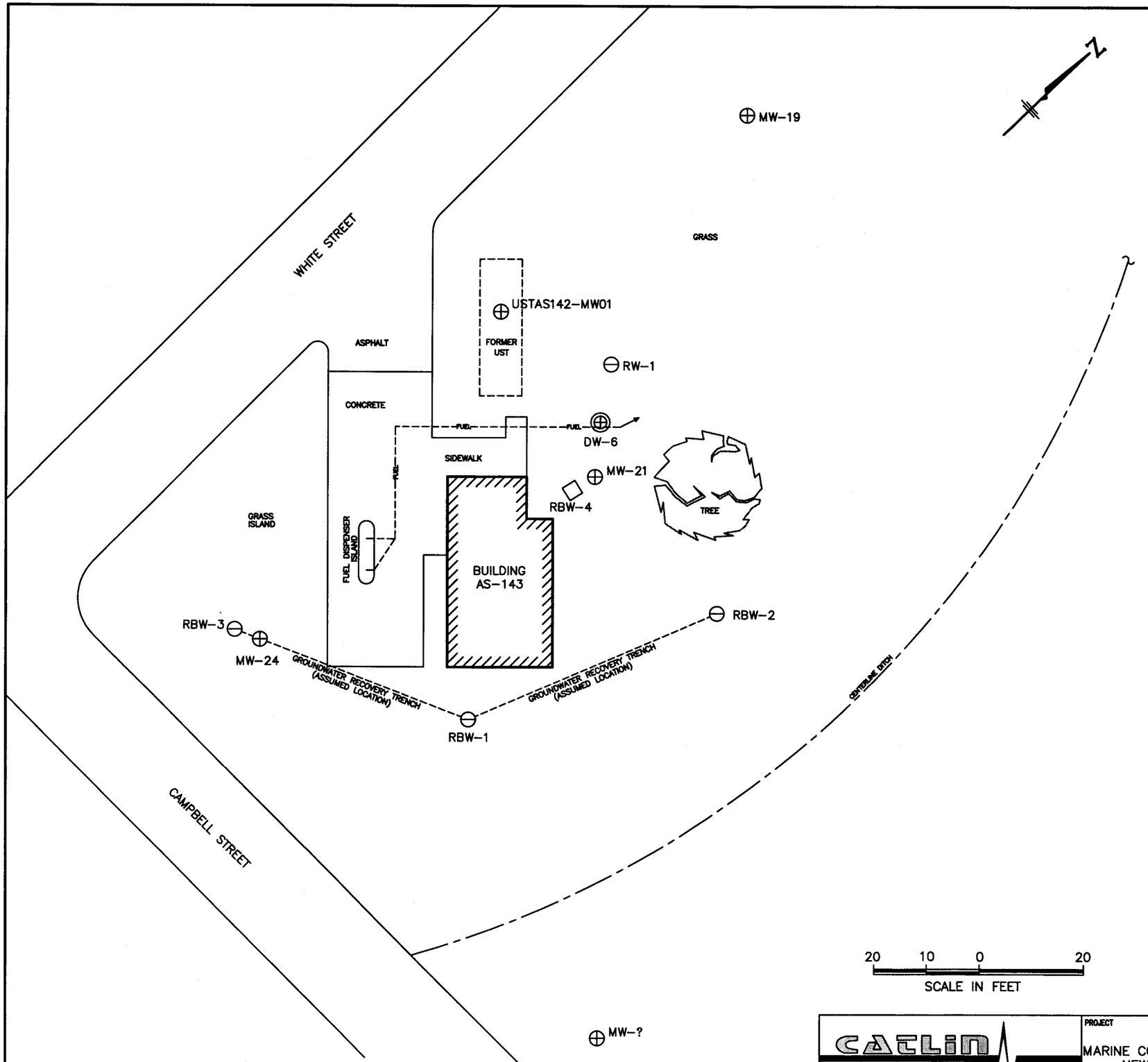
CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: AS-142 MARINE CORPS AIR STATION NEW RIVER, N.C.
JOB NO. 202068-01 | DATE: JAN 2003

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 504.1
SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: MEM

FIGURE 5C

202068-JAN2003-01-05C



Analytical Method: MADEP VPH AS COMPARED TO NCDENR IGWQS

Well ID	Contaminant of Concern → Sample ID	Date Collected	C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
IGWQS(µg/L)			420	4,200	42,000	210
MW-19	MW-18	12/26/02	<100	<100*	NA	<100*
MW-21	MW-21	12/26/02	920	1,400*	NA	490*
MW-21D	MW-21D	12/26/02	760	1,200*	NA	480*
MW-24	MW-24	2/25/03	2,200	2,200*	NA	440*
MW-?	MW-25	12/26/02	<100	<100*	NA	<100*
DW-6	DW-6	12/26/02	<100	<100*	NA	<100*

All results in µg/L.
* Partial fraction, EPH not analyzed.
Shaded areas indicate concentration greater than the IGWQS.
NA = Not analyzed

LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE II MONITORING WELL
⊕		TYPE III MONITORING WELL
⊖		RECOVERY WELL

NOTES:
1. MAP ADAPTED FROM LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

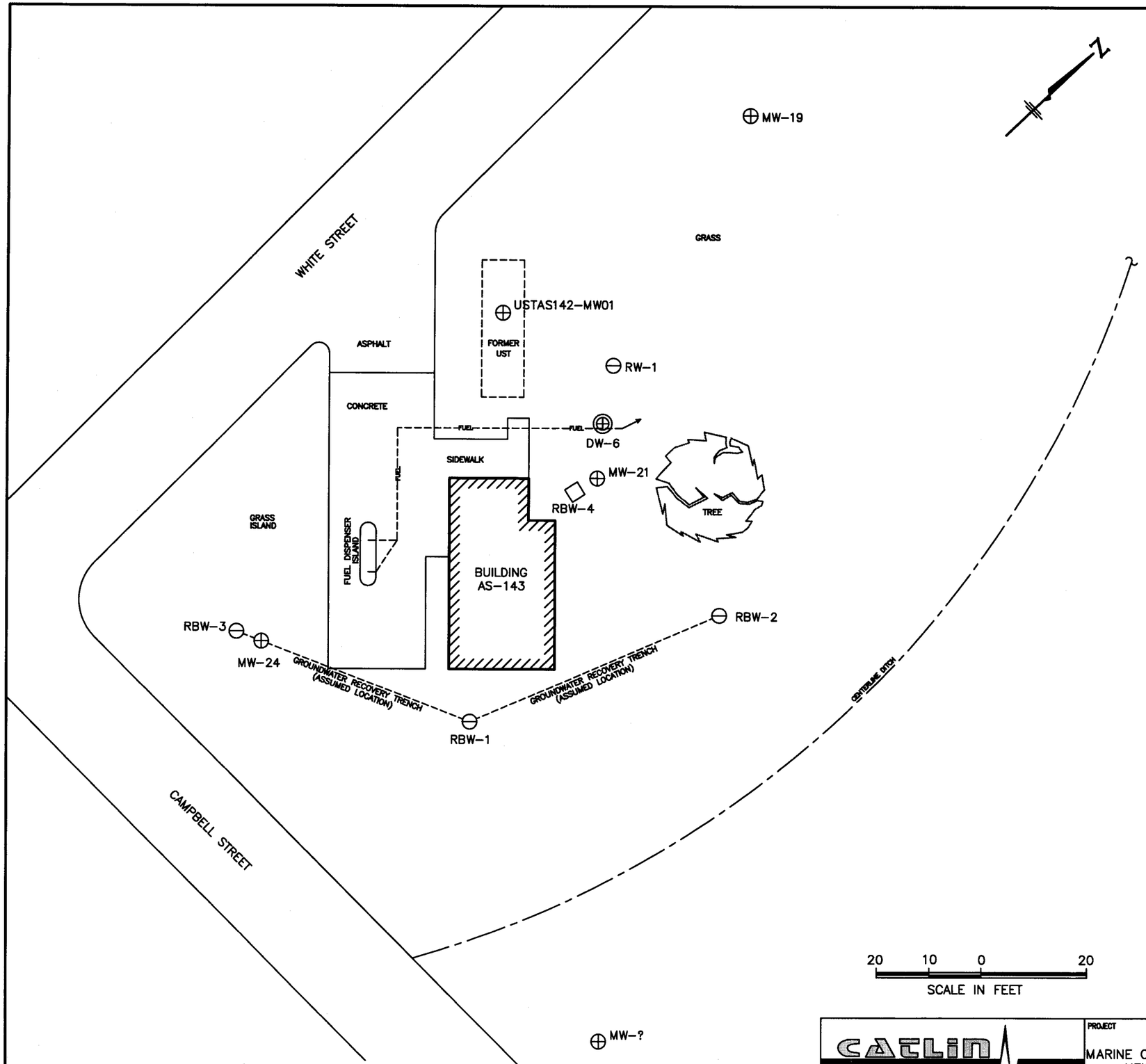
PROJECT: AS-142 MARINE CORPS AIR STATION NEW RIVER, N.C.

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS – MADEP VPH AS COMPARED TO NCDENR IGWQS

FIGURE: 5D

JOB NO. 202068-01 | DATE: JAN 2003 | SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: MEM

202068-JAN2003-01-05D



Analytical Method: EPA Method 6020

Well ID	Contaminant of Concern → Sample ID	Date Collected	Lead,Extractable
GCL (µg/L) / 2L Standard (µg/L)			15,000 / 15
MW-19	MW-18	12/26/02	<5
MW-21	MW-21	12/26/02	<5
MW-21D	MW-21D	12/26/02	<5
MW-24	MW-24	2/25/03	<5
MW-?	MW-25	12/26/02	27.6
DW-6	DW-6	12/26/02	<5

All results in µg/L.
Shaded areas indicate concentration greater than 2L GWQS.

LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE II MONITORING WELL
⊕		TYPE III MONITORING WELL
⊖		RECOVERY WELL

NOTES:
1. MAP ADAPTED FROM LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

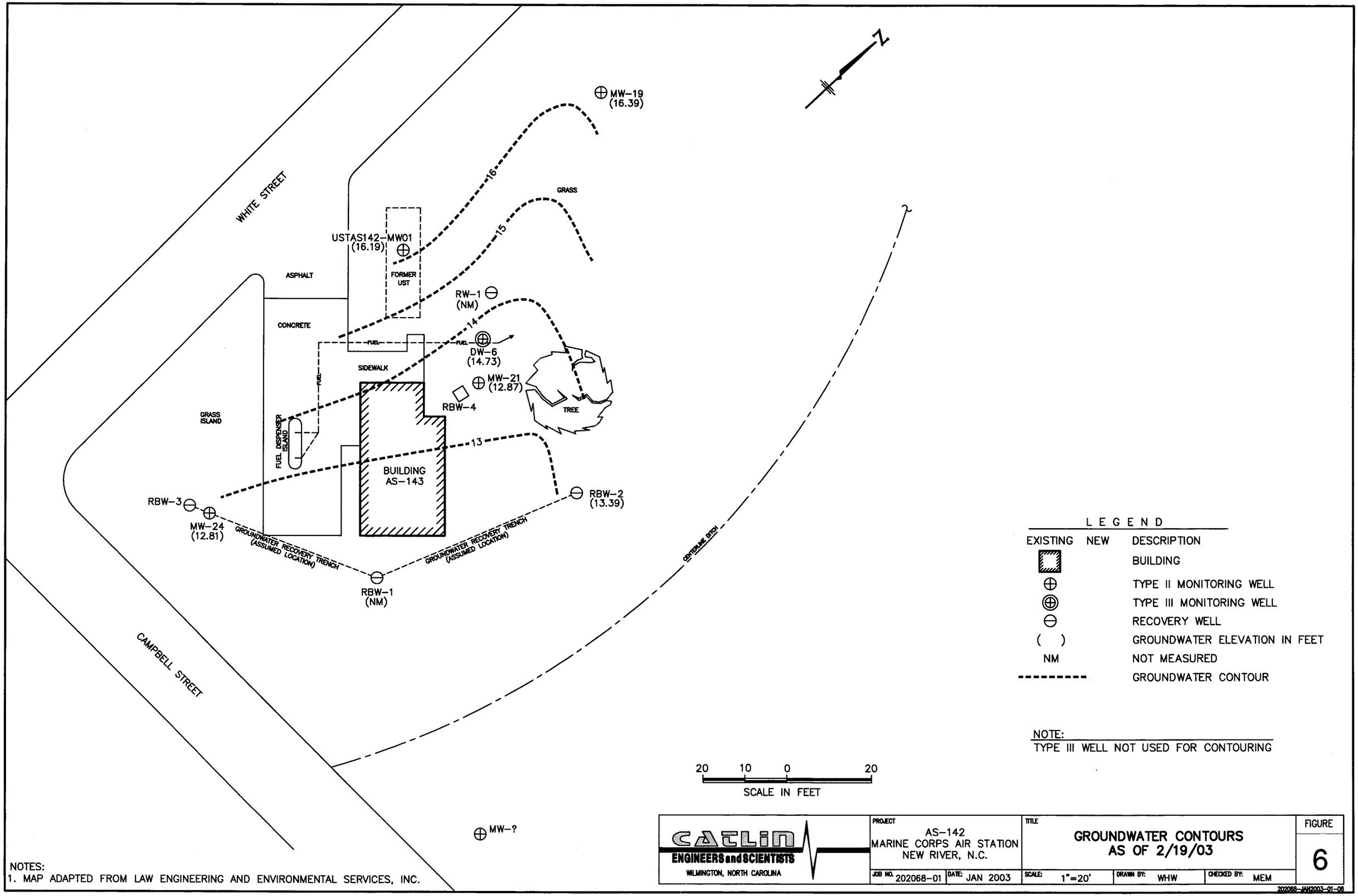
CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: AS-142 MARINE CORPS AIR STATION NEW RIVER, N.C.
JOB NO. 202068-01 | DATE: JAN 2003

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 6020
SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: MEM

FIGURE 5E

202068-JAN2003-01-05E



LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE II MONITORING WELL
⊕		TYPE III MONITORING WELL
⊖		RECOVERY WELL
( )		GROUNDWATER ELEVATION IN FEET
NM		NOT MEASURED
---------		GROUNDWATER CONTOUR

NOTE:
TYPE III WELL NOT USED FOR CONTOURING

NOTES:
1. MAP ADAPTED FROM LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: AS-142
MARINE CORPS AIR STATION
NEW RIVER, N.C.

JOB NO. 202068-01 | DATE: JAN 2003

TITLE: GROUNDWATER CONTOURS AS OF 2/19/03

SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: MEM

FIGURE 6

202068-JAN2003-01-06

APPENDIX A

BORING LOGS AND AS-BUILT WELL DETAILS
(Refer to Appendix F)

APPENDIX B

NORTH CAROLINA WELL CONSTRUCTION RECORDS
(Refer to Appendix F)

APPENDIX C

FIELD MEASUREMENTS

MONITORING WELL CASING AND WATER TABLE ELEVATIONS
AS OF 2/19/03

AS-142
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA

DATA POINT	TOP OF CASING ELEVATION (MSL)	DEPTH TO WATER	FREE PRODUCT THICKNESS	SPECIFIC GRAVITY ADJUSTMENT	WATER TABLE ELEVATION
DW-6	21.83	7.10	0	--	14.73
MW-21	21.76	8.89	0	--	12.87
MW-24	21.58	8.77	0	--	12.81
RWB-2	19.50	6.11	0	--	13.39
USTAS142-MW01	18.20	2.01	0	--	16.19
MW-19	19.10	2.71	0	--	16.39

MONITORING WELL SAMPLING RECORD

AS-142
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA

Well No.	*Date*	*Time Sampled*	*Diameter (in.)*	*Well Depth (feet)*	*DTW (feet)*	*Feet of Water in Well*	*Gal/Foot*	*One Volume (gals.)*	*Three Volumes (gals.)*	*Volume of Bailer (gals.)*	*No. Bails Required*	*No. Bails Taken*
MW-19	12/26/02	11:50	2	12.7	4.10	8.6	0.163	1.40	4.21	0.24	17.52	18
MW-21	12/26/02	12:25	2	13.5	6.89	6.61	0.163	1.08	3.23	0.24	13.47	14
MW-?	12/26/02	12:40	2	13.5	7.28	6.22	0.163	1.01	3.04	0.24	12.67	13
DW-6	12/26/02	12:00	2	42.5	7.40	35.10	0.163	5.72	17.16	0.24	71.52	72 (Pumped)
MW-24	2/25/03	16:25	2	13.6	6.67	6.93	0.163	1.13	3.39	0.24	14.12	14

APPENDIX D

STANDARD PROCEDURES

CATLIN STANDARD METHODS OF INVESTIGATION

(REVISED APRIL 2002)

1.0 DATA COLLECTION

1.1 BACKGROUND DATA

Background data and history information relevant to the site investigation is generated through numerous sources. These sources may include, but are not limited to, the following:

- Conversations with the client and regulatory officials involved with the incident.
- Review of pertinent regulatory correspondence.
- Review of previous and existing reports and other technical data.
- Review of available historical records.

1.2 SURVEYS AND POTENTIAL RECEPTOR DATA

Physical survey and potential receptor data are collected in accordance with the intended level of investigation. In general, the purpose is to collect sufficient information for site assessment and corrective action planning.

Individual receptors are identified and evaluated in the context of their potential for contaminant impact. Potential receptors of contamination can include surface water bodies, groundwater supply wells, wellhead protection areas, and subsurface building structures.

1.2.1 Horizontal Survey

Horizontal survey data are generated using either accepted general field surveying techniques, or existing survey maps; or by using a combination of existing data and field generated information. The survey area generally extends to a point at least 50 feet beyond suspected plume boundaries. A receptor scale survey of a larger area surrounding a site will be made if appropriate and necessary.

1.2.2 Vertical Survey

A vertical survey is conducted at the site typically within an accuracy of 0.01 foot. The datum plane is generally assumed unless otherwise noted. Assumed temporary benchmarks (TBM) are selected near ground level. The vertical survey includes such points as top of all well casings, selected ground shots, important utility inverts, utility fluid levels, important surface water levels, and other items determined to be significant.

1.3 DRILLING AND MONITORING WELL/PIEZOMETER INSTALLATION

Necessary permits are applied for and obtained in accordance with federal, state, and local requirements prior to drilling or well construction activities. Additionally, the well locations are scanned for underground utilities prior to conducting intrusive subsurface activities. Wells are installed under applicable licensing requirements, and are designed and constructed in accordance with accepted standards and practices. Any wells purposely installed at off-site locations are permitted through appropriate right-of-entry agreements with all necessary property owners and/or their agents.

1.3.1 Drilling Methods and Subsurface Data Collection

Drilling is accomplished utilizing one or more of the following methods:

Auger Drilling

Auger drilling is the preferred, most often used method of subsurface investigation and is accomplished using a vehicle or trailer mounted drill rig. Continuous flight auger types used vary upon the site and situation; ranging from the 4-inch outside diameter solid stem to the 12-inch outside diameter hollow stem. Auger type is selected based upon appropriateness and/or site-specific requirements.

Hand Augering

Hand augering is utilized when economically and scientifically feasible, or when no other method is suitable. Hand augers typically produce three-inch diameter holes and are generally limited to depths of less than 15 feet.

Direct Push

Direct push methods of subsurface investigation are used generally for soil screening purposes or collection of groundwater samples where permanent wells are not viable.

Other Methods

Other drilling methods, such as mud and air rotary, rock coring, cable tool, and large bucket augering are used when site conditions or project requirements dictate.

Regardless of the drilling method used, the drill rig(s) and all drilling tools are thoroughly cleaned between boreholes to prevent cross introduction of contaminants. Split spoon samples are collected and field-described at intervals of five feet or less, and cuttings are continuously monitored for organic vapors. Drill cuttings are containerized for off-site disposal or are spread on the ground surface in proximity to the well or boring in accordance with North Carolina Department of Environment and Natural Resources (NCDENR) requirements. A geologist or engineer, trained in using visual/manual techniques, is always present during drilling and is responsible for subsurface contaminant and geologic data collection. Soils are classified in general agreement with the Unified Soils Classification System (USCS).

1.3.2 Hydropunch Installation

Hydropunch penetrometers (Hydropunches) are used to delineate the spatial extent of dissolved and free phase plumes. Soil borings are advanced to the appropriate depth and then the Hydropunch is advanced through the soil boring into undisturbed material. Groundwater samples are collected by pulling back on the body of the Hydropunch and allowing the groundwater to enter the screened portion of the sample chamber. Samples are retrieved using a decontaminated Teflon bailer or peristaltic pump.

1.3.3 Well Installation

Wells are typically constructed of threaded PVC casing and screen. No glues or cements are used in joining PVC components. Well diameter, slot sizes, and protective covers vary depending upon site-specific conditions or situation-specific requirements.

1.3.4 Well Development

Wells are developed by over-pumping or surging using appropriate pumps, blocks, or bailers. Through development, unwanted fine materials are removed from the natural formation surrounding the well. Well development will be performed no sooner than 24-hours after grouting is completed for the Type III wells. Water generated during development is containerized and properly disposed or is discharged onto the ground in proximity of the well in accordance with NCDENR requirements.

1.4 HYDROGEOLOGIC DATA COLLECTION

Data used to help characterize hydrogeologic conditions at a site are obtained through various procedures including, but not necessarily limited to, those described below:

1.4.1 Regional Geology

Information pertaining to the regional geologic framework is compiled from existing publications, maps, and scientific papers.

1.4.2 Site Geology

Shallow site geology is generally determined from field descriptions and borehole samples. Interpretations with regard to hydrogeologically important contacts, zones, fractures, faults, cleavage, and facies changes are made when possible.

1.4.3 Groundwater Occurrence and Characteristics

Groundwater data is obtained utilizing a number of methods and procedures, not limited to the general list below:

Well Water Levels

After well development, wells are allowed to stabilize for a minimum of 24 hours prior to measuring. Water level and free product thickness (where applicable) measurements are performed using an electronic interface probe or steel tape with water/product finding pastes.

The specific gravity of any accumulated product is determined and used to calculate true hydraulic grade from measured water levels. This information is combined with vertical survey data to determine relative potentiometric surface elevations for all wells.

Aquifer Testing

Various aquifer tests may be used to make determinations of hydraulic conductivity. Slug or pumping tests are often used to characterize site hydrogeologic conditions and to develop remedial action alternatives utilizing appropriate pumping technologies.

Other Methods

Other methods may be deemed appropriate for determining various groundwater characteristics. These other methods may include nested well configurations and/or clustered piezometer installations; sieve or pipette analysis; fracture trace analysis; computer modeling; and geophysical logging.

1.5 PETROLEUM HYDROCARBON DATA COLLECTION

1.5.1 Collection Methods

Petroleum hydrocarbon data is obtained through various methods including, but not limited to, the following:

Field Analysis

- Direct thickness measurement of phase separated components using tapes and/or probes.
- Manual vapor analysis using a photoionization detector (PID) or flame ionization detector (FIS).
- Detectable odor and visual observation.

Laboratory Analysis

- Laboratory analysis of phase-separated products.
- Laboratory vapor, soil, and groundwater analysis using appropriate EPA Methods.

1.5.2 Field Sampling

Field sampling procedures are performed in accordance with recommended protocol, accepted industry standards, and under appropriate chain-of-custody procedures. Generally, sampling procedures are as follows:

Product Samples

Product samples are obtained using clean equipment and containers. Each is shipped to the analytical laboratory in protective containers.

Vapor Samples

PID/FID readings are measured from soil sample headspace using containerized samples that have been brought to ambient temperature.

Carbon tubes are utilized in conjunction with a laboratory-calibrated vacuum pump to obtain vapor samples. The carbon tubes are sealed and refrigerated for shipment to the analytical laboratory (This method is known as the Carbon Adsorption Method).

Soil Samples

Soil samples are immediately packed into clean containers, and refrigerated for shipment to the analytical laboratory.

Groundwater Samples

Groundwater samples are collected in accordance with the following procedures:

- Creeks/Lakes/Etc.

  Grab samples are obtained.

- Domestic Wells

  Wells are pumped for a time sufficient to completely purge the well and any pressure or holding tanks prior to sampling.

- Monitoring Wells

  Water level measurements are made and well volumes calculated for each well.

  Three well volumes are removed from each well using a thoroughly cleaned Teflon bailer or appropriate purging pump. If it is not possible to remove three volumes, due to very low yields, a minimum of one volume is removed prior to obtaining a sample.

  Where analysis for metals is required, wells are typically sampled utilizing low flow techniques, which reduce turbidity and the potential for matrix interference.

Samples are collected and containerized in a manner that minimizes agitation and contact with the air.

Sampling records are field prepared.

Samples are labeled and proper chain of custody documents are maintained.

Samples are promptly protectively packed, refrigerated, and shipped to the analytical laboratory for analysis.

2.0 DATA EVALUATION

Data obtained as a result of the site investigation is compiled and evaluated and a report is prepared for client review and distribution to the appropriate agencies. Generally, specific data are evaluated as follows:

- Background data are evaluated in context with the suspected or confirmed problem.
- Survey data are utilized to develop site maps and to evaluate contaminant receptors.
- Well construction records are compiled and presented as part of the report. As-built information is used in combination with other data to evaluate subsurface conditions and monitoring well screen settings as they relate to the investigation.
- Subsurface drilling logs are used to develop geologic cross-sections, fence diagrams, isopachs, structure contours, or other constructions. Regional geologic data are used to obtain an overall framework.
- Hydrogeologic data are used to develop contour maps, flow nets and other constructions. The data is also used to calculate various hydrogeologic parameters that describe aquifer characteristics.
- Hydrocarbon data are utilized to develop various plume geometry and isoconcentration maps.
- All data are compiled and utilized for making specific recommendations with regard to remedial action alternatives.

APPENDIX E

LABORATORY REPORTS
AND
CHAIN-OF-CUSTODY DOCUMENTATION

FILE COPY

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Richard Catlin & Associates
P.O. Box 10279
Wilmington, NC 28404-0279

January 9, 2003

Report Number: G128-1032

Client Project ID: AS-142

Dear Mr. Mason,

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

If there are any questions about the report or the services performed during this project, please call for assistance. We will be happy to answer any questions or concerns which you may have.

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

Sincerely,

Paradigm Analytical Laboratories, Inc.

Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: MW-18
Client Project ID: AS-142
Lab Sample ID: 59582
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Bromodichloromethane	1/3/03	1	1	BQL
Bromoform	1/3/03	1	2	BQL
Bromomethane	1/3/03	1	2	BQL
Carbon tetrachloride	1/3/03	1	1	BQL
Chlorobenzene	1/3/03	1	1	BQL
Chloroethane	1/3/03	1	1	BQL
Chloroform	1/3/03	1	1	BQL
Chloromethane	1/3/03	1	1	BQL
Dibromochloromethane	1/3/03	1	1	BQL
1,2-Dibromoethane (EDB)	1/3/03	1	1	BQL
1,2-Dichlorobenzene	1/3/03	1	1	BQL
1,3-Dichlorobenzene	1/3/03	1	1	BQL
1,4-Dichlorobenzene	1/3/03	1	1	BQL
1,1-Dichloroethane	1/3/03	1	1	BQL
1,2-Dichloroethane	1/3/03	1	1	BQL
1,1-Dichloroethene	1/3/03	1	1	BQL
cis-1,2-Dichloroethene	1/3/03	1	1	BQL
trans-1,2-Dichloroethene	1/3/03	1	1	BQL
1,2-Dichloropropane	1/3/03	1	1	BQL
cis-1,3-Dichloropropene	1/3/03	1	1	BQL
trans-1,3-Dichloropropene	1/3/03	1	1	BQL
Methylene Chloride	1/3/03	1	5	BQL
1,1,2,2-Tetrachloroethane	1/3/03	1	1	BQL
Tetrachloroethene	1/3/03	1	1	BQL
1,1,1-Trichloroethane	1/3/03	1	1	BQL
1,1,2-Trichloroethane	1/3/03	1	1	BQL
Trichloroethene	1/3/03	1	1	BQL
Trichlorofluoromethane	1/3/03	1	1	BQL
Vinyl Chloride	1/3/03	1	1	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	41	102

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

Reviewed By: mcc

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 601

Client Sample ID: DW-6
Client Project ID: AS-142
Lab Sample ID: 59583
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Bromodichloromethane	1/3/03	1	1	BQL
Bromoform	1/3/03	1	2	BQL
Bromomethane	1/3/03	1	2	BQL
Carbon tetrachloride	1/3/03	1	1	BQL
Chlorobenzene	1/3/03	1	1	BQL
Chloroethane	1/3/03	1	1	BQL
Chloroform	1/3/03	1	1	BQL
Chloromethane	1/3/03	1	1	BQL
Dibromochloromethane	1/3/03	1	1	BQL
1,2-Dibromoethane (EDB)	1/3/03	1	1	BQL
1,2-Dichlorobenzene	1/3/03	1	1	BQL
1,3-Dichlorobenzene	1/3/03	1	1	BQL
1,4-Dichlorobenzene	1/3/03	1	1	BQL
1,1-Dichloroethane	1/3/03	1	1	BQL
1,2-Dichloroethane	1/3/03	1	1	BQL
1,1-Dichloroethene	1/3/03	1	1	BQL
cis-1,2-Dichloroethene	1/3/03	1	1	BQL
trans-1,2-Dichloroethene	1/3/03	1	1	BQL
1,2-Dichloropropane	1/3/03	1	1	BQL
cis-1,3-Dichloropropene	1/3/03	1	1	BQL
trans-1,3-Dichloropropene	1/3/03	1	1	BQL
Methylene Chloride	1/3/03	1	5	BQL
1,1,2,2-Tetrachloroethane	1/3/03	1	1	BQL
Tetrachloroethene	1/3/03	1	1	BQL
1,1,1-Trichloroethane	1/3/03	1	1	BQL
1,1,2-Trichloroethane	1/3/03	1	1	BQL
Trichloroethene	1/3/03	1	1	BQL
Trichlorofluoromethane	1/3/03	1	1	BQL
Vinyl Chloride	1/3/03	1	1	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	39	96

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 601

Client Sample ID: MW-21
Client Project ID: AS-142
Lab Sample ID: 59584
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Bromodichloromethane	1/7/03	1	1	BQL
Bromoform	1/7/03	1	2	BQL
Bromomethane	1/7/03	1	2	BQL
Carbon tetrachloride	1/7/03	1	1	BQL
Chlorobenzene	1/7/03	1	1	BQL
Chloroethane	1/7/03	1	1	BQL
Chloroform	1/7/03	1	1	BQL
Chloromethane	1/7/03	1	1	BQL
Dibromochloromethane	1/7/03	1	1	BQL
1,2-Dibromoethane (EDB)	1/7/03	1	1	BQL
1,2-Dichlorobenzene	1/7/03	1	1	BQL
1,3-Dichlorobenzene	1/7/03	1	1	BQL
1,4-Dichlorobenzene	1/7/03	1	1	BQL
1,1-Dichloroethane	1/7/03	1	1	BQL
1,2-Dichloroethane	1/7/03	1	1	BQL
1,1-Dichloroethene	1/7/03	1	1	BQL
cis-1,2-Dichloroethene	1/7/03	1	1	BQL
trans-1,2-Dichloroethene	1/7/03	1	1	BQL
1,2-Dichloropropane	1/7/03	1	1	BQL
cis-1,3-Dichloropropene	1/7/03	1	1	BQL
trans-1,3-Dichloropropene	1/7/03	1	1	BQL
Methylene Chloride	1/7/03	1	5	BQL
1,1,2,2-Tetrachloroethane	1/7/03	1	1	BQL
Tetrachloroethene	1/7/03	1	1	BQL
1,1,1-Trichloroethane	1/7/03	1	1	BQL
1,1,2-Trichloroethane	1/7/03	1	1	BQL
Trichloroethene	1/7/03	1	1	BQL
Trichlorofluoromethane	1/7/03	1	1	BQL
Vinyl Chloride	1/7/03	1	1	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	38	94

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: MW-21D
Client Project ID: AS-142
Lab Sample ID: 59585
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Bromodichloromethane	1/7/03	1	1	BQL
Bromoform	1/7/03	1	2	BQL
Bromomethane	1/7/03	1	2	BQL
Carbon tetrachloride	1/7/03	1	1	BQL
Chlorobenzene	1/7/03	1	1	BQL
Chloroethane	1/7/03	1	1	BQL
Chloroform	1/7/03	1	1	BQL
Chloromethane	1/7/03	1	1	BQL
Dibromochloromethane	1/7/03	1	1	BQL
1,2-Dibromoethane (EDB)	1/7/03	1	1	BQL
1,2-Dichlorobenzene	1/7/03	1	1	BQL
1,3-Dichlorobenzene	1/7/03	1	1	BQL
1,4-Dichlorobenzene	1/7/03	1	1	BQL
1,1-Dichloroethane	1/7/03	1	1	BQL
1,2-Dichloroethane	1/7/03	1	1	BQL
1,1-Dichloroethene	1/7/03	1	1	BQL
cis-1,2-Dichloroethene	1/7/03	1	1	BQL
trans-1,2-Dichloroethene	1/7/03	1	1	BQL
1,2-Dichloropropane	1/7/03	1	1	BQL
cis-1,3-Dichloropropene	1/7/03	1	1	BQL
trans-1,3-Dichloropropene	1/7/03	1	1	BQL
Methylene Chloride	1/7/03	1	5	BQL
1,1,2,2-Tetrachloroethane	1/7/03	1	1	BQL
Tetrachloroethene	1/7/03	1	1	BQL
1,1,1-Trichloroethane	1/7/03	1	1	BQL
1,1,2-Trichloroethane	1/7/03	1	1	BQL
Trichloroethene	1/7/03	1	1	BQL
Trichlorofluoromethane	1/7/03	1	1	BQL
Vinyl Chloride	1/7/03	1	1	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	38	95

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

Reviewed By: mr C

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 601

Client Sample ID: MW-25
Client Project ID: AS-142
Lab Sample ID: 59586
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)	
Bromodichloromethane	1/4/03	1	1	BQL	
Bromoform	1/4/03	1	2	BQL	
Bromomethane	1/4/03	1	2	BQL	
Carbon tetrachloride	1/4/03	1	1	BQL	
Chlorobenzene	1/4/03	1	1	BQL	
Chloroethane	1/4/03	1	1	BQL	
Chloroform	1/4/03	1	1	BQL	
Chloromethane	1/4/03	1	1	BQL	
Dibromochloromethane	1/4/03	1	1	BQL	
1,2-Dibromoethane (EDB)	1/4/03	1	1	BQL	
1,2-Dichlorobenzene	1/4/03	1	1	BQL	
1,3-Dichlorobenzene	1/4/03	1	1	BQL	
1,4-Dichlorobenzene	1/4/03	1	1	BQL	
1,1-Dichloroethane	1/4/03	1	1	BQL	
1,2-Dichloroethane	1/4/03	1	1	BQL	
1,1-Dichloroethene	1/4/03	1	1	BQL	
cis-1,2-Dichloroethene	1/4/03	1	1		5
trans-1,2-Dichloroethene	1/4/03	1	1	BQL	
1,2-Dichloropropane	1/4/03	1	1	BQL	
cis-1,3-Dichloropropene	1/4/03	1	1	BQL	
trans-1,3-Dichloropropene	1/4/03	1	1	BQL	
Methylene Chloride	1/4/03	1	5	BQL	
1,1,2,2-Tetrachloroethane	1/4/03	1	1	BQL	
Tetrachloroethene	1/4/03	1	1	BQL	
1,1,1-Trichloroethane	1/4/03	1	1	BQL	
1,1,2-Trichloroethane	1/4/03	1	1	BQL	
Trichloroethene	1/4/03	1	1		3
Trichlorofluoromethane	1/4/03	1	1	BQL	
Vinyl Chloride	1/4/03	1	1	BQL	

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	38	95

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: Trip Blank
Client Project ID: AS-142
Lab Sample ID: 59587
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Bromodichloromethane	1/6/03	1	1	BQL
Bromoform	1/6/03	1	2	BQL
Bromomethane	1/6/03	1	2	BQL
Carbon tetrachloride	1/6/03	1	1	BQL
Chlorobenzene	1/6/03	1	1	BQL
Chloroethane	1/6/03	1	1	BQL
Chloroform	1/6/03	1	1	BQL
Chloromethane	1/6/03	1	1	BQL
Dibromochloromethane	1/6/03	1	1	BQL
1,2-Dibromoethane (EDB)	1/6/03	1	1	BQL
1,2-Dichlorobenzene	1/6/03	1	1	BQL
1,3-Dichlorobenzene	1/6/03	1	1	BQL
1,4-Dichlorobenzene	1/6/03	1	1	BQL
1,1-Dichloroethane	1/6/03	1	1	BQL
1,2-Dichloroethane	1/6/03	1	1	BQL
1,1-Dichloroethene	1/6/03	1	1	BQL
cis-1,2-Dichloroethene	1/6/03	1	1	BQL
trans-1,2-Dichloroethene	1/6/03	1	1	BQL
1,2-Dichloropropane	1/6/03	1	1	BQL
cis-1,3-Dichloropropene	1/6/03	1	1	BQL
trans-1,3-Dichloropropene	1/6/03	1	1	BQL
Methylene Chloride	1/6/03	1	5	BQL
1,1,2,2-Tetrachloroethane	1/6/03	1	1	BQL
Tetrachloroethene	1/6/03	1	1	BQL
1,1,1-Trichloroethane	1/6/03	1	1	BQL
1,1,2-Trichloroethane	1/6/03	1	1	BQL
Trichloroethene	1/6/03	1	1	BQL
Trichlorofluoromethane	1/6/03	1	1	BQL
Vinyl Chloride	1/6/03	1	1	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	39	96

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

Reviewed By: mkc

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 602

Client Sample ID: MW-18
Client Project ID: AS-142
Lab Sample ID: 59582
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	1/3/03	1	1	BQL
Diisopropyl ether (DIPE)	1/3/03	1	1	BQL
Ethylbenzene	1/3/03	1	1	BQL
Methyl-tert-butyl ether (MTBE)	1/3/03	1	2	BQL
Toluene	1/3/03	1	1	BQL
m/p-Xylene	1/3/03	1	2	BQL
o-Xylene	1/3/03	1	2	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	40	101

Comments:
All values corrected for dilution.

Flags:
BQL = Below quantitation limit

Reviewed By: MLC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 602

Client Sample ID: DW-6
Client Project ID: AS-142
Lab Sample ID: 59583
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	1/3/03	1	1	BQL
Diisopropyl ether (DIPE)	1/3/03	1	1	BQL
Ethylbenzene	1/3/03	1	1	BQL
Methyl-tert-butyl ether (MTBE)	1/3/03	1	2	BQL
Toluene	1/3/03	1	1	BQL
m/p-Xylene	1/3/03	1	2	BQL
o-Xylene	1/3/03	1	2	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	40	101

Comments:
All values corrected for dilution.

Flags:
BQL = Below quantitation limit

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 602

Client Sample ID: MW-21
Client Project ID: AS-142
Lab Sample ID: 59584
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	1/4/03	10	10	**200**
Diisopropyl ether (DIPE)	1/4/03	10	10	BQL
Ethylbenzene	1/4/03	10	10	**110**
Methyl-tert-butyl ether (MTBE)	1/4/03	10	20	**87**
Toluene	1/4/03	10	10	**50**
m/p-Xylene	1/4/03	10	20	**200**
o-Xylene	1/4/03	10	20	**43**

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	40	101

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit

Reviewed By: JMC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 602

Client Sample ID: MW-21D
Client Project ID: AS-142
Lab Sample ID: 59585
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	1/4/03	10	10	**250**
Diisopropyl ether (DIPE)	1/4/03	10	10	BQL
Ethylbenzene	1/4/03	10	10	**170**
Methyl-tert-butyl ether (MTBE)	1/4/03	10	20	**92**
Toluene	1/4/03	10	10	**110**
m/p-Xylene	1/4/03	10	20	**410**
o-Xylene	1/4/03	10	20	**110**

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	40	101

Comments:
All values corrected for dilution.

Flags:
BQL = Below quantitation limit

Reviewed By: mAC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 602

Client Sample ID: MW-25
Client Project ID: AS-142
Lab Sample ID: 59586
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	1/4/03	1	1	BQL
Diisopropyl ether (DIPE)	1/4/03	1	1	BQL
Ethylbenzene	1/4/03	1	1	BQL
Methyl-tert-butyl ether (MTBE)	1/4/03	1	2	BQL
Toluene	1/4/03	1	1	BQL
m/p-Xylene	1/4/03	1	2	BQL
o-Xylene	1/4/03	1	2	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	40	101

Comments:
All values corrected for dilution.

Flags:
BQL = Below quantitation limit

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: Trip Blank
Client Project ID: AS-142
Lab Sample ID: 59587
Lab Project ID: G128-1032

Analyzed By: JTF
Date Collected: 12/26/02
Date Received: 12/26/02
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	1/6/03	1	1	BQL
Diisopropyl ether (DIPE)	1/6/03	1	1	BQL
Ethylbenzene	1/6/03	1	1	BQL
Methyl-tert-butyl ether (MTBE)	1/6/03	1	2	BQL
Toluene	1/6/03	1	1	BQL
m/p-Xylene	1/6/03	1	2	BQL
o-Xylene	1/6/03	1	2	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	41	102

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit

Reviewed By: MRC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: AS-142

Sample Information and Analytical Results	
Sample Identification	MW-18
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	12/26/02
Date Received	12/26/02
Date Extracted	12/30/02
Date Analyzed	12/30/02
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	< 100 (µg/L)
C_9-C_{12} Aliphatics**	< 100 (µg/L)
C_9-C_{10} Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	120
Surrogate % Recovery - FID	120

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

** = Excludes any surrogates or internal standards.

Lab Info: G128-1032-59582

Reviewed By: MLC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: AS-142

Sample Information and Analytical Results	
Sample Identification	DW-6
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	12/26/02
Date Received	12/26/02
Date Extracted	12/30/02
Date Analyzed	12/30/02
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	< 100 (µg/L)
C_9-C_{12} Aliphatics**	< 100 (µg/L)
C_9-C_{10} Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	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: G128-1032-59583

Reviewed By: mkC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: AS-142

Sample Information and Analytical Results	
Sample Identification	MW-21
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	12/26/02
Date Received	12/26/02
Date Extracted	12/31/02
Date Analyzed	12/31/02
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	920 (µg/L)
C_9-C_{12} Aliphatics**	1400 (µg/L)
C_9-C_{10} Aromatics**	490 (µg/L)
Surrogate % Recovery - PID	88
Surrogate % Recovery - FID	120

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

** = Excludes any surrogates or internal standards.

Lab Info: G128-1032-59584

Reviewed By: MRC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: AS-142

Sample Information and Analytical Results	
Sample Identification	MW-21D
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	12/26/02
Date Received	12/26/02
Date Extracted	12/31/02
Date Analyzed	12/31/02
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	760 (µg/L)
C_9-C_{12} Aliphatics**	1200 (µg/L)
C_9-C_{10} Aromatics**	480 (µg/L)
Surrogate % Recovery - PID	84
Surrogate % Recovery - FID	120

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

** = Excludes any surrogates or internal standards.

Lab Info: G128-1032-59585

Reviewed By: MLC

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: AS-142

Sample Information and Analytical Results	
Sample Identification	MW-25
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	12/26/02
Date Received	12/26/02
Date Extracted	12/30/02
Date Analyzed	12/30/02
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	< 100 (µg/L)
C_9-C_{12} Aliphatics**	< 100 (µg/L)
C_9-C_{10} Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	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: G128-1032-59586

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

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

Calibration Ranges and Limits

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

Calibration Concentration Levels

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

Calibration Check Date: 12/30/02

Calibration Check

Range	Levels (µg/L)	Levels (mg/Kg)	RPD
C_5-C_8 Aliphatics	200	20	-8.5
C_9-C_{12} Aliphatics	150	15	-0.6
C_9-C_{10} Aromatics	325	32.5	-11.3

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

Reviewed By: MLC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	MW-18	Analyzed By:	RML
Client Project ID:	AS-142	Date Collected:	12/26/02
Lab Sample ID:	59582	Date Received:	12/26/02
Lab Project ID:	G128-1032	Matrix:	Water
Batch ID:	2532		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Lead, Extractable	BQL	5.00	25	UG/L	6020	1/6/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	DW-6	Analyzed By:	RML
Client Project ID:	AS-142	Date Collected:	12/26/02
Lab Sample ID:	59583	Date Received:	12/26/02
Lab Project ID:	G128-1032	Matrix:	Water
Batch ID:	2532		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Lead, Extractable	BQL	5.00	25	UG/L	6020	1/6/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	MW-21	Analyzed By:	RML
Client Project ID:	AS-142	Date Collected:	12/26/02
Lab Sample ID:	59584	Date Received:	12/26/02
Lab Project ID:	G128-1032	Matrix:	Water
Batch ID:	2532		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Lead, Extractable	BQL	5.00	25	UG/L	6020	1/6/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	MW-21D	Analyzed By:	RML
Client Project ID:	AS-142	Date Collected:	12/26/02
Lab Sample ID:	59585	Date Received:	12/26/02
Lab Project ID:	G128-1032	Matrix:	Water
Batch ID:	2532		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Lead, Extractable	BQL	5.00	25	UG/L	6020	1/6/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	MW-25	Analyzed By:	RML
Client Project ID:	AS-142	Date Collected:	12/26/02
Lab Sample ID:	59586	Date Received:	12/26/02
Lab Project ID:	G128-1032	Matrix:	Water
Batch ID:	2535		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Lead, Extractable	**27.6**	5.00	25	UG/L	6020	1/6/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Ethylene Dibromide
by GC 504.1

Client Sample ID:	MW-18	Date Collected:	12/26/02
Client Project ID:	AS-142	Date Received:	12/26/02
Lab Sample ID:	59582	Date Analyzed:	1/7/03
Lab Project ID:	G128-1032	Analyzed By:	CLP

Compound	Result (ug/L)	Quantitation Limit	Method	Dilution Factor
Ethylene Dibromide	BQL	0.02	504.1	1.0

Comments:
BQL = Undetected or below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Ethylene Dibromide
by GC 504.1

Client Sample ID: DW-6
Client Project ID: AS-142
Lab Sample ID: 59583
Lab Project ID: G128-1032

Date Collected: 12/26/02
Date Received: 12/26/02
Date Analyzed: 1/7/03
Analyzed By: CLP

Compound	Result (ug/L)	Quantitation Limit	Method	Dilution Factor
Ethylene Dibromide	BQL	0.02	504.1	1.0

Comments:
BQL = Undetected or below quantitation limit.

Reviewed By: MMC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Ethylene Dibromide
by GC 504.1

Client Sample ID: MW-21
Client Project ID: AS-142
Lab Sample ID: 59584
Lab Project ID: G128-1032

Date Collected: 12/26/02
Date Received: 12/26/02
Date Analyzed: 1/7/03
Analyzed By: CLP

Compound	Result (ug/L)	Quantitation Limit	Method	Dilution Factor
Ethylene Dibromide	BQL	0.02	504.1	1.0

Comments:
BQL = Undetected or below quantitation limit.

Reviewed By: MAC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Ethylene Dibromide
by GC 504.1

Client Sample ID: MW-21D
Client Project ID: AS-142
Lab Sample ID: 59585
Lab Project ID: G128-1032

Date Collected: 12/26/02
Date Received: 12/26/02
Date Analyzed: 1/7/03
Analyzed By: CLP

Compound	Result (ug/L)	Quantitation Limit	Method	Dilution Factor
Ethylene Dibromide	BQL	0.02	504.1	1.0

Comments:
BQL = Undetected or below quantitation limit.

Reviewed By: MC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Ethylene Dibromide
by GC 504.1

Client Sample ID: MW-25
Client Project ID: AS-142
Lab Sample ID: 59586
Lab Project ID: G128-1032

Date Collected: 12/26/02
Date Received: 12/26/02
Date Analyzed: 1/7/03
Analyzed By: CLP

Compound	Result (ug/L)	Quantitation Limit	Method	Dilution Factor
Ethylene Dibromide	BQL	0.02	504.1	1.0

Comments:
BQL = Undetected or below quantitation limit.

Reviewed By: MPC

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

Chain-of Custody Record & Analytical Request

COC# 34229

Page 1 of 1

ient: Catlin Eng. & Sci.
ldress: 220 Old Dairy Rd
ldress: Wilmington NC 28403
uote #: DOD101

Project ID: AS-142
Contact: ~~Tom Landis~~ Mike E. Mason
Phone: 452-5861
Fax:

Date: 12-26-02
Turnaround: Std.
Job Number: 202-068
P.O. Number: ~~221226-2~~ 220829-3

Report To: Mike E. Mason
Invoice To: Sheila

Sample ID	Date	Time	Matrix	Preservatives: HCL	Preservatives: HNO3			Analyses: 601/602	Analyses: 504.1	Analyses: VPH	Analyses: 3030C Pb							Comments: Please specify any special reporting requirements
MW-18	12/26/02	1150	W	✓	✓			✓	✓	✓	✓							Summary EDD Format
MW-6	↓	1200	↓	✓	✓			✓	✓	✓	✓							Camp Lejeune EDD Format
MW-21	↓	1225	↓	✓	✓			✓	✓	✓	✓							
MW-21D	↓	1225	↓	✓	✓			✓	✓	✓	✓							G128-1032
MW-25	↓	1240	↓	✓	✓			✓	✓	✓	✓							
Trip Blank	↓	800	↓	✓				✓										

Relinquished By	Date	Time	Received By	Date	Time	Temperature
[signature]	12/26/02	1410	[signature]	12/26/02	1410	12.1°C on ice - cooling down to temp

State Certification Requested

NC ____ SC ____ Other ____

SEE REVERSE FOR TERMS AND CONDITIONS

FILE COPY

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

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

March 11, 2003

Report Number: G128-1061

Client Project ID: AS-142

Dear Mr. Mason,

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

If there are any questions about the report or the services performed during this project, please call for assistance. We will be happy to answer any questions or concerns which you may have.

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

Sincerely,

Paradigm Analytical Laboratories, Inc.

Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 601

Client Sample ID: MW-24
Client Project ID: AS-142
Lab Sample ID: 64579
Lab Project ID: G128-1061

Analyzed By: JTF
Date Collected: 02/25/03
Date Received: 02/26/03
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Bromodichloromethane	2/27/03	1	1	BQL
Bromoform	2/27/03	1	2	BQL
Bromomethane	2/27/03	1	2	BQL
Carbon tetrachloride	2/27/03	1	1	BQL
Chlorobenzene	2/27/03	1	1	BQL
Chloroethane	2/27/03	1	1	BQL
Chloroform	2/27/03	1	1	BQL
Chloromethane	2/27/03	1	1	BQL
Dibromochloromethane	2/27/03	1	1	BQL
1,2-Dibromoethane (EDB)	2/27/03	1	1	BQL
1,2-Dichlorobenzene	2/27/03	1	1	BQL
1,3-Dichlorobenzene	2/27/03	1	1	BQL
1,4-Dichlorobenzene	2/27/03	1	1	BQL
1,1-Dichloroethane	2/27/03	1	1	BQL
1,2-Dichloroethane	2/27/03	1	1	BQL
1,1-Dichloroethene	2/27/03	1	1	BQL
cis-1,2-Dichloroethene	2/27/03	1	1	BQL
trans-1,2-Dichloroethene	2/27/03	1	1	BQL
1,2-Dichloropropane	2/27/03	1	1	BQL
cis-1,3-Dichloropropene	2/27/03	1	1	BQL
trans-1,3-Dichloropropene	2/27/03	1	1	BQL
Methylene Chloride	2/27/03	1	5	BQL
1,1,2,2-Tetrachloroethane	2/27/03	1	1	BQL
Tetrachloroethene	2/27/03	1	1	BQL
1,1,1-Trichloroethane	2/27/03	1	1	BQL
1,1,2-Trichloroethane	2/27/03	1	1	BQL
Trichloroethene	2/27/03	1	1	BQL
Trichlorofluoromethane	2/27/03	1	1	BQL
Vinyl Chloride	2/27/03	1	1	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
1,4-Dichlorobutane	40	43	108

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GC 602

Client Sample ID: MW-24
Client Project ID: AS-142
Lab Sample ID: 64579
Lab Project ID: G128-1061

Analyzed By: JTF
Date Collected: 2/25/03
Date Received: 2/26/03
Matrix: Water

Compound	Date Analyzed	Dilution	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	2/27/03	25	25	**470**
Diisopropyl ether (DIPE)	2/27/03	25	25	BQL
Ethylbenzene	2/27/03	25	25	**220**
Methyl-tert-butyl ether (MTBE)	2/27/03	25	50	BQL
Toluene	2/27/03	25	25	**290**
m/p-Xylene	2/27/03	25	50	**390**
o-Xylene	2/27/03	25	50	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
Trifluorotoluene	40	41	102

Comments:

All values corrected for dilution.

Flags:

BQL = Below quantitation limit

Reviewed By: MLC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Ethylene Dibromide
by GC 504.1

Client Sample ID:	MW-24	Date Collected:	2/25/03
Client Project ID:	AS-142	Date Received:	2/26/03
Lab Sample ID:	64579	Date Analyzed:	3/6/03
Lab Project ID:	G128-1061	Analyzed By:	CLP

Compound	Result (ug/L)	Quantitation Limit	Method	Dilution Factor
Ethylene Dibromide	BQL	0.02	504.1	1.0

Comments:
BQL = Undetected or below quantitation limit.

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: AS-142

Sample Information and Analytical Results	
Sample Identification	MW-24
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	02/25/03
Date Received	02/26/03
Date Extracted	03/07/03
Date Analyzed	03/07/03
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	2200 (µg/L)
C_9-C_{12} Aliphatics**	2200 (µg/L)
C_9-C_{10} Aromatics**	440 (µg/L)
Surrogate % Recovery - PID	54
Surrogate % Recovery - FID	140***

* = 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: G128-1061-64579

Reviewed By: MLC

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

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

Calibration Ranges and Limits

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

Calibration Concentration Levels

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

Calibration Check Date: 03/06/03

Calibration Check

Range	Levels (µg/L)	Levels (mg/Kg)	RPD
C_5-C_8 Aliphatics	200	20	-9.0
C_9-C_{12} Aliphatics	150	15	3.4
C_9-C_{10} Aromatics	325	32.5	-3.3

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

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	MW-24	Analyzed By:	RML
Client Project ID:	AS-142	Date Collected:	2/25/03
Lab Sample ID:	64579	Date Received:	2/26/03
Lab Project ID:	G128-1061	Matrix:	Water
Batch ID:	2625		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Lead,Extractable	BQL	5.00	25	UG/L	6020	3/3/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL

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

Chain-of Custody Record & Analytical Request

COC# [illegible]

Page 1 of 1

lient: CATLIN ENG. & Sci. | Project ID: AS-142 | Date: 2-26-03 | Report To: MIKE E. MASON
ddress: 220 Old Dairy Rd | P.O. Number: 230226-2 | Turnaround: STND
ddress: Wilmington, NC | Contact: MIKE E. MASON | Job Number: 202-068
uote #: DOD101 | Phone: 452-5861 | Invoice To: SHEILA @ CATLIN

Sample ID	Date	Time	Matrix	Preservatives				Analyses										Comments: Please specify any special reporting requirements
				HCL	HNO3			601/602	504.1	VPH	3030c Pb							G128-1061
MW-24	2/25	4:25	W	✓	✓			✓	✓	✓	✓							Summary EDD format
																		Camp Lejeune EDD format

Relinquished By	Date	Time	Received By	Date	Time	Temperature	Sampled By	Airbill #
[signature]	2/26/03	8:45	[signature]	2/26/03	9:15	on ice 5.8c		

APPENDIX F

HISTORICAL REPORT INFORMATION

EXCERPTS FROM PHASE I LIMITED SITE ASSESSMENT

PHASE I
LIMITED SITE ASSESSMENT
AND RECOMMENDATION FOR "NO FURTHER ACTION"

FORMER GASOLINE UNDERGROUND STORAGE TANK
BUILDING AS-142
AIR STATION FUEL FARM
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA

Prepared For:

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

Prepared By:

Law Engineering and Environmental Services, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

Navy Contract No. N62470-95-D-6009
LAW Job No. 30740-6-0600-0148

March 29, 2002

B. Risk Characterization

Part I – Groundwater/Surface Water/Vapor Impacts

High Risk

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

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

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? **NO**

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 groundwater)? **NO**

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? **NO**
   If yes, describe. N/A

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

Intermediate Risk

7. Is a surface water body located within 500 feet of the source area of the release? **NO**
   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? N/A

8. Is the source area of release located within a approved or planned wellhead protection area as defined in 42 USC 300h-7(e)? **NO**
   If yes, describe. **N/A**

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

If Yes, describe.

The source area at the subject site is located within an interstream area (See Figure 1), which is identified by Cardinell and Others[1] as a potential recharge area to the semi-confined Castle Hayne Aquifer. The Marine Corps Base (MCB) currently obtains all water for the drinking water supply from the Castle Hayne Aquifer. However, there are no water-supply wells within 1,500 feet of the site, and the Marine Corps Air Station (MCAS) does not intend to develop the water resources in the vicinity of the subject site.

10. Do the levels of groundwater contamination, for any contaminant, exceed the gross contaminant levels (see Table 9 of the New Guidelines) established by the Department? **NO**

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)? **NO**
   Describe. **N/A**

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

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**
   Describe.

   The Building AS-142 site is currently part of the MCAS fuel farm, operating as a gas station from Building AS-143.

4. Do children visit the property? **NO**
   Explain. **N/A**

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

   The Building AS-142 site is under the general security of the MCB. The location of the former underground storage tank (UST) is not fenced.

---

[1] Alex P. Cardinell and Others, Hydrogeological Framework of U.S. Marine Corps Base at Camp Lejeune, North Carolina, U.S. Geological Survey Water Resources Investigation Report 93-4049 (Raleigh, N.C.: USGS, [1993], p. 29.

5. Do pavement, buildings, or other structures cap the contaminated soil? **NO**
If yes, explain 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 MCAS is not subject to local or County zoning requirements because it is part of a military reservation.

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

We are not aware of any plans to change the Building AS-142 site's function. The Installations and Environment/EMD/EQB, MCB, states if in the future the building was to be renovated or demolished, the project would be reviewed in advance by the MCB Environmental Impact Working Group (EIWG).

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)?

Permanent MCAS barracks are located approximately 1400 feet southwest from the source area (See Figure 2).

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?

The enlisted men's club with a gymnasium and athletic field is located approximately 900 feet west from the source area. A medical clinic is located approximately 700 feet north of the source area. The area to the south and east of the source area is developed with office, aircraft hanger and light industrial work facilities for MCAS personnel. Other places of public assembly, including a school, daycare, theater and church are located beyond 1500 feet from the subject site (See Figure 2).

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

The surrounding properties are part of the MCAS. The MCAS is not subject to local or county zoning requirements because it is part of a military reservation.

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

The surrounding area is also part of the MCAS. The adjacent property contains the Campbell Street fuel farm facility. The surrounding areas are industrial in nature, containing office, warehouse, and aircraft- and vehicle-repair facilities.

C. Receptor Information

1. Water-Supply Wells

There are no water-supply wells within 1500 feet of the subject site.

2. Public Water Supplies

Are public water supplies available within 1500 feet of the source are of the release? **YES**
If yes, where is the location of the nearest public water line and the source(s) of the public water supply.

Public water is provided to buildings within 1500 feet of the Building AS-142 site by water mains which carry treated potable water. The potable water supply used in the area is obtained from the MCAS water-supply treatment plant. Groundwater obtained from the Castle Hayne Aquifer beneath the MCAS is the raw water source that is treated at the plant.

3. Surface Water

The major surface water body closest to the source area is the New River. The New River is located approximately 6000 feet to the east (See Figure 1).

4. Wellhead Protection Areas

The Department of Environment and Natural Resources (DENR) has not established wellhead protection areas for the Camp Lejeune area.

5. Describe Deep Aquifers in the Coastal Plain Physiographic Region

Deep aquifers below the surficial aquifer in the area of Building AS-142 site include the Castle Hayne aquifer, the Beaufort aquifer and the Peedee aquifer, in order of increasing depth. The principal water-supply aquifer for the Base is the Castle Hayne aquifer, a series of sand and limestone beds that occur approximately between 50 and 300 feet below ground surface (bgs). The Castle Hayne aquifer is about 150 to 350 feet thick in the MCAS area (Cardinell and others,

1993). It is a critical water-supply source, not only for Camp Lejeune but also for the southern coast and eastern-central Coastal Plain of North Carolina.

The Castle Hayne aquifer is overlain by the surficial aquifer and the Castle Hayne confining unit, with the exception of areas where these units have been eroded. The Castle Hayne confining unit is composed of clay, silt and sandy clay beds. Cardinell and others (1993) state that the Castle Hayne confining unit ranges from 0 to 26 feet in thickness in the MCB area and is incised by the New River and its tributaries.

Cardinell and others (1993) state that recharge to the Castle Hayne aquifer is via downward percolation from the surficial aquifer in interstream areas. The vertical hydraulic conductivity of the Castle Hayne confining unit was estimated to range from 0.0014 to 0.41 feet per day. The Castle Hayne aquifer may be hydraulically connected to the New River and its tributaries where the Castle Hayne confining unit has been cut.

6. Describe Subsurface Structures

The approximate locations of the subsurface utilities in the vicinity of the former UST are shown on Figure 3.

7. Property Owners and Occupants

The U.S. Government owns the Building AS-142 property and adjacent properties within the MCAS. The property owner/occupant information is provided in attached Table 1.

D. Site Geology and Hydrogeology

On November 28, 2001, LAW advanced one soil boring to a depth of 18 feet below ground surface (bgs) for the purpose of installing a source area Type II monitoring well. Four hand auger borings were advanced to a depth of four feet bgs at the approximate midpoint of the former UST basin side-walls. One hand auger boring was advanced to a depth of two and one-half feet bgs at the location of the fuel-dispensing island. The soil at the subject site generally consists of slightly silty fine to coarse sand from the ground surface to three feet bgs. This surficial layer of sand is underlain by clayey, silty, fine to coarse sand from approximately three to 18 feet bgs. The well boring was advanced through UST basin fill material consisting of silty, fine sand to a depth of eight feet bgs. See Appendix A for boring logs and lithologic descriptions.

On December 4, 2001, LAW measured groundwater at a depth of 4.38 feet below the top of the source area well casing. The top of the well casing is set just slightly below ground surface. The fines within the soil types identified at the site would facilitate attenuation of petroleum-related contaminants by adsorption.

I. TABLES

(Applicable Tables Only)

Table 1 **Property Owners/ Occupants**

Date: 3/29/02 **Incident No. and Name: No. 23299, MCAS Building AS-142** **Facility ID#: S-002740**

Tax Parcel Number/ Map ID	Owner/ Occupant Name	Address
Not Applicable	Commanding General*	Marine Corps Base PSC Box 20004 Camp Lejeune, NC 28542-0004 (910) 451-5068

* Owner/ Occupant of Subject Site and Contiguous Properties.

Table 2
Date: 3/29/02

Summary of Soil Sampling Results
Incident No. and Name: No. 23297, MCAS Building 142

Facility ID#: S-002740

Analytical Method →			Volatile Organic Compounds 8260B/5035											MADEP Hydrocarbon Fractions		
Contaminant of Concern →																
Sample ID	**Date Collected**	**Sample Depth (ft. BGS)**	Benzene	n-Butylbenzene	sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	Methyl-tert-butyl-ether	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Xylenes	C_5-C_8 Aliphatics	C_9-C_{12} Aliphatics	C_9-C_{10} Aromatics
USTAS142-SB01	11/28/01	3 to 4	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	.007	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.013	<10	<10	<10
USTAS142-SB01-D	11/28/01	3 to 4	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.0064	<0.013			
USTAS142-SB02	11/28/01	3 to 4	<1.6	**4.6**	<1.6	**27.0**	**2.6**	<1.6	**7.5**	**12.0**	**35.0**	**67.0**	**19.0**	**126.0**	**2300***	2500	**470***
USTAS142-SB03	11/28/01	3 to 4	**1.7**	0.4	0.14	**1.8**	0.16	0.74	**0.8**	0.65	1.5	3.9	0.97	**7.7**	**220**	460	**70**
USTAS142-SB04	11/28/01	3 to 4	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.0063	<0.013	12	29	<10
USTAS142-SB05	11/28/01	2 to 2.5	**8.9**	<1.2	<1.2	**6.4**	<1.2	<1.2	<1.2	<1.2	**44.0**	3.2	<1.2	**26.1**	**450**	230	27
Soil-to-Groundwater MSCC (mg/kg)			*.0056*	*4*	*3*	*0.24*	*2*	*0.92*	*0.58*	*2*	*7*	*8*	*7*	*5*	*72*	*3,255*	*34*
Residential MSCC (mg/kg)			*22*	*156*	*156*	*1,560*	*1,564*	*156*	*63*	*156*	*3,200*	*782*	*782*	*32,000*	*939*	*9,386*	*469*
Industrial/Commercial MSCC (mg/kg)			*200*	*4,088*	*4,088*	*40,000*	*40,880*	*4,088*	*1,635*	*4,088*	*82,000*	*20,440*	*20,440*	*200,000*	*24,528*	*245,280*	*12,264*

MSCC = Maximum Soil Contaminant Concentration
ft. BGS = feet below ground surface
Concentrations given in milligrams per kilogram (mg/kg)
<# = Result less than the given practical quantitation limit
Blank cells indicate test was not performed on sample
Shaded cells indicate concentrations in excess of the Soil-to-Groundwater MSCC
Shaded cells with an "*" indicate concentrations in excess of the Residential MSCC

Table 3
Date: 3/29/02

Summary of Groundwater Sampling Results
Incident No. and Name: No. 23297, MCAS Building 142

Facility ID#: S-002740

Analytical Method →			Volatile Organic Compounds 6210D												MADEP Hydrocarbon Fractions			6010B	
Contaminant of Concern →																			
Well ID	**Sample ID**	**Date Collected**	Benzene	n-Butylbenzene	Sec-Butylbenzene	Diisopropyl ether	Ethylbenzene	Isopropylbenzene	Methyl-tert-butyl-ether	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Xylenes	C_5-C_8 Aliphatics	C_9-C_{12} Aliphatics	C_9-C_{10} Aromatics	Chromium	Lead
USTAS142-MW01	USTAS142-MW01	12/04/01	**450**	21	11	10	170	15	**280**	15	32	10	62	16	50	**1,000**	890	200	<0.01	<0.01
2L Standard (µg/L)			*1*	*70*	*70*	*70*	*29*	*70*	*200*	*21*	*70*	*1,000*	*350*	*350*	*530*	*420*	*4,200*	*210*	*50*	*15*
GCL (µg/L)			*5,000*	*6,900*	*8,500*	*70,000*	*29,000*	*25,000*	*200,000*	*15,500*	*30,000*	*257,500*	*28,500*	*25,000*	*87,500*	*	*	*	*50,000*	*15,000*

GCL = Gross Contaminantion Level
Concentrations given in micrograms per liter (µg/L)
<# = Result less than the practical quantitation limit
Shaded cells indicate concentrations in excess of the North Carolina Groundwater Quality Standard
* GCLs have not been established for these MADEP Hydrocarbon Fractions

H. Site History

UST System Information

UST ID Number	Product	Capacity (gallons)	Date Installed	Date Permanently Closed	Was Release Associated With UST System
AS-142	Gasoline	10,000	November 1994	December 12, 2000	Yes

Source: UST closure report prepared by J.A. Jones Environmental Services Company.

UST Owner/Operator Information

UST ID Number	Name of Owner/Operator	Dates of Ownership/Operation	Owner or Operator?
AS-142	Commanding General	Installation to Closure	Owner/Operator
Address			**Telephone Number**
PSC Box 20004 Marine Corps Base Camp Lejeune, NC 28542-0004			(910) 451-5068

The subject UST was installed in November 1994. The UST was last in operation on March 28, 2000, and has been replaced by an aboveground storage tank (AST). J.A. Jones Environmental Services Company (J.A. Jones) removed the UST on December 12, 2000. The UST was constructed of fiberglass, equipped with an automated monitoring and leak detection system and buried entirely in ABC stone/gravel basin fill. The UST was replaced because groundwater was reportedly seeping into the tank. However, it was speculated that groundwater seepage was through an ancillary equipment sump. The automated monitoring system had never detected a leak and there did not appear to be any holes or fractures in the UST upon examination after removal. There was no residual product observed within the tank, which was cleaned using a high-pressure washer during removal activities. J.A. Jones closure report states that the fuel distribution lines were removed during installation of the replacement AST.

The UST dimensions were 26.5 feet long by 8 feet in diameter. The burial depth at the top of the UST was five feet bgs. The final dimensions of the excavation were 34 feet long by 20 feet wide by 13 feet deep. Petroleum stained soil was not observed within the excavation. However, a distinct petroleum odor emanated from the south wall of the excavation. Excavated soil/gravel was stockpiled pending laboratory analysis. J.A. Jones collected a total of nine soil samples during removal activities for laboratory analysis, including four basin side-wall samples, four line samples and one composite stockpile sample. The wall and line samples were collected at approximately 10 and 2-3 feet bgs, respectively. The soil samples were tested in the laboratory for diesel-range and gasoline-range, total petroleum hydrocarbons (TPH), by EPA preparation/testing methods 3550/8015 and 5030/8015, respectively. Three wall samples exhibited diesel range TPH concentrations of 6.5, 160 and 39 mg/kg. One line sample exhibited a diesel-range TPH concentration of 430 mg/kg, and a gasoline-range TPH concentration of 100 mg/kg. The State Action Level for TPH is 10 mg/kg. The J.A. Jones soil sample locations are shown on Figure 4. The stockpile sample exhibited a diesel range TPH concentration of 14 mg/kg, and the stockpiled soil/gravel totaling 149.36 tons was transported off base for remediation. The following table summarizes soil sample laboratory test results.

Summary of Soil Sample Test Results: UST Closure Assessment

Incident No. and Name: 23297, MCAS Building AS-142 **Facility ID# S-002740**

Analytical Method →			3550/8015	5030/8015
Contaminant of Concern →			Diesel Range TPH	Gasoline Range TPH
Sample ID	**Date Collected**	**Sample Depth (ft. BGS)**		
AS-142-1	12/12/00	10	<10	<1
AS-142-2	12/12/00	10	<10	6.5
AS-142-3	12/12/00	10	<10	**160**
AS-142-4	12/12/00	10	<10	**39**
AS-142-5	12/12/00	3	**100**	**430**
AS-142-6	12/27/00	2.5	<10	<1
AS-142-7	4/16/01	2	<10	<1
AS-142-8	4/16/01	2	<10	<1
AS-142-pile	12/13/00	NA	**14**	<1
Action Level (mg/kg)			10	10

ft. BGS = feet below ground surface
Concentrations given in milligrams per kilogram (mg/kg)
Shaded cell = concentration exceeds Action level

J.A. Jones closure report states that the basin wall soil samples were collected just above the groundwater table at 10 feet bgs. However, J.A. Jones also reported the groundwater table depth at 4.3 feet bgs in a nearby monitoring well. Free product was not observed on the groundwater surface within the excavation. A temporary well was installed within the basin when the excavation was back-filled. Backfill sand was obtained from a borrow-pit on base. One groundwater sample was collected from the well and tested in the laboratory by EPA methods 601/602, Volatile Petroleum Hydrocarbon (VPH) by the Massachusetts Department of Environmental Protection (MADEP) method and for lead by EPA preparation/test method 3030C/6010. Benzene, total xylenes, methyl tert-butyl ether, lead, C5-C8 aliphatics and C9-C10 aromatics were detected in groundwater at concentrations above their respective North Carolina Grounwater Quality Standards established in 15A NCAC 2L (2L Standards). The following table summarizes groundwater sample laboratory test results.

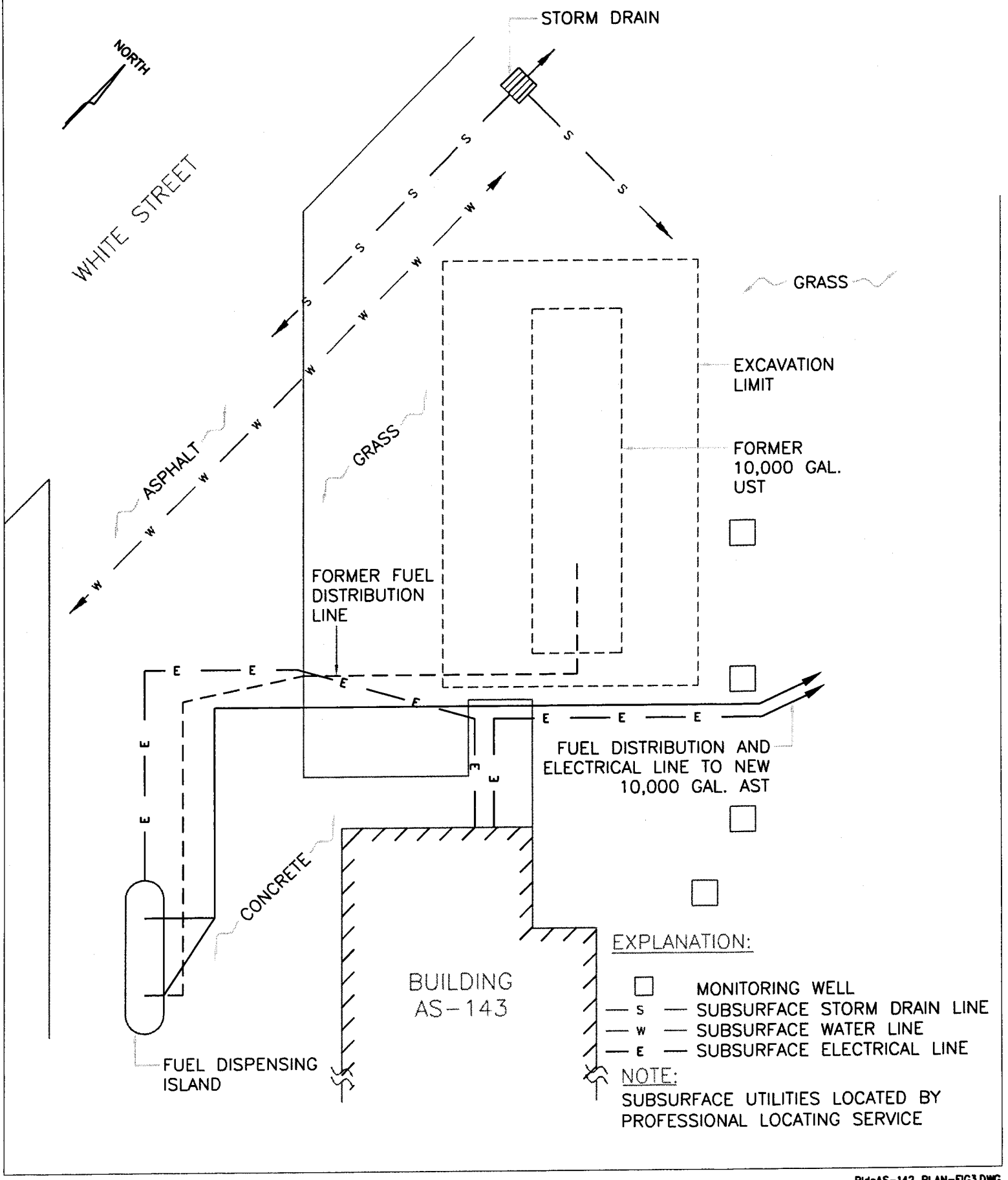
Summary of Groundwater Sample Test Results: UST Closure Assessment

Incident No. and Name: 23297, MCAS Building AS-142 **Facility ID# S-002740**

Analytical Method →			601/602					3030C/ 6010	MADEP VPH		
Contaminant of Concern →			Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	Lead	C5-C8 Ali-phatic	C9-C12 Ali-phatic	C9-C10 Aro-matic
Well ID	**Sample ID**	**Date Collected**									
Temp	AS-142-W	1/4/01	**530**	810	11	**1300**	**420**	**132**	**2800**	1800	**1300**
2L Standard (mg/l)			1	1000	29	530	200	15	420	4200	210
GCL (mg/l)			5000	257500	29000	87500	200000	15000	N/E	N/E	N/E

MTBE = Methyl tert-butyl ether
GCL = Gross Contaminant Level
Concentrations given in milligrams per liter (µg/L)
N/E = GCL not established
Shaded cell = Concentration exceeds 2L Standard

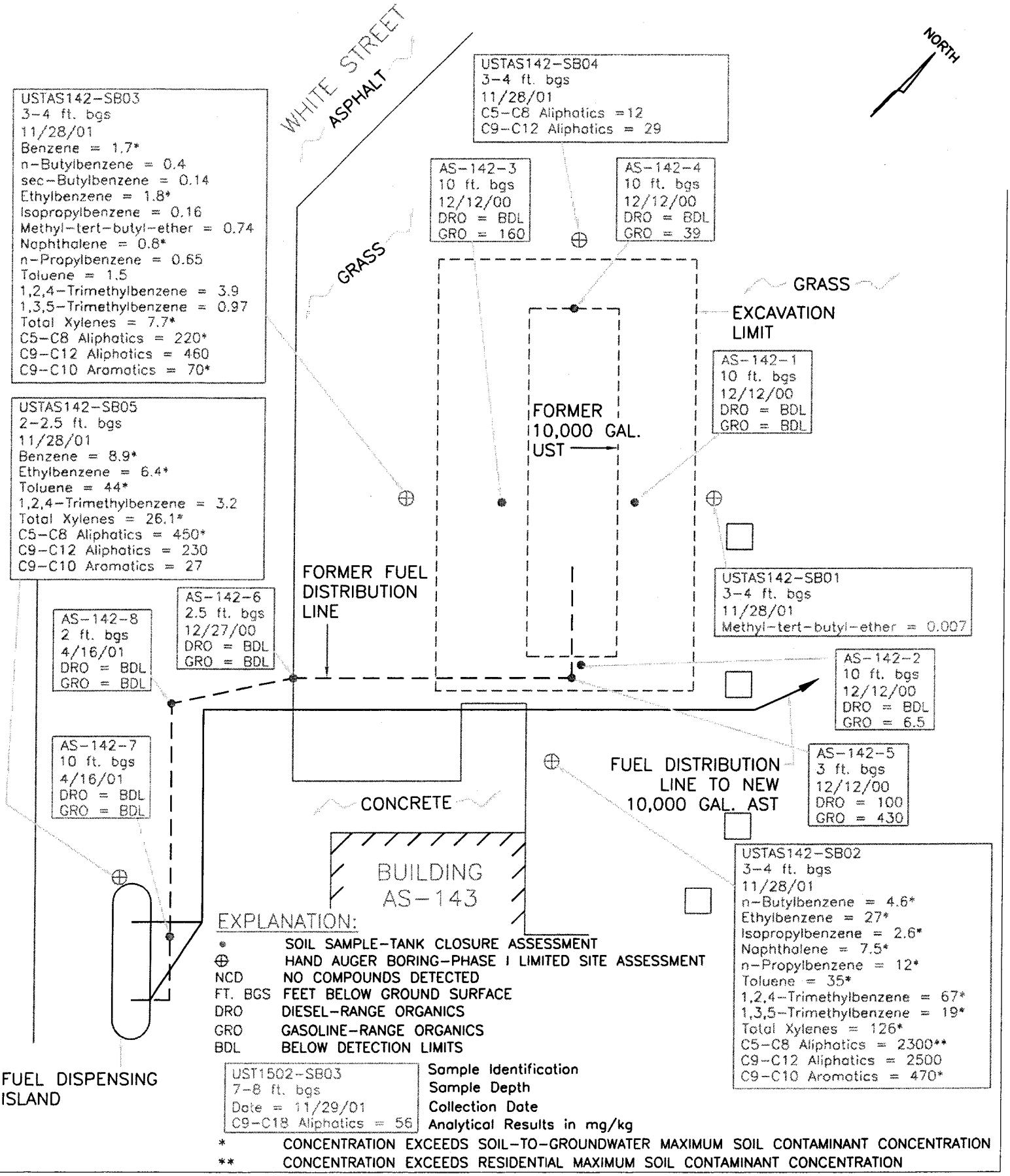
J. FIGURES



BldgAS-142_PLAN-FIG3.DWG

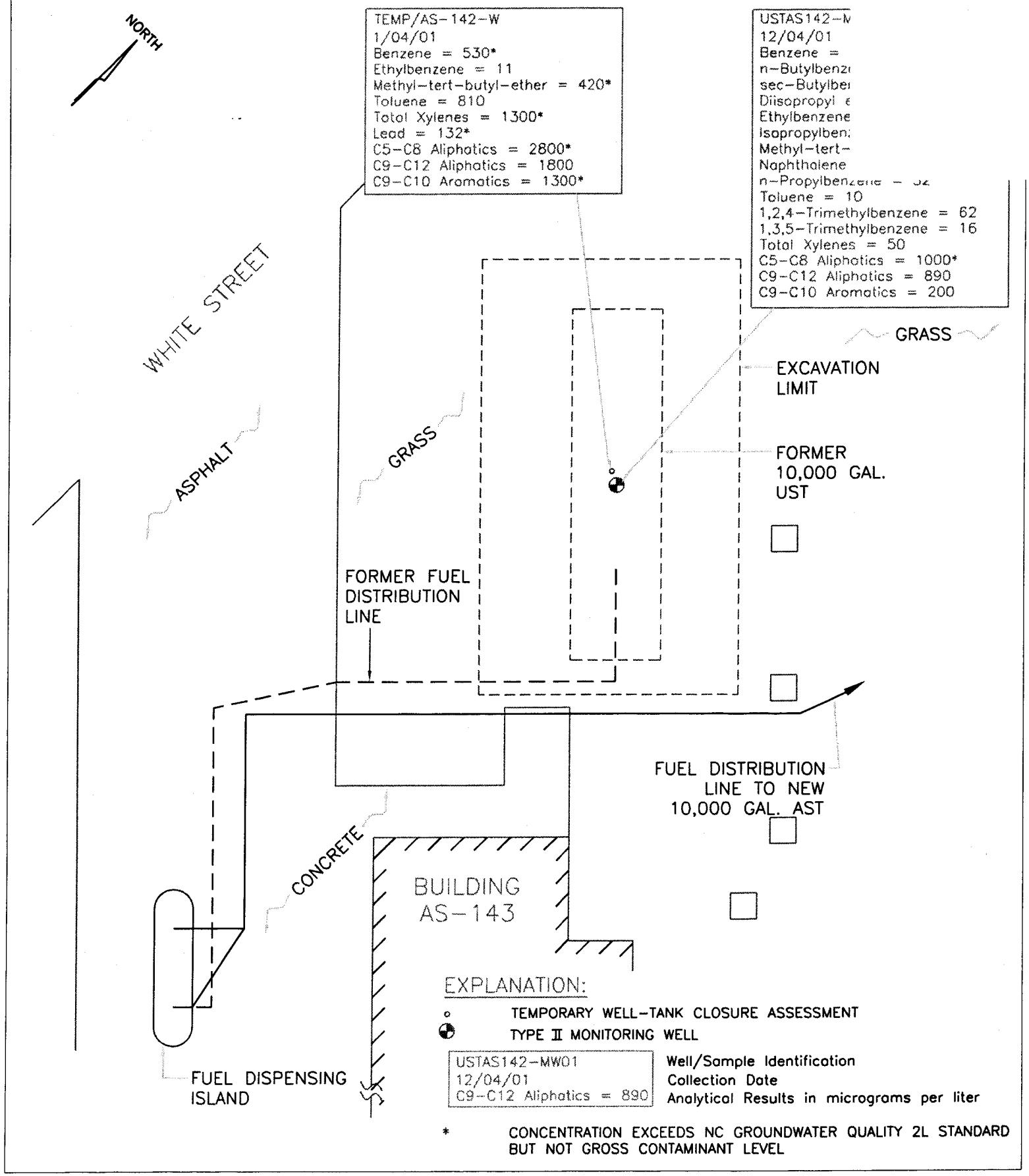
LAW
LAWGIBB Group Member
LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC. RALEIGH NC

PROJECT: LIMITED SITE ASSESSMENT MARINE CORPS AIR STATION NEW RIVER, N.C.	TITLE: SITE MAP FORMER UST BUILDING AS-142		FIGURE 3
JOB NO: 30740-6-0600-0148	DATE: JAN. 2002	SCALE: 1"=10'	DRAWN BY: R.R.	CHECKED BY:



BldgAS-142_PLAN-FIG4.DWG

LAW LAWGIBB Group Member LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC. RALEIGH NC	PROJECT LIMITED SITE ASSESSMENT MARINE CORPS AIR STATION NEW RIVER, N.C.	TITLE SOIL ANALYTICAL RESULTS MAP FORMER UST BUILDING AS-142		FIGURE 4
	JOB NO: 30740-6-0600-0148	DATE: JAN. 2002	SCALE: 1"=10'	DRAWN BY: R.R.	CHECKED BY:



BldgAS-142_PLAN-FIG5.DWG

LAW LAWGIBB Group Member LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC. RALEIGH NC	PROJECT LIMITED SITE ASSESSMENT MARINE CORPS AIR STATION NEW RIVER, N.C.	TITLE GROUNDWATER ANALYTICAL RESULTS MAP FORMER UST BUILDING AS-142		FIGURE 5
	JOB NO: 30740-6-0600-0148	DATE: JAN. 2002	SCALE: 1"=10'	DRAWN BY: R.R.	CHECKED BY:

WELL CONSTRUCTION DATA

Table 4 **Well Construction Information**

Date: 3/29/02 **Incident No. and Name: No. 23297, MCAS Building AS-142** **Facility ID#: S-002740**

Well ID	Date Installed	Date Water Level Measured	Well Casing Depth (ft. BGS)	Screened Interval (ft. BGS)	Bottom of Well (ft. BGS)	Top of Casing Elevation *(ft.)	Depth to Water from Top of Casing (ft.)	Free Product Thickness **(ft.)	Ground-water Elevation (ft.)	Comments
USTAS142 -MW01	11/28/01	12/4/01	3	3 to 18	18	Not Established	4.38	Not Present	Not Established	

* Reference Point for Elevation Measurements _____, Assumed Elevation: _____ft.

** If free product is present in a well, groundwater elevation should be calculated by: [Top of Casing Elevation – depth to Water] + [free product thickness x 0.8581]

ft. BGS = feet below ground surface

TABLE 1-1

SUMMARY OF WELL CONSTRUCTION DETAILS - DECEMBER 1991
CAMPBELL STREET FUEL FARM
CONTRACT TASK ORDER 0265

Well No.	Date Installed	Top of Casing Elevation[1] (feet, above MSL)	Ground Surface Elevation (feet, above MSL)	Boring Depth (feet, below ground surface)	Depth of Outer Casing (feet, below ground surface)	Well Depth (feet, below ground surface)	Screen Interval Depth (feet, below ground surface)	Depth to Sand Pack (feet, below ground surface)	Depth to Bentonite (feet, below ground surface)
MW-1	12/10/91	23.24	19.6	14.0	NA	14.0	4.0 - 13.8	2.0	1.0
MW-2	12/10/91	22.83	19.1	14.0	NA	14.0	4.0 - 13.8	2.0	1.0
MW-3	12/12/91	21.69	18.3	14.0	NA	14.0	4.0 - 13.8	2.0	1.0
MW-4	12/12/91	22.77	18.6	14.0	NA	14.0	4.0 - 13.8	2.0	1.0
MW-5	12/12/91	23.85	20.7	15.1	NA	15.1	5.3 - 14.7	2.0	1.0
MW-6	12/13/91	20.40	17.3	15.0	NA	15.0	5.0 - 14.8	2.0	1.0
MW-7	12/13/91	21.04	17.5	14.0	NA	14.0	4.0 - 13.8	2.0	1.0
DW-1[3]	12/17/91 12/18/91	20.79	18.3	30.0	20.0	30.0	25.0 - 29.8	23.0	19.0
DW-2	1/6/92 1/7/92	22.91	19.5	30.0	20.0	30.0	25.0 - 29.8	23.0	21.0
DW-3	1/6/92 1/7/92	22.98	19.6	30.0	20.0	28.0	25.0 - 27.8	21.0	19.0

(1) MSL - Mean Sea Level
(2) NA = Not Applicable
(3) Monitoring Wells DW-1, DW-2, and DW-3 were constructed as Type III monitoring wells.

Source: Baker Environmental, Inc., August 12, 1992. "Final Site Assessment Report, Campbell Street Fuel Farm and UST System AST-143" (Contract No. N62470-89-D-4814, Contract Task Order 0013).

TABLE 1-2

SUMMARY OF WELL CONSTRUCTION DETAILS - NOVEMBER 1992
CAMPBELL STREET FUEL FARM
CONTRACT TASK ORDER 0265

Well No.	Date Installed	Top of Casing Elevation(1) (feet, above MSL)	Ground Surface Elevation (feet, above MSL)	Boring Depth (feet, below ground surface)	Depth of Outer Casing (feet, below ground surface)	Well Depth (feet, below ground surface)	Screen Interval Depth (feet, below ground surface)	Depth to Sand Pack (feet, below ground surface)	Depth to Bentonite (feet, below ground surface)
MW-8	11-19-92	20.45	17.8	13.5	NA(2)	13.0	2.9 to 12.4	2.0	1.5
MW-9	11-19-92	20.45	18.0	14.5	NA	14.0	3.9 to 13.5	2.0	1.0
MW-10	11-19-92	21.17	18.4	15.5	NA	15.0	4.9 to 14.4	2.6	0.5
MW-11	11-18-92	22.03	19.3	16.5	NA	16.0	5.9 to 14.6	2.5	0.5
MW-12	11-19-92	21.41	18.9	14.5	NA	14.0	3.9 to 13.5	2.5	0.5
MW-13	11-20-92	22.80	20.0	15.5	NA	15.0	4.9 to 14.5	3.0	0.5
MW-14	11-20-92	20.07	17.3	13.5	NA	13.0	3.1 to 12.6	2.0	0.5
MW-15	11-21-92	21.08	18.4	16.5	NA	16.0	5.9 to 15.4	4.0	2.0
MW-16	11-20-92	21.45	18.8	15.5	NA	15.0	4.9 to 14.5	2.7	0.5
MW-17	11-20-92	22.51	19.8	13.5	NA	13.0	3.2 to 12.6	2.0	0.5
MW-18	11-22-92	18.69	18.9	13.5	NA	13.0	3.1 to 12.7	2.0	1.0

(1) MSL - Mean Sea Level
(2) NA = Not Applicable
MW-1 through MW-7 and DW-1 through DW-3 installed December 1992.

Source: Baker Environmental, Inc., February 15, 1993 Draft Site Assessment Report, Additional Assessment Activities, Campbell Street Fuel Farm and UST System 125-143 (Contract No. N62470-89-D-4814, Contract Task Order 0013).

TABLE 1-2

SUMMARY OF WELL CONSTRUCTION DETAILS - NOVEMBER 1992
CAMPBELL STREET FUEL FARM
CONTRACT TASK ORDER 0265

Well No.	Date Installed	Top of Casing Elevation[1] (feet, above MSL)	Ground Surface Elevation (feet, above MSL)	Boring Depth (feet, below ground surface)	Depth of Outer Casing (feet, below ground surface)	Well Depth (feet, below ground surface)	Screen Interval Depth (feet, below ground surface)	Depth to Sand Pack (feet, below ground surface)	Depth to Bentonite (feet, below ground surface)
MW-19	11-23-92	19.10	19.2	14.0	NA[2]	13.9	4.0 to 13.5	2.0	1.0
MW-20	11-23-92	19.40	19.7	15.0	NA	14.0	4.6 to 14.1	3.0	1.0
MW-21	11-21-92	21.76	19.1	14.5	NA	14.0	3.9 to 13.5	2.0	0.5
MW-22	11-23-92	21.69	18.9	13.0	NA	13.0	2.9 to 12.5	1.5	0.5
MW-23	11-21-92	21.35	18.9	13.5	NA	13.0	2.9 to 12.5	2.0	0.5
MW-24	11-22-92	21.56	19.0	11.5	NA	11.0	2.8 to 10.8	2.0	0.5
MW-25	11-23-92	21.17	18.6	14.5	NA	14.0	3.9 to 13.5	2.5	0.5
DW-4	11-22-92	21.07	18.5	52.0	41.0	51.0	45.6 to 50.4	39.5	37.0
DW-5	11-19-92	22.79	20.0	43.0	33.0	43.0	37.8 to 42.5	33.0	31.0
DW-6	12-02-92	21.83	19.1	42.5	32.0	42.5	37.3 to 42.0	35.0	29.0
RW-1	11-23-92	21.79	19.1	23.5	NA	23.0	3.0 to 22.4	1.5	0.5

(1) MSL - Mean Sea Level
(2) NA = Not Applicable
MW-1 through MW-7 and DW-1 through DW-3 installed December 1992.

Source: Baker Environmental, Inc., February 15, 1993 Draft Site Assessment Report, Additional Assessment Activities, Campbell Street Fuel Farm and UST System 125-143 (Contract No. N62470-89-D-4814, Contract Task Order 0013).