CATLIN
ENGINEERS and SCIENTISTS

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

June 20, 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 I Limited Site Assessment
FC 40-3
Marine Corps Base
Camp Lejeune, North Carolina

Navy Contract No. N62470-01-D-3009
Delivery Order No. 0058
CATLIN Project No. 203-003

Dear Mr. Conway:

Please find enclosed one copy of the above referenced Final Phase I Limited Site Assessment document. Additionally, please find attached CATLIN's response to comments by Ms. Kimberly L. Hakola of Camp Lejeune to the Draft LSA.

CATLIN Engineers and Scientists appreciate the opportunity to continue to provide services to LANTDIV and the MCB on your environmental projects.

Sincerely,

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

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

Attachments: Final LSA

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

203003_final ltr.doc

Response to Comments for
Phase 1 Limited Site Assessment - DRAFT
FC 40-3
Reviewer - Ms. Kimberly L. Hakola
May 6, 2003

1) Purpose of Investigation
1st and 2nd paragraphs; Italicize *Guidelines for Assessment...*

Acknowledged. Text has been modified.

2) 2nd paragraph, 2nd sentence
Insert commas before and after "in accordance with the 2001 Guidelines".

Acknowledged. Text has been modified.

3) 3rd paragraph, 1st sentence
According to Table 1, UST removed April 2, 2002.

Review of UST Closure Report indicates that the UST was last in operation on April 2, 2002 and was removed on April 3, 2002. The text and table have been modified.

4) 3rd paragraph
Why is this paragraph included under "Purpose of Investigation"? May want to include a sentence stating that these results led to NORR and LSA.

We feel that the background information is pertinent to the purpose of the investigation. Information pertaining to NORR has been added.

5) Section A
UST Owner Address: ATTN: I&E/EMD/EQB, Marine Corps Base, PSC Box 20004, Camp Lejeune, NC 28542

Acknowledged. Text has been modified.

6) UST Operator: Commanding General

Acknowledged. Text has been modified.

7) Property Owner: Commanding General

Acknowledged. Text has been modified.

8) Property Owner Address: (see above)

Acknowledged. Text has been modified.

9) Property Occupant Address: (verify mailing address)

The address was obtained from the UST Closure Report. The physical address is correct however the mailing address has not been verified. Attempts to contact the occupants have not been successful.

10) Date Discovered: ????

Release discovered on April 16, 2002 when analytical results from the soil samples collected during UST closure activities were received. Text has been modified.

11) Sizes and Contents: (delete UST FC 40-3)

Text has been modified. However, for future reference, CATLIN typically includes UST nomenclature where possible to help eliminate confusion where multiple USTs may be involved.

12) Section B
Part I, Question 9; Insert "Department" after second reference to North Carolina.

Acknowledged. Text has been modified.

13) Part II, Question 3
Underline "yes" since this site may be considered commercial/industrial.

Acknowledged. Text has been modified.

14) Part II, Question 4
Revise to read, "...area of Marine Corps Base, Camp Lejeune; children..." Isn't this area fenced?

Semicolon has been added to text. The rear of the building is fenced, however, the area of concern is not fenced.

15) Part II, Question 2
Reference Figure 2.

Reference to Figure 2 has been added to the heading for the Section.

16) Part II, Question 4
Insert comma after "undeveloped".

Comma has been added to text.

17) Section C
Item 4, 1st paragraph, 3rd sentence; Insert space between "Inc." and "dated".

Acknowledged. Text has been modified.

18) Item 5, 1st paragraph, 1st sentence
Insert "Department" after second reference to North Carolina.

Acknowledged. Text has been modified.

19) Item 6, 1st paragraph, 2nd sentence
Insert "site" after "subject".

Acknowledged. Text has been modified.

20) Section D
2nd paragraph, first sentence; Replace "C" with "B" in boring number.

Acknowledged. Text has been modified.

21) 3rd paragraph, first sentence
Insert "samples" after "split spoon".

Acknowledged. Text has been modified.

22) Section E
Part 1, 1st paragraph, 1st sentence; Revise sentence.

Sentence has not been changed.

23) Part 1, 2nd paragraph, 5th sentence
Delete space between UST and FC.

Acknowledged. Text has been modified.

24) Part 1, EPA Method 8270
Add TICS to title.

Acknowledged. Text has been modified.

25) Part 1, EPA Method 6010B
Insert mg/kg after 1.96.

Acknowledged. Text has been modified.

26) Part 2, 1st paragraph, 1st sentence
Check date. I think it should be March 25, 2003.

Acknowledged. Text has been modified.

27) Part 2, EPA Method 6210D
For TW01, naphthalene should be 0.8 (not 0.5) and for TW01D, 4-Isoproplytoluene should be 0.5 (not 0.8)

Acknowledged. Text has been modified.

28) Part 2, EPA Method 625
Replace 3 with 13 in second sentence. Are these lab contaminants? Any TICS?

Acknowledged. The results have been changed from 3 to 13. Please see the attached response to suspected laboratory contamination. No TICs were identified. However, the results suggest the presence of additional non-target compounds. This has been discussed in the text.

29) Part 3, 1st paragraph
Check date. Construction record dated 3/17/03, but abandonment record dated 2/25/03.

Acknowledged. The correct abandonment date is 3/25/03. There was a typo on the abandonment record.

30) Part 3, 3rd paragraph
Do not capitalize boring or as-built.

Acknowledged. Text has been modified.

31) Section F
2nd paragraph
Most recent soil sample is BQL. What about lead and chromium?

Acknowledged. Text has been modified.

32) 3rd paragraph
Mention 4-Isopropyltoluene.

Acknowledged. Text has been modified.

33) Section H
1st paragraph, 3rd sentence
Is it April 2 or 3? (see Table 1)

Review of the UST Closure Report indicated that the UST was last in service on April 2, 2002 and was removed on April 3, 2002. The text has been modified to reflect these facts.

34) 1st paragraph, 4th sentence
Revise sentence.

Sentence has not been changed.

35) 1st paragraph, 7th sentence
Capitalize state.

Acknowledged. Text has been modified.

36) Section I
2nd reference
Replace period with comma after "Company".
Acknowledged. Text has been modified.

37) 5th reference
Delete one reference to 1999. Insert period at end.

Acknowledged. Text has been modified.

38) Table 2
Insert "Box" in address.

Acknowledged. Text has been modified.

39) Table 3A – 3E and 4A – 4E
Insert incident number at top of page.

Acknowledged. All tables have been modified where necessary.

40) Table 4E
Results are in mg/L. Include 2L standards.

Results have been changed to mg/l to maintain consistency with State standards. North Carolina GWQS and GCLs have been added to table.

41) Table 6
Insert "Box" in address.

Acknowledged. All tables have been modified where necessary.

42) Table 7
Top of casing elevation is wrong.

Do not agree. The top of casing elevation as presented is consistent with all survey data. The elevation is based on a temporary benchmark (Corner of Building FC-40) with an assumed elevation of 100.00 feet.

43) Figure 4C
Wrong table.

Acknowledged. The correct table has been placed on figure.

44) Figure 5D
Results in mg/L.

Acknowledged. The table has been modified.

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

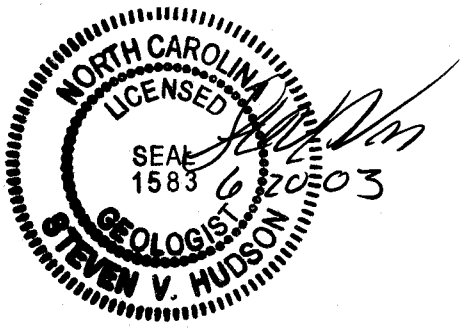
FOR

FC 40-3
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

NCDENR UST INCIDENT NO.: 24222
NCDENR FACILITY ID NUMBER: E-002740

JUNE 20, 2003

CONTRACT NO. N62470-01-D-3009
DELIVERY ORDER NO. 0058
CATLIN PROJECT NO. 203-003



PREPARED BY:

CATLIN ENGINEERS AND SCIENTISTS
P. O. BOX 10279
WILMINGTON, NORTH CAROLINA 28404-0279
(910) 452-5861

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LIST OF ACRONYMS

2000 Guidelines	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater
2001 Guidelines	Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section (Effective July 1, 2001)
2L GWQS	NCAC T15A:02L Groundwater Quality Standards
ARO	Asheville Regional Office
AS	Air Sparge
AST	Aboveground Storage Tank
BDL	Below Detection Limit
BN	Base/Neutral (extractables)
BNA	Base/Neutral/Acid (extractables)
BQL	Below Quantitation Limit
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Corrective Action Plan
CATLIN	CATLIN Engineers and Scientists (Formerly RC&A)
CFR	Code of Federal Regulations
COC	Chain of Custody
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
SAA	Same as Above
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 to the *Guidelines for Assessment and Corrective Action* effective July 1, 2001 (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.

In order to establish this information and determine the magnitude of petroleum impact at this site, a receptor survey was performed, one temporary groundwater monitoring well was installed in the former UST basin, groundwater samples were collected, and one soil sample was collected beneath the former associated piping. CATLIN, in accordance with the 2001 Guidelines, performed collection of soil and groundwater samples for testing by analytical methods consistent with the required analysis for a potential used oil release.

J.A. Jones Environmental Services, Inc. (J.A. Jones) performed excavation operations and removed the suspect UST, FC40-3, on April 3, 2002. The 1,000-gallon capacity, double wall fiberglass UST was reportedly utilized to store used oil generated during vehicle maintenance activities conducted at Building FC 40. During tank removal, six soil samples (FC40-1 through FC40-4, FC40-6, and FC40-7) were collected from the sidewalls of the excavation. Two soil samples (FC40-5 and FC40-8) were collected from the bottom of the excavation. Soil samples were tested for TPH-Diesel and TPH-Gasoline per EPA Methods 3550 and 5030, and for total lead and chromium using EPA Method 6010B. Laboratory analyses were reported as above State action levels for TPH diesel in the former 1,000-gallon waste oil UST basin. The Tank Removal Report states that the UST excavation was backfilled with clean soils obtained from a nearby borrow pit. In response to the submitted UST Closure Report dated June 6, 2002, DENR issued a NOR dated December 28, 2002 requesting further action to address the release. This report is intended to present the data necessary to satisfy the State requirements.

PHASE I LIMITED SITE ASSESSMENT REPORT

A. SITE IDENTIFICATION

DATE OF REPORT: May 6, 2003
Facility ID: E-002740 UST Incident Number (if known): 24222
Site Name: FC 40-3
Site Location: Building FC40, Sneads Ferry Road, Marine Corps Base, Camp Lejeune
Nearest City/Town: Jacksonville County: Onslow

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

UST Operator: Commanding General – MCB, Camp Lejeune
Address: SAA Phone: (910) 451-9660

Property Owner: Commanding General – MCB, Camp Lejeune
Address: SAA Phone: (910) 451-5068

Property Occupant: Combat Engineers Battalion, 2nd Marine Division
Address: Building 1880, Lewis Road Phone: (910) 451-9660

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

Release Information

Date Discovered: April 16, 2002
Longitude: W 77° 18' 55" **Latitude:** N 34° 39' 25"
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (e.g. Piping/UST):
UST and associated piping are suspected
Sizes and contents of UST system(s) from which the release occurred:
1,000-gallon used oil

I, **Steven V. Hudson** 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

Limited Site Assessment Risk Classification and Land Use Form

Part I - Groundwater/Surface Water/Vapor Impacts
High Risk

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

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

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

   There are not any active potable water supply wells located within 1,000 feet of the source area. However, supply well PSW-609 was previously located approximately 250 feet east of the subject site. According to base personnel, this well has been permanently abandoned.

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

   There are not any active water supply wells located within 1,000 feet of the source area of the release.

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

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

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

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

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

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

Intermediate Risk

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

No. The location of the former tank basin (source area) is greater than 500 feet from named surface waters.

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

Not Applicable

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

No. Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However, MCB, Camp Lejeune has identified proposed wellhead protection areas on the base. The site is located in an area deemed as a potential wellhead protection area based on the Wellhead Protection Plan Update prepared by Triangle Environmental, Inc. dated March 1999. However, the supply well (PSW-609) that was present at the subject site during the preparation of the report has been permanently abandoned.

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

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

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

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

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

Groundwater sample results were well below established GCLs.

Part II - Land Use

Property Containing Source Area of Release

The questions below pertain to the property containing the source area of the release. (See Figure 2)

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

No. The property consists of a vehicle maintenance facility with associated vehicle parking/refueling areas.

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

No. The property consists of a vehicle maintenance facility with associated vehicle parking/refueling areas.

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

Yes. As previously mentioned, the property consists of a vehicle maintenance facility with associated vehicle parking/refueling areas. The immediate vicinity of the former tank basin is located within the paved refueling area.

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

No. The site is located within the French Creek industrial area of Marine Corps Base, Camp Lejeune; children would not typically be permitted in this area.

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

Yes. The site is located within a restricted area of the base. Unauthorized personnel are not permitted access to the area. Due to the nature of site activities minimal pedestrian traffic would be present. However, the area of concern is not fenced.

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

Yes. An asphalt drive/parking area caps the former UST basin.

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

The former UST has been replaced by an AST and the plans for the Building and immediate surrounding area will remain the same for the foreseeable future.

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

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

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

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

Property Surrounding Source Area of Release

The questions below pertain to the area within 1500 feet of the source area of the release (excludes property containing source area of the release):
(See Figure 2)

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

Greater than 1,500 feet.

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?*

Greater than 1,500 feet.

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

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

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

The property is bordered to the south and west by buildings utilized as office space, warehouse/industrial space, and support for the MCB. The land to the north and east of the subject site is generally undeveloped, forested land.

C. RECEPTOR INFORMATION

1. Water Supply Wells

(Refer to Table 5 and Figure 1)

As shown on Figure 1 and Table 5, there are no active public drinking water supply wells located within 1,500 feet of the source area of the release. Supply well PSW-609 was previously located approximately 250 feet east of the former UST basin. According to base personnel, and based on field observations, the well has been permanently abandoned.

2. Public Water Supplies

Are public water supplies available within 1,500 feet of the source area of the release? **YES** NO

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

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

3. Surface Water

There are no named surface bodies of water identified with 1,500 feet of the subject site.

4. Wellhead Protection Areas

Wellhead protection areas defined by 42 USC 300h-7(e) have not, as of this time, been designated by the State. However MCB, Camp Lejeune has identified proposed wellhead protection areas on the base. The site is located in an area deemed as a potential wellhead protection area based on the Wellhead Protection Plan Update prepared by Triangle Environmental, Inc., dated March 1999. However, the supply well (PSW-609) that was present at the subject site during the preparation of Wellhead Protection Plan report has been permanently abandoned. Therefore, it is unlikely that the area would currently be considered as part of the Wellhead Protection Area based on the existing conditions.

5. Deep Aquifers in the Coastal Plain Physiographic Region

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

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

Aquifers below the surficial aquifer in the area of Building FC 40 typically include the Castle Hayne Aquifer, the Beaufort Aquifer, and the Peedee Aquifer, in order of increasing depth. Both the Beaufort and Peedee Aquifers contain saltwater in portions of the MCB and are not generally used for water supply. The Castle Hayne Aquifer contains freshwater and is the principal aquifer used in the area for water supply.

6. Subsurface Structures

(Refer to Figure 3)

Drainage ditches are located to the north and east of the former tank basin. Numerous underground utilities may be present throughout other areas of the subject site but were not encountered during this investigation. Known utilities are illustrated in Figure 3.

7. Property Owners and Occupants

(Refer to Table 6)

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

D. SITE GEOLOGY AND HYDROGEOLOGY

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

Field observations noted during soil boring advancement in the area of the former distribution line (USTFC40-03-SB01) indicates the native material at the site is comprised of light brown gray, very fine grained sand with dark brown layering (up to 1" thick) from approximately four feet to nine feet below ground. Fill material consisting of dark brown, silty, fine sand with limestone gravel was identified from below the asphalt to one and one-half feet deep. Material identified during the advancement of boring USTFC40-03-TW01 within the former UST basin from ground surface (asphalt) to a depth of 10.5 feet was

described as fill consisting of brown to gray brown, very poorly sorted, sub-angular to well rounded gravel with a fine sand to silt matrix. Two attempts were made to advance the boring. However, auger refusal was encountered during each attempt at a depth of approximately 10 to 10.5 feet deep. The refusal is believed to have occurred on a subsurface concrete slab located beneath the UST basin.

The split spoon sample collected from nine feet below ground surface during advancement of temporary monitoring well boring was saturated. The depth to groundwater as measured in the monitoring well was approximately 9.6 feet below the top of casing, roughly 9.8 feet bls.

E. SAMPLING RESULTS

1. Soil Sampling

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

As detailed in the Underground Storage Tank Closure Report, UST FC40-3, completed by J.A. Jones dated June 6, 2002; eight soil samples were obtained during the tank closure activities. Laboratory analyses of these samples revealed contaminant concentrations above State action levels for TPH diesel in two (FC-40-2 and FC-40-3) of the eight samples collected from depths of 7.5 feet BLS. Soils from a nearby borrow pit were reportedly used as backfill and no groundwater was encountered. Based on these results, a Phase I LSA was required.

CATLIN personnel conducted soil sampling activities on March 17, 2003. Split spoon soil samples were collected at five-foot intervals during temporary monitoring well boring advancement. Due to groundwater and subsequent auger refusal being encountered prior to identifying native material, soil samples were not collected from the borings advanced within the former UST basin (backfilled with clean fill material) to facilitate temporary monitoring well installation. One soil boring was advanced beneath the location of the former distribution lines utilizing hand augering techniques. Soil samples (USTFC40-03-SB01 and a duplicate sample USTFC40-03-SB01D) were selected from the boring from four to six feet below ground surface for laboratory analysis. All sampling was conducted in general accordance with CATLIN's Standard Procedures included in Appendix D.

The soil samples were placed in laboratory glassware, labeled, placed immediately on ice in a cooler, and transported under proper chain-of-custody protocol to Paradigm Analytical Laboratories of Wilmington, North Carolina. Chain of custody documentation is attached in Appendix E.

Analytical results for the soil samples are included in Appendix E and are as follows:

<u>EPA Method 8260B (includes DIPE +MTBE)</u>

As indicated in Table 3A and illustrated in Figure 4A, no EPA Method 8260B compounds were identified above laboratory quantitation limits in soil samples

collected during this investigation.

EPA Method 8270 + TICS

As indicated in Table 3B and illustrated in Figure 4B, no EPA Method 8270 compounds or TICs were identified above laboratory quantitation limits in soil samples collected during this investigation.

EPA Method 6010B (Lead and Chromium)

Lead was identified in soil sample USTFC40-03-SB01 at a concentration of 1.82 mg/kg and chromium was identified at a concentration of 1.96 mg/kg in the same sample. These concentrations are well below the Soil to Groundwater MSCC of 270 mg/kg for lead and 27 mg/kg for chromium. Laboratory results are summarized on Table 3C and on Figure 4C.

MADEP VPH/EPH

As indicated in Tables 3C-3D and illustrated in Figure 4C, all sample results were below laboratory PQLs.

2. Groundwater Sampling

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

On March 25, 2003 CATLIN personnel sampled monitoring well USTFC40-03-TW01 for laboratory analysis per EPA Methods 6210D+IPE+MTBE, 625 + tics, MADEP VPH/EPH, and Standard Method 3030C. A duplicate sample, USTFC40-03-TW01D was collected for laboratory analysis per EPA Method 6210D+IPE+MTBE. Monitoring well USTFC40-03-TW01 was abandoned immediately after groundwater sampling activities were completed.

Groundwater samples were collected in accordance with CATLIN's Standard Methods and Procedures in Appendix D. 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.

Analytical results for the groundwater samples collected are included in Appendix E and are as follows:

EPA METHOD 6210D + IPE + MTBE

As indicated in Table 4A and illustrated on Figure 5A, the groundwater sample collected from monitoring well USTFC40-03-TW01 revealed 0.5 µg/L of 4-Isopropyltoluene (no 2L GWQS is currently established), and 0.8 µg/L of naphthalene (2L GWQS = 21 µg/L). All other 6210D analytes were below laboratory PQLs. Laboratory analysis of the duplicate groundwater sample collected from USTFC40-03-TW01D revealed 0.7 µg/L naphthalene. All other 6210D analytes were below

laboratory PQLs.

EPA METHOD 625 + TICS

The summarized results of EPA Method 625 + tics as shown on Table 4B and illustrated on Figure 5B, indicate that 13 µg/L Bis(2-ethylhexyl)phthalate and 17 µg/L of phenol were identified by laboratory analysis in groundwater sample USTFC40-03-TW01. The 13 µg/L concentration of Bis(2-ethylhexyl)phthalate is slightly above the 2L GWQS of 3 µg/L. There is no established GCL for Bis(2-ethylhexyl)phthalate. The 17 µg/L of phenol is well below the 2L GWQS of 300 µg/L. Numerous non-target tentatively identified compounds (TICs) appear to have been present in the sample based on the Library Search. See the laboratory reports presented in Appendix E for results and explanations of the Library Search for Semivolatile Compounds (TICs).

MADEP VPH/EPH

As shown of Tables 4C and 4D and illustrated on Figure 5C, toxicologically defined hydrocarbon fractions detected above the IGWQS were limited to the $C_9 - C_{22}$ Aromatics that were identified at a concentration of <3,200 µg/L. The current IGWQS for $C_9 - C_{22}$ Aromatics is 210 µg/L. There are no established GCLs for the MADEP fractions.

EPA Method 6010B (Lead and Chromium)

As indicated on Table 4E and illustrated on Figure 5D, laboratory analysis of the groundwater samples collected from USTFC40-03-TW01 and USTBB52/SBB70-MW02 revealed no lead or chromium concentrations above the laboratory method detection limit.

3. Monitoring Well Construction Information

(Refer to Table 7 and Appendices A and B)

On March 17, 2003 CATLIN personnel installed one temporary Type II monitoring well (USTFC40-03-TW01) to facilitate groundwater sampling.

Monitoring well USTFC40-03-TW01 was constructed to a depth of 10.5 feet using 10 feet of 2-inch diameter, 0.010 inch slotted schedule 40 PVC well screen and 0.5 feet of 2-inch diameter schedule 40 PVC riser. The annular space between the wells and boring walls were filled with medium sand pack to the top of well screen. One and one-half of a foot of bentonite was placed on top of the sand pack and hydrated. Immediately following groundwater sampling activities, the well was removed and properly abandoned in compliance with current State guidelines.

Refer to Table 7 for well construction data and Appendices A and B for boring logs, as-built details, and North Carolina Well Construction and Abandonment Records.

F. CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this Phase I LSA, CATLIN concludes that the subject site at Building FC40 meets the criteria for classification as a Low Risk-Industrial/Commercial site and should be considered as a candidate for closure.

The MADEP VPH/EPH concentrations revealed by laboratory analysis of soils collected during UST removal activities appear to have been very localized and are below current Industrial/Commercial MSCCs. Lead and chromium were the only compounds identified in the soil during this investigation above laboratory quantitation limits. The concentrations of lead (1.82 mg/kg) and chromium (1.96 mg/kg) were well below the Industrial/Commercial MSCCs of 400 mg/kg (lead) and 1,226 mg/kg (chromium). Additionally, the levels of lead and chromium identified in the soil are well below the more stringent Soil to Groundwater MSCCs of 270 mg/kg and 27 mg/kg, respectively.

Groundwater sample results from monitoring well USTFC40-03-TW01 were below current 2L GWQS and IGWQS for all analyzed compounds with the exception of Bis(2-ethylhexyl)phthalate at a concentration of 13 µg/L (2L GWQS of 3 µg/L) and $C_9 - C_{22}$ Aromatics at concentrations of <3,200 µg/L (IGWQS of 210 µg/L). There are no GCLs currently established for either of the compounds. Additionally, 0.5 µg/L of 4-Isopropyltoluene was identified in the groundwater sample collected from USTFC40-03-TW01. There is no current 2L GWQS or IGWQS for this compound.

G. FREE PRODUCT INVESTIGATION/RECOVERY

Free product accumulations have not been documented or observed during tank removal activities or this investigation.

H. SITE HISTORY

(Refer to Tables 1 and 2)

The Combat Engineers Battalion, 2nd Marine Division, currently utilizes building FC40. The site previously contained one 1,000-gallon double wall fiberglass UST used to store used oil generated during routine vehicle maintenance of military vehicles and equipment. The tank and associated piping were closed by removal by J.A. Jones Environmental Services Company on April 3, 2002. According to the Underground Storage Tank Closure Report prepared by J.A. Jones dated June 6, 2002, approximately 38 cubic yards of soil were excavated to facilitated UST removal and closure. The final dimensions of the excavation were reportedly 22ft (L) x 10ft (W) x 9ft (D). Soil samples were collected from beneath the UST for laboratory TPH analysis during UST removal activities. Laboratory results revealed TPH concentrations in excess of State action levels. UST history and owner information is included on Tables 1 and 2.

I. REFERENCES

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

J. A. Jones Environmental Services Company, *Underground Storage Tank Closure Report UST FC40-3, Marine Corps Base, Camp Lejeune, NC, June 6, 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.

Triangle Environmental, Inc., *Wellhead Protection Plan Update, Camp Lejeune, Onslow County, North Carolina, March 1999.*

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

TABLES

TABLE 1

SITE HISTORY
UST SYSTEM INFORMATION

FC-40-3

UST ID Number	**Product** (gasoline, diesel, jet fuel, etc.)	**Capacity** (gallons)	**Date Installed** (m/dd/yy)	**Date Permanently Closed (P), or Still in Use* (C)** (m/dd/yy)	**Was Release Associated With UST System?** (Yes / No)
FC-40-3	Used Oil	1,000	May-94	4/03/02 (P)	Yes

* Still in use means not permanently closed.

TABLE 2

SITE HISTORY
UST OWNER/OPERATOR INFORMATION

FC 40-3

UST ID Number	Name of Owner or Operator	Dates of Ownership/Operation (m/dd/yy) to (m/dd/yy)	Owner or Operator?
FC-40-3	Commanding General Marine Corps Base Camp Lejeune, NC	May 1994 to 04/02/02	Owner

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

TABLE 3A SUMMARY OF SOIL LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern →		All 8260B Analytes
	Date Collected	Sample Depth (ft. BGS)	
Residential MSCC (mg/kg) **Industrial/Commercial MSCC (mg/kg)** **Soil to Groundwater MSCC (mg/kg)**			Varies Varies Varies
USTFC40-03-SB01	3/17/03	4-6	BQL
USTFC40-03-SB01D	3/17/03	4-6	BQL

All results in mg/kg.

TABLE 3B SUMMARY OF SOIL LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern →		All 8270 Analytes
	Date Collected	Sample Depth (ft. BGS)	
Residential MSCC (mg/kg) **Industrial/Commercial MSCC (mg/kg)** **Soil to Groundwater MSCC (mg/kg)**			Varies Varies Varies
USTFC40-03-SB01	3/17/03	4-6	BQL

All results in mg/kg.

TABLE 3C SUMMARY OF SOIL LABORATORY RESULTS

Date: March 2003 Incident Number and Name: Pending - FC-40-3 Facility ID#: E-002740

Analytical Method: EPA Method 6010B

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	Lead	Chromium
Residential MSCC (mg/kg)			400	47
Industrial/Commercial MSCC (mg/kg)			400	1,226
Soil to Groundwater MSCC (mg/kg)			270	27
USTFC40-03-SB01	3/17/03	4-6	1.82	1.96

All results in mg/kg.

TABLE 3D SUMMARY OF SOIL LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Analytical Method: MADEP VPH/EPH

Sample ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Date Collected	Sample Depth (ft. BGS)						
USTFC40-03-SB01	3/17/03	4-6	<10	<10	<10	<10	<10	<10

All results in mg/kg.

TABLE 3E SUMMARY OF SOIL LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

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

Sample ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Date Collected	Sample Depth (ft. BGS)				
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264
Soil to Groundwater MSCC (mg/kg)			72	3,255	##	34
USTFC40-03-SB01	3/17/03	4-6	<10	<20	<10	<20

Health based level >100%

Considered immobile

All results in mg/kg.

TABLE 4A SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Analytical Method: EPA Method 6210D + IPE + MTBE

Well ID	Contaminant of Concern → / Sample ID	Date Collected	4-Isopropyltoluene	Naphthalene	All other analytes
GCL (µg/L)			NE	15,500	Varies
2L Standard (µg/L)			NE	21	Varies
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	0.5	0.8	BQL
USTFC40-03-TW01D	USTFC40-03-TW01D	3/25/03	<0.5	0.7	BQL

All results in µg/L.

TABLE 4B SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Analytical Method: EPA Method 625 + TICS

Well ID	Contaminant of Concern →		Bis(2-ethylhexyl)phthalate	Phenol	All other analytes
	Sample ID	Date Collected			
GCL (µg/L)			NE	NE	Varies
2L GWQS (µg/L)			3	300	Varies
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	**13**	17	BQL

All results in µg/L

Bold result indicates concentration above 2L GWQS.

TABLE 4C SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Analytical Method: MADEP VPH/EPH

Well ID	Contaminant of Concern →		C9-C18 Aliphatics	C19-C36 Aliphatics	C11-C22 Aromatics	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics
	Sample ID	Date Collected						
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	570	5000	3100	<100	170	<100

All results in µg/L.

TABLE 4D SUMMARY OF GROUNDWATER LABORATORY RESULTS

Date: March 2003 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

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

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Sample ID	Date Collected				
IGWQS(µg/L)			420	4,200	42,000	210
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	<100	740	5,000	**<3,200 ***

All results in µg/L.

* = Result equals the sum of the C11-C22 fraction result (3100 µg/L) and the C9-C10 fraction quantitation limit (<100 µg/L).

Bold result indicates concentration is greater than the IGWQS.

TABLE 5

WATER SUPPLY WELL INFORMATION

Date: May-03 Incident Number and Name: 24222 - FC40-3 Facility ID#: E-002740

Well ID#	Well Owner/User (indicate which)	Address	Phone Number	Well Use	Well Depth (ft. BGS)	Type of Well	Well Casing Depth (ft. BGS)	Well Screen Interval (x to y ft. BGS)	Distance from source area of release (ft.)
There are no active water supply wells located within a 1,500' radius of the subject site. PSW 609 was previously located on the subject site. The well was permantly abandoned in May 1998.									

TABLE 6

PROPERTY OWNERS/OCCUPANTS

Date: May-03 Incident No. and Name: 24222 - FC 40-3 Facility ID#: E-002740

Tax Parcel Number/Map ID	Owner/Occupant Name (Last, First MI)	Address
N/A	Owner: Commanding General MCB, Camp Lejeune	ATTN: I&E/EMD/EQB Marine Corps Base, PSC Box 20004 Camp Lejeune, NC 28542
N/A	Operator: Combat Engineers Battalion 2nd Marine Division	Building 1880 Lewis Road Marine Corps Base, Camp Lejeune, NC 28542

TABLE 7

WELL CONSTRUCTION INFORMATION
FC40-3
MCB, Camp Lejeune

Date: Jun-03 Incident Number and Name: 24222 - FC-40-3 Facility ID#: E-002740

Well ID	Date Installed (m/dd/yy)	Date Water Level Measured (m/dd/yy)	Well Casing Depth (ft. BGS)	Screened Interval (x to y ft. BGS)	Bottom of Well (ft. BGS)	Top of Casing Elevation (ft.)	Depth to Water from Top of Casing (ft.)	Free Product Thickness** (ft.)	Ground Water Elevation* (ft.)	Comments
USTFC40-03-TW01	03/17/03	03/25/03	0.5	0.5 - 10.0	10.5	99.71	9.57	NMT	90.14	Auger refusal at bottom of boring - appears to be concrete slab.

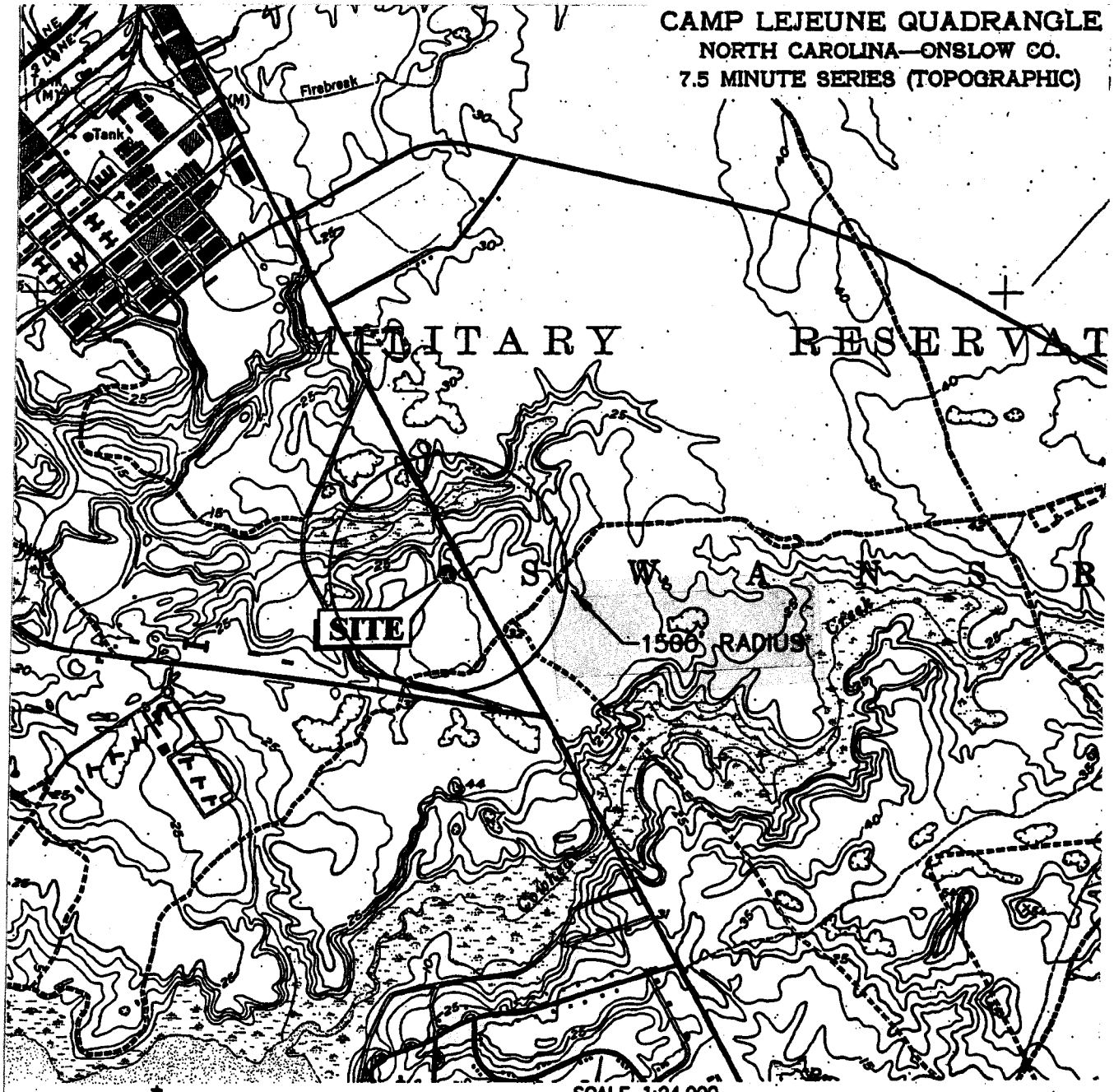
* Reference Point for Elevation Measurements (TBM = Corner of FC-40), Assumed Elevation: (100.00ft.).

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

ft BGS = feet below ground surface

NMT = no measurable thickness

FIGURES



UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

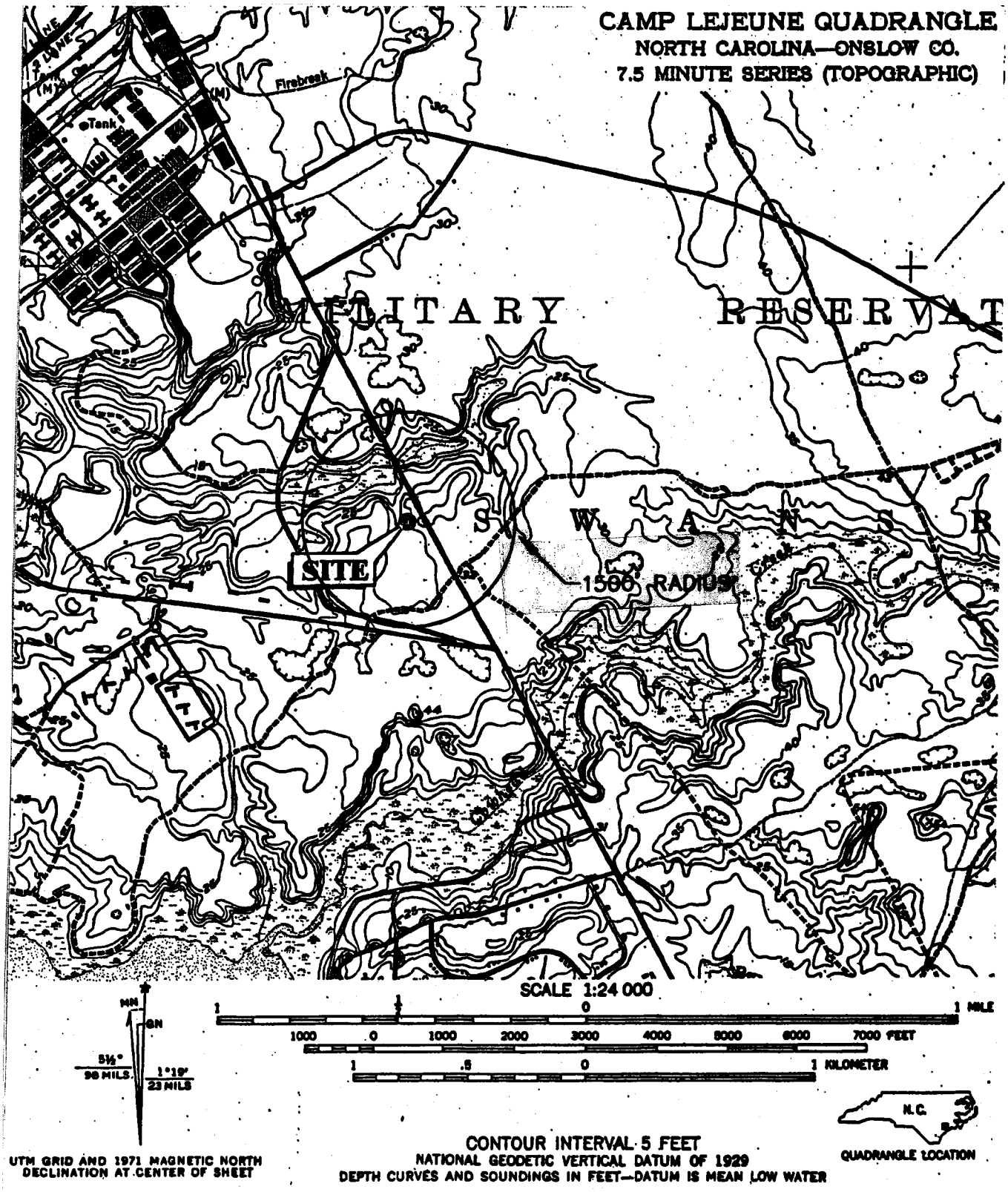
CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

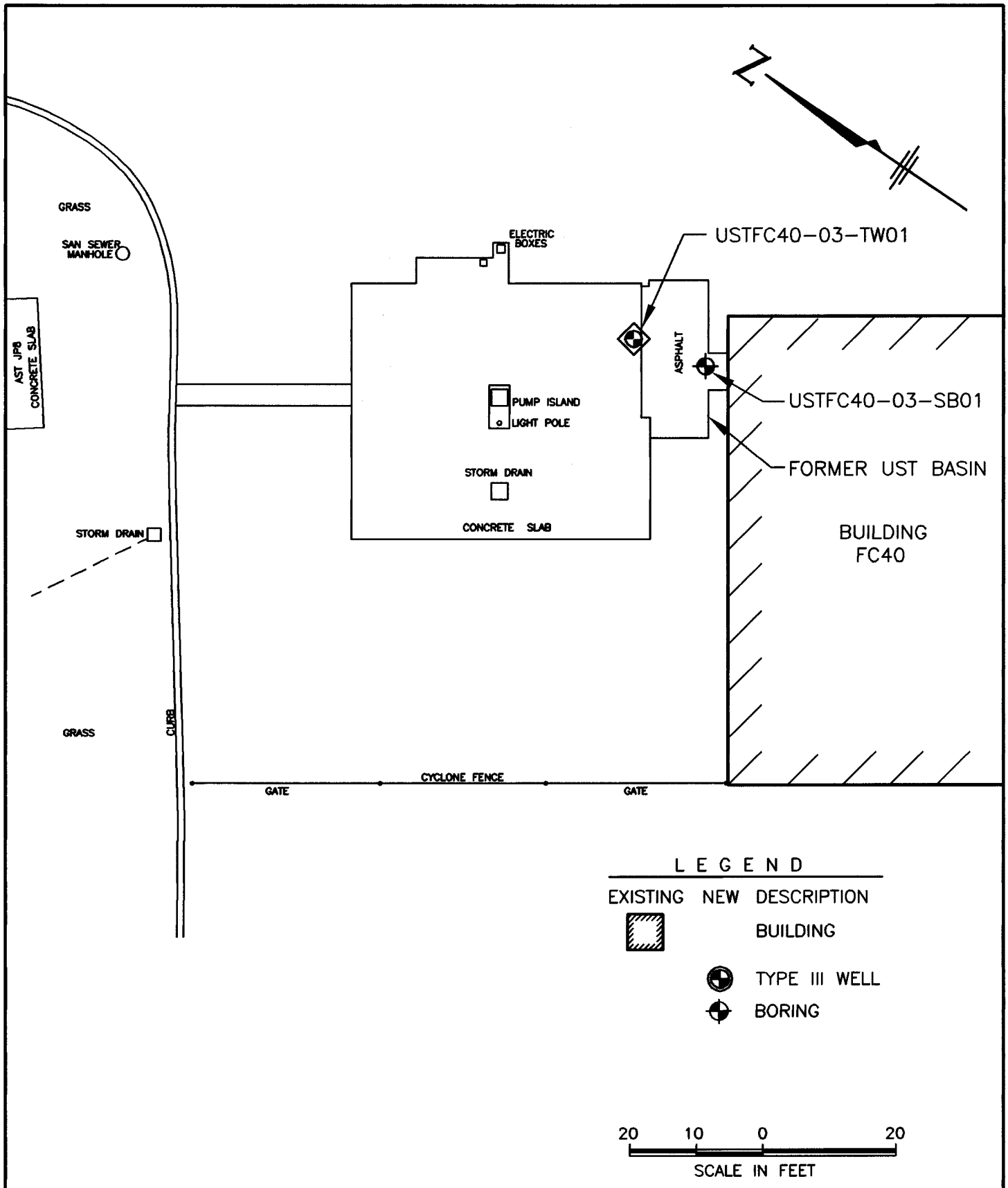
PROJECT	TITLE	FIGURE
FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.	SITE LOCATION AND WATER SURVEY	1

JOB NO:	DATE:	SCALE:	DRAWN BY:	CHECKED BY:
203003-14	MAY 2003	AS SHOWN	WHW	SVH

203003-14-01



CATLIN ENGINEERS and SCIENTISTS, WILMINGTON, NORTH CAROLINA	PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE: SITE LOCATION WITH PLACES OF PUBLIC ASSEMBLY	FIGURE 2
	JOB NO: 203003-14 DATE: MAY 2003	SCALE: AS SHOWN DRAWN BY: WHW CHECKED BY: SVH	203003-14-02

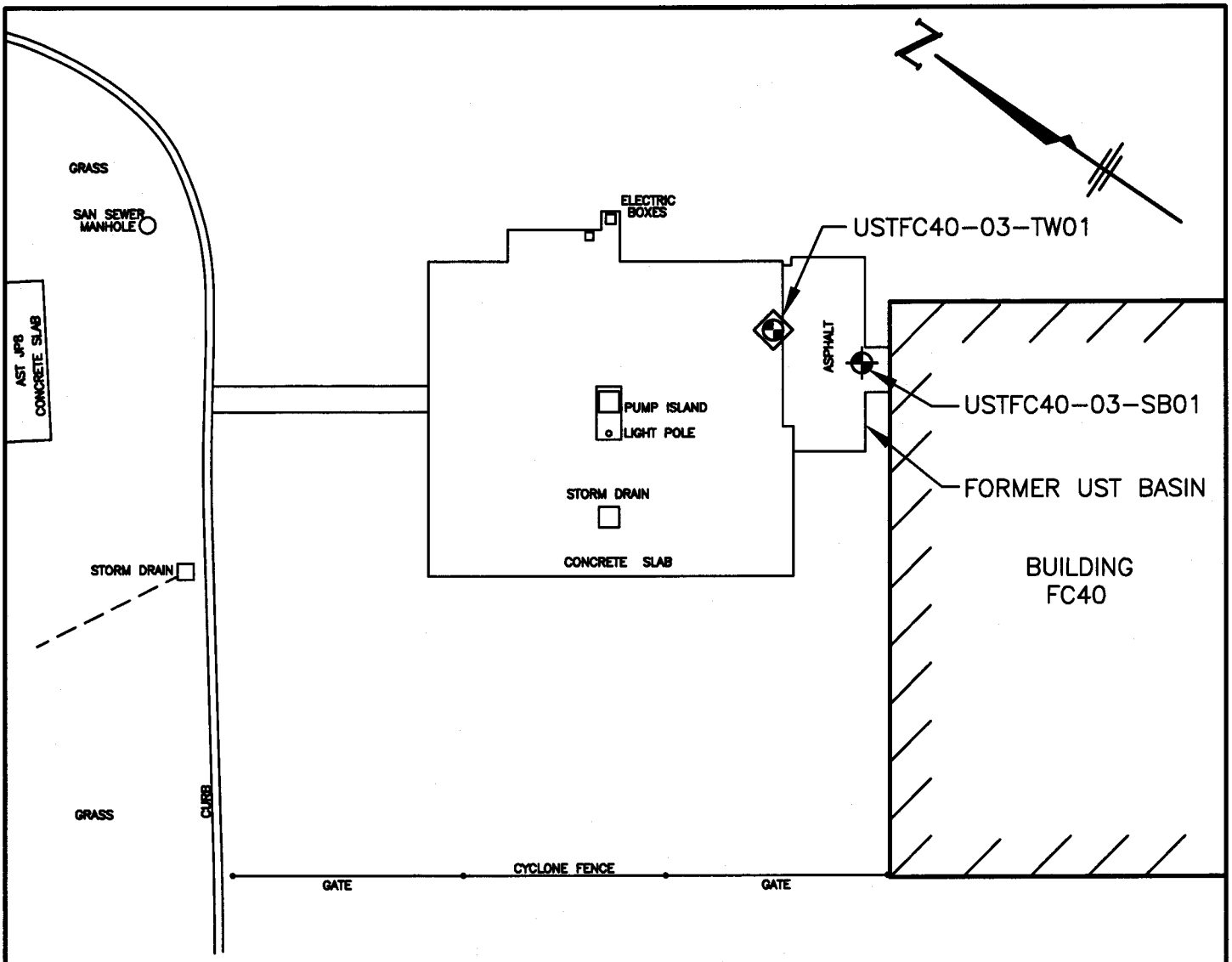


CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT	TITLE	FIGURE
FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.	SITE PLAN WITH UTILITIES	3

JOB NO: 203003-14	DATE: MAY 2003	SCALE: 1"=20'	DRAWN BY: WHW	CHECKED BY: SVH

203003-14-03



Analytical Method: EPA Method 8260B/5035

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	All 8260B Analytes
Residential MSCC (mg/kg)			Varies
Industrial/Commercial MSCC (mg/kg)			Varies
Soil to Groundwater MSCC (mg/kg)			Varies
USTFC40-03-SB01	3/17/03	4-6	BQL
USTFC40-03-SB01D	3/17/03	4-6	BQL

All results in mg/kg.

LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
	●	TYPE III WELL
	⊕	BORING

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

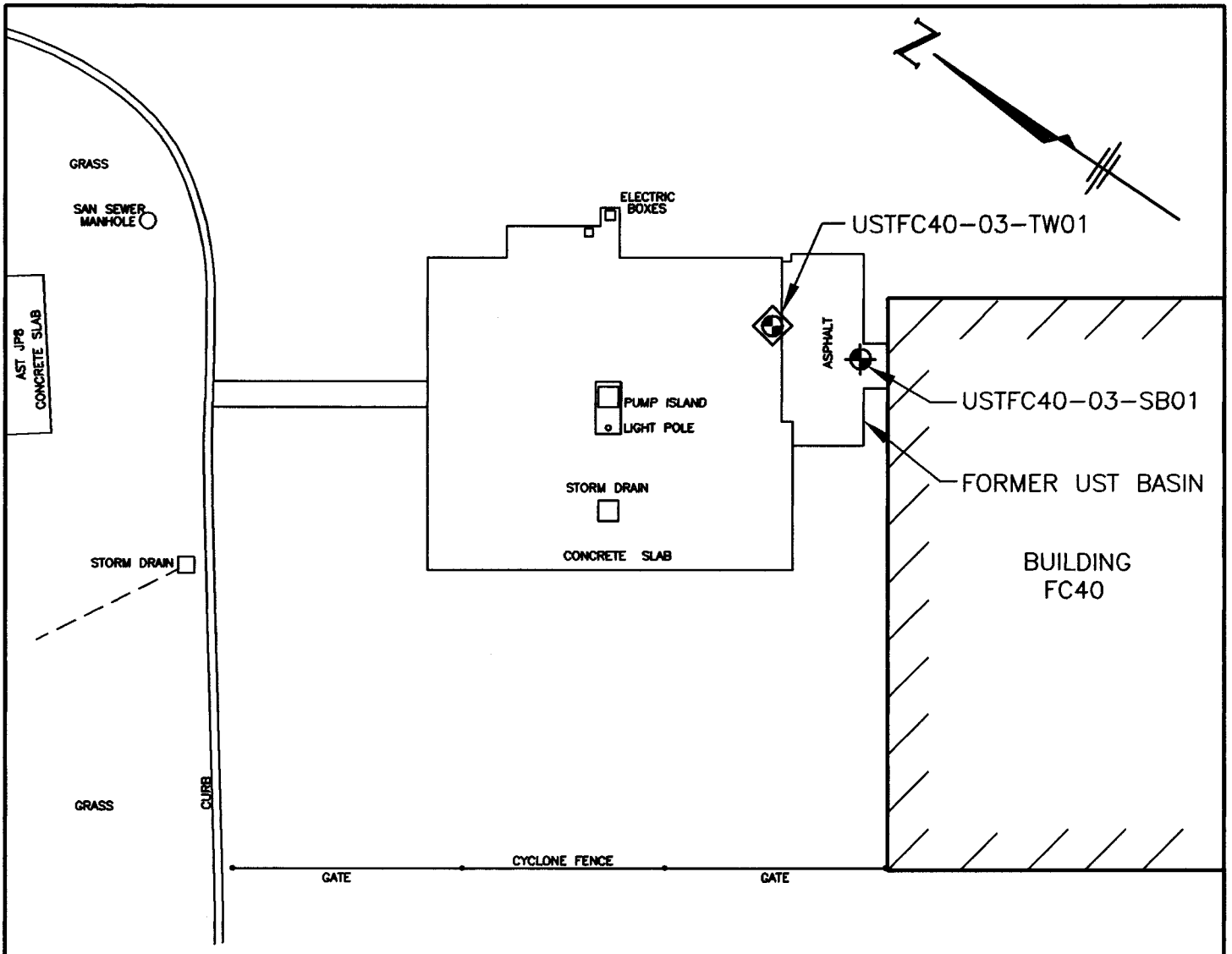
PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

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

FIGURE 4A

JOB NO: 203003-14 DATE: MAY 2003 SCALE: 1"=20' DRAWN BY: WHW CHECKED BY: SVH

203003-14-04A



Analytical Method: EPA Method 8270

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	All 8270 Analytes
Residential MSCC (mg/kg)			Varies
Industrial/Commercial MSCC (mg/kg)			Varies
Soil to Groundwater MSCC (mg/kg)			Varies
USTFC40-03-SB01	3/17/03	4-6	BQL

All results in mg/kg.

LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE III WELL
⊕		BORING

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

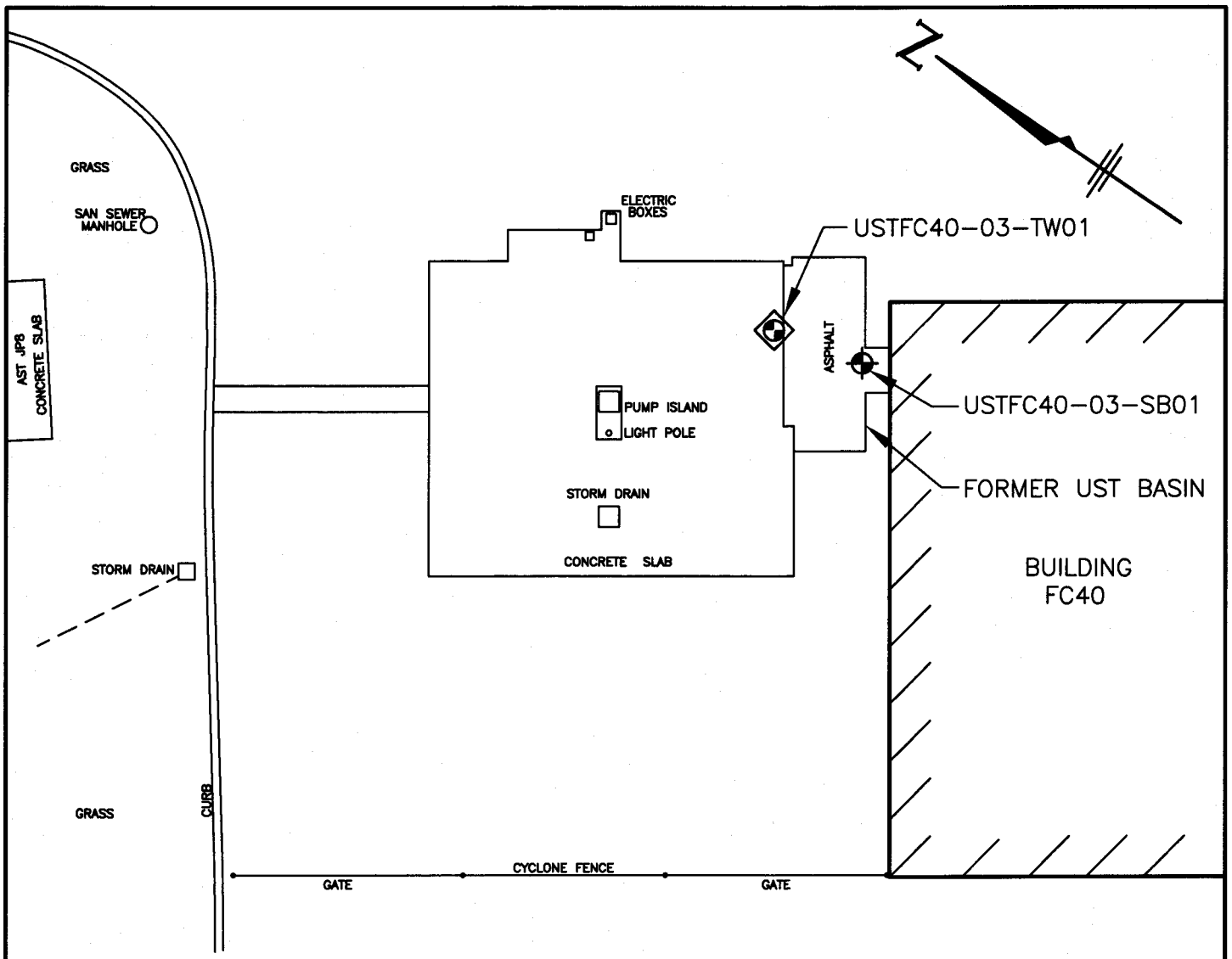
PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

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

FIGURE 4B

JOB NO: 203003-14 DATE: MAY 2003 SCALE: 1"=20' DRAWN BY: WHW CHECKED BY: SVH

203003-14-048



Analytical Method: EPA Method 6010B

Sample ID	Contaminant of Concern → Date Collected	Sample Depth (ft. BGS)	Lead	Chromium
Residential MSCC (mg/kg)			400	47
Industrial/Commercial MSCC (mg/kg)			400	1,226
Soil to Groundwater MSCC (mg/kg)			270	27
USTFC40-03-SB01	3/17/03	4-6	1.82	1.96

All results in mg/kg.

LEGEND

EXISTING	NEW	DESCRIPTION
		BUILDING
		TYPE III WELL
		BORING

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

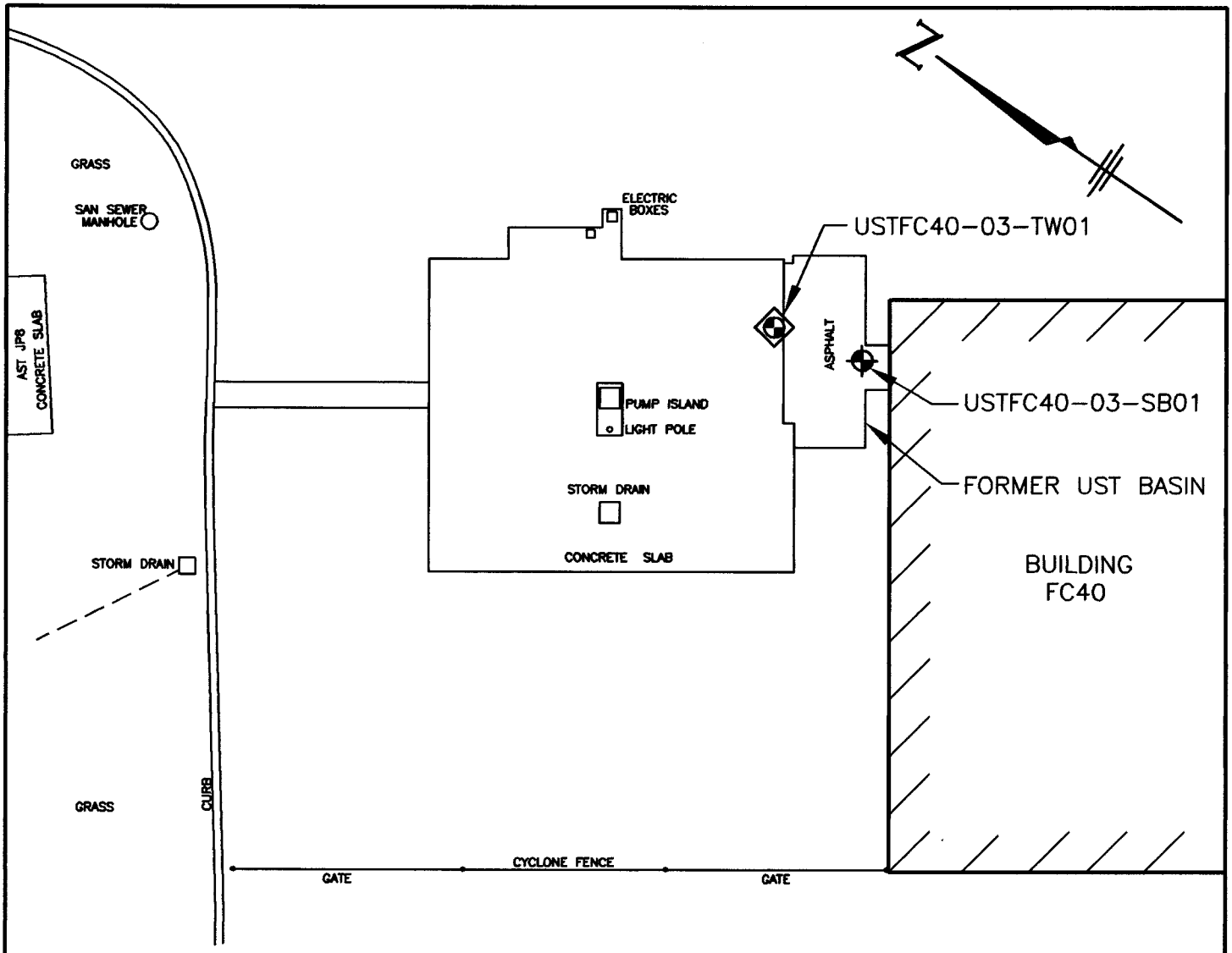
PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

TITLE: SITE PLAN WITH SOIL LABORATORY RESULTS - EPA METHOD 6010B

FIGURE 4C

JOB NO: 203003-14 | DATE: MAY 2003 | SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: SVH

203003-14-04C



LEGEND

EXISTING NEW DESCRIPTION

BUILDING

TYPE III WELL

BORING

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

Sample ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Date Collected	Sample Depth (ft. BGS)				
Residential MSCC (mg/kg)			939	9,386	93,860	469
Industrial/Commercial MSCC (mg/kg)			24,528	245,280	#	12,264
Soil to Groundwater MSCC (mg/kg)			72	3,255	##	34
USTFC40-03-SB01	3/17/03	4-6	<10	<20	<10	<20

Health based level >100%

Considered immobile

All results in mg/kg.

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS

WILMINGTON, NORTH CAROLINA

PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

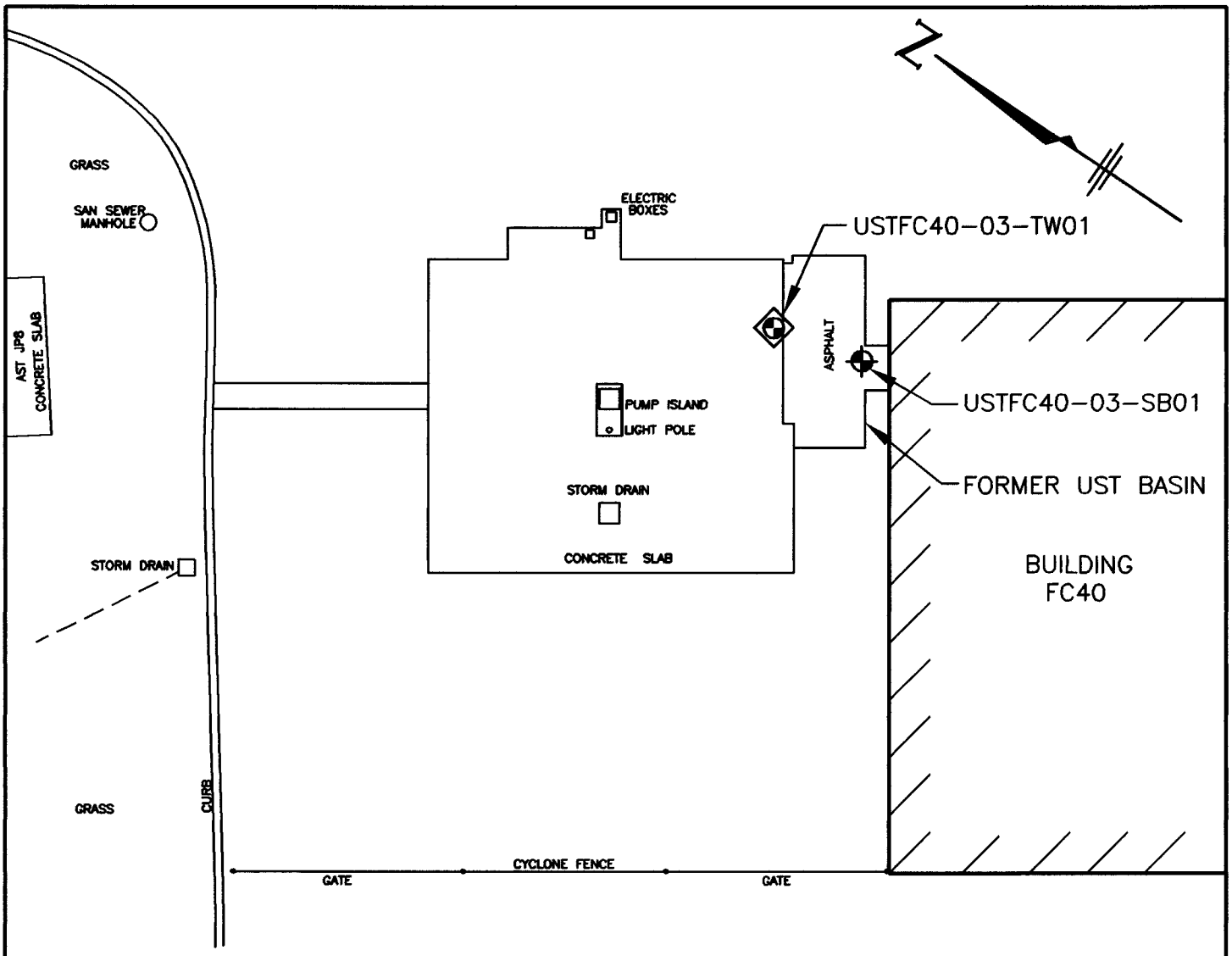
JOB NO: 203003-14 DATE: MAY 2003

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

SCALE: 1"=20' DRAWN BY: WHW CHECKED BY: SVH

FIGURE 4D

203003-14-040



LEGEND

EXISTING	NEW	DESCRIPTION
▨		BUILDING
	⊕	TYPE III WELL
	⊕	BORING

Analytical Method: EPA Method 6210D + IPE + MTBE

Well ID	Contaminant of Concern → Sample ID	Date Collected	4-Isopropyltoluene	Naphthalene	All other analytes
GCL (µg/L)			NE	15,500	Varies
2L Standard (µg/L)			NE	21	Varies
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	0.5	0.8	BQL
USTFC40-03-TW01D	USTFC40-03-TW01D	3/25/03	<0.5	0.7	BQL

All results in µg/L.

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

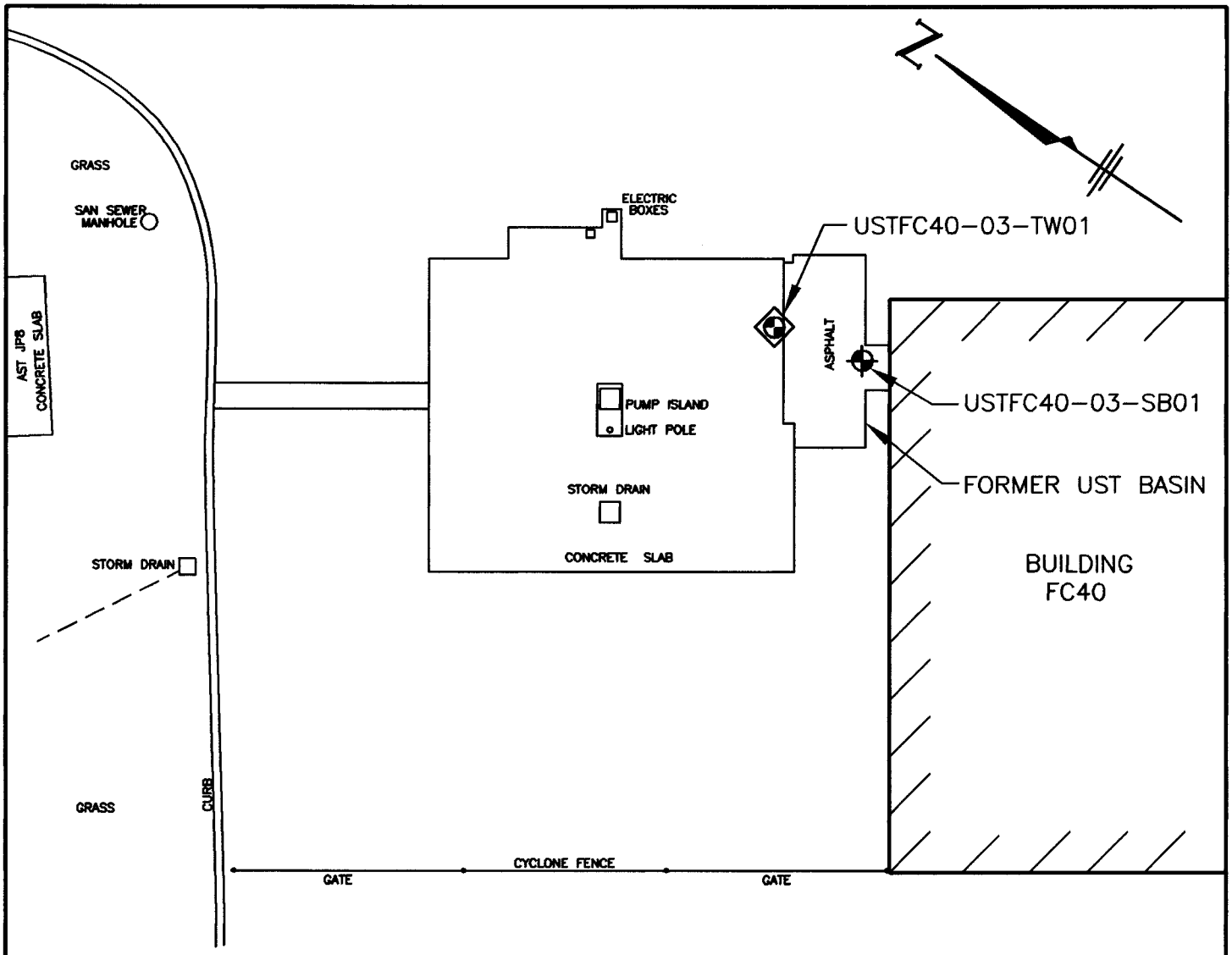
PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS EPA METHOD 6210D+IPE+MTBE

FIGURE 5A

JOB NO: 203003-14 DATE: MAY 2003 SCALE: 1"=20' DRAWN BY: WHW CHECKED BY: SVH

203003-14-05A



Analytical Method: EPA Method 625 + TICS

Well ID	Contaminant of Concern →		Bis(2-ethylhexyl)phthalate	Phenol	All other analytes
	Sample ID	Date Collected			
GCL (µg/L)			NE	NE	Varies
2L GWQS (µg/L)			3	300	Varies
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	**13**	17	BQL

All results in ug/L
Bold result indicates concentration above 2L GWQS.

L E G E N D

EXISTING	NEW	DESCRIPTION
▨		BUILDING
⊕		TYPE III WELL
⊕		BORING

20 10 0 20
SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

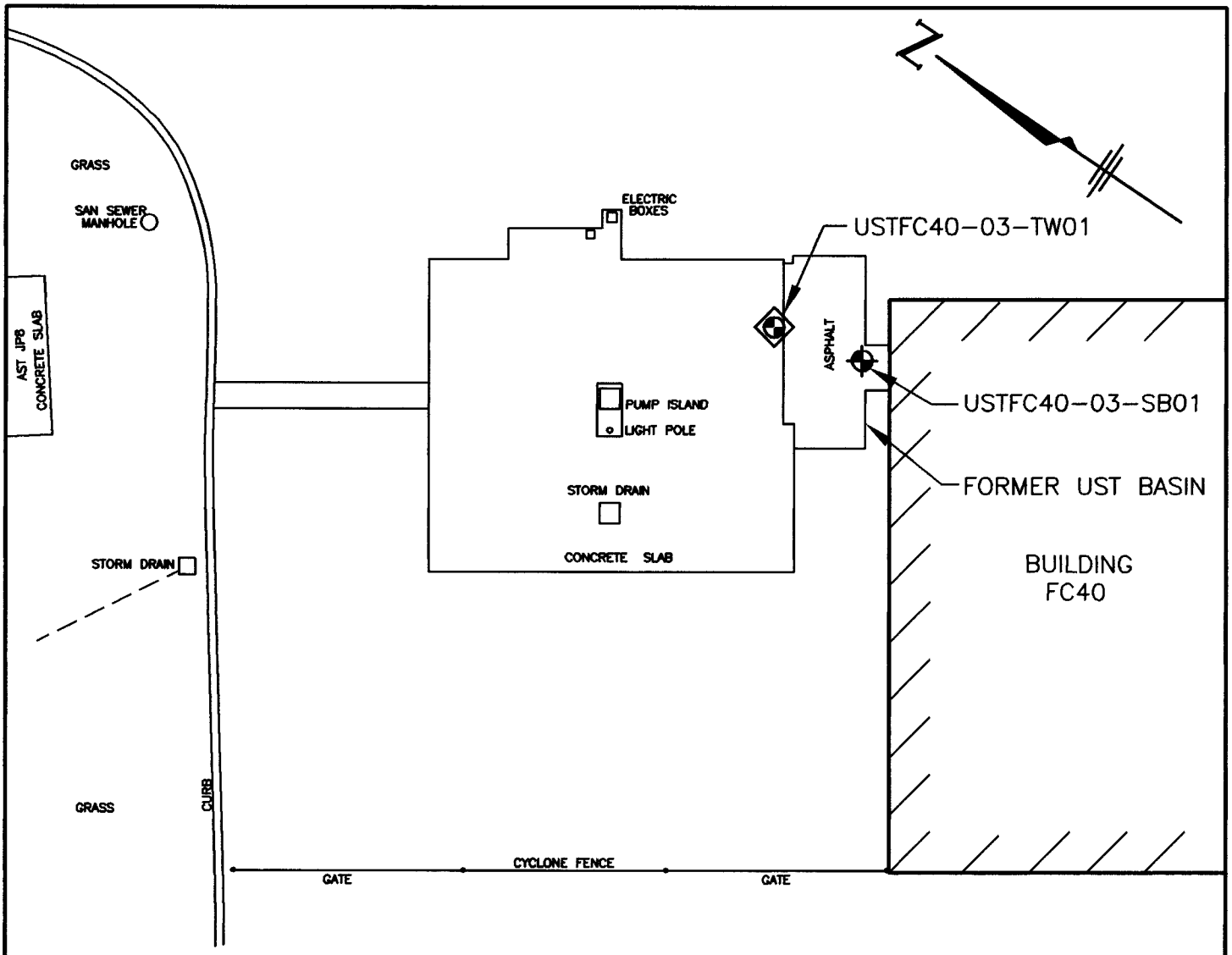
PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

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

FIGURE 5B

JOB NO: 203003-14 | DATE: MAY 2003 | SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: SVH

203003-14-05B



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

Well ID	Contaminant of Concern →		C5-C8 Aliphatics	C9-C18 Aliphatics	C19-C36 Aliphatics	C9-C22 Aromatics
	Sample ID	Date Collected				
IGWQS(µg/L)			420	4,200	42,000	210
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	<100	740	5,000	**<3,200 ***

L E G E N D

EXISTING	NEW	DESCRIPTION
▨		BUILDING
	⊕	TYPE III WELL
	⊕	BORING

All results in µg/L.

* = Result equals the sum of the C11-C22 fraction result (3100 µg/L) and the C9-C10 fraction quantitation limit (<100 µg/L).

Bold result indicates concentration is greater than the IGWQS.

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

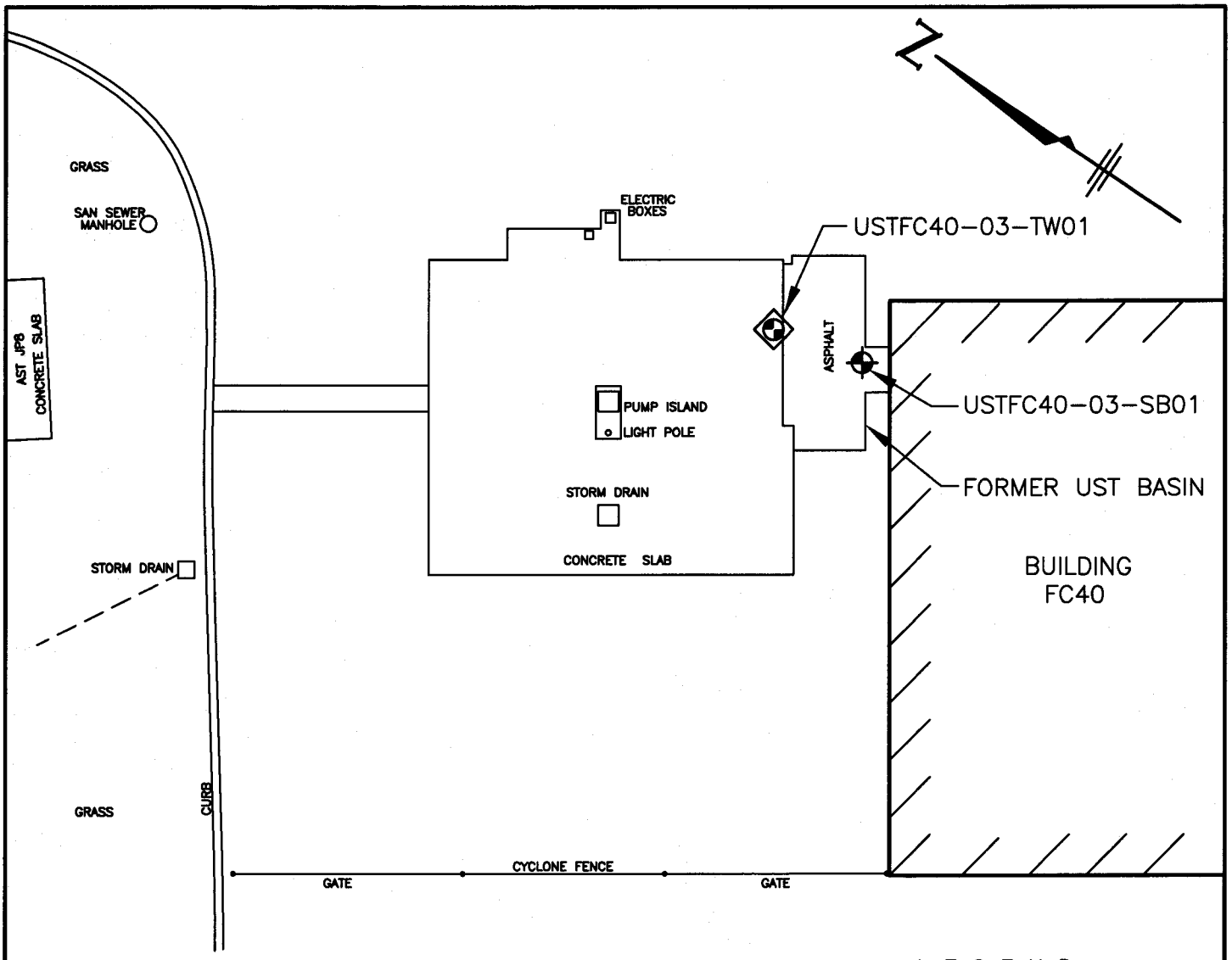
PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

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

FIGURE: 5C

JOB NO: 203003-14 | DATE: MAY 2003 | SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: SVH

203003-14-05C



L E G E N D

EXISTING	NEW	DESCRIPTION
▨		BUILDING
	⊕	TYPE III WELL
	⊕	BORING

Analytical Method: EPA Method 6010B

Well ID	Contaminant of Concern →		Lead	Chromium
	Sample ID	Date Collected		
GCL (µg/L)			**15,000**	**50,000**
2L Standard (µg/L)			**15**	**50**
USTFC40-03-TW01	USTFC40-03-TW01	3/25/03	<10	<10

All results in µg/L.

20 10 0 20

SCALE IN FEET

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT: FC40-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.

TITLE: SITE PLAN WITH GROUNDWATER LABORATORY RESULTS – EPA METHOD 6010B

FIGURE: 5D

JOB NO: 203003-14 | DATE: MAY 2003 | SCALE: 1"=20' | DRAWN BY: WHW | CHECKED BY: SVH

203003-14-05D

APPENDICES

APPENDIX A

BORING LOGS AND AS-BUILT WELL DETAILS

BORING LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203-003	**STATE:** NC	**COUNTY:** Onslow	**LOCATION:** MCB Camp Lejeune
PROJECT NAME: FC-40-3		**LOGGED BY:** Tom Stetler	**BORING ID:** UST FC40-03 -SB01
		DRILLER: Bobbie Fowler	
NORTHING:	**EASTING:**	**CREW:** Scott Price	
SYSTEM:	**BORING LOCATION:** Former product transfer lines		**LAND ELEV.:**
DRILL MACHINE: Hand Auger	**METHOD:** Hand Auger	**0 HOUR DTW:**	**BORING DEPTH:** 9.0
START DATE: 03/17/03	**FINISH DATE:** 03/17/03	**24 HOUR DTW:**	**ROCK DEPTH:** ---

DEPTH	BLOW COUNT 6" 6" 6" 6"	SAMP. TYPE	OVA RESULTS (ppm) 0 200 400 600 800 1000	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION
							0.0	LAND SURFACE	
0.3							0.3	ASPHALT	
	HAND AUGER		▲1.4		GW/ GM		1.5	FILL consisting of dark brown, SILTY, f. SAND w/Limestone gravel. Dry. No HCO.	
1.5	HAND AUGER		▲0		SP		4.5	Tan, well sorted, f. to v.f. SAND. Moist. Slight HCO.	
4.5	HAND AUGER		▲0	UST FC40-03 SB-01	SP		9.0	Light brown gray, v.f. SAND w/dark brown layering (up to 1" thick). Moist. Slight to no HCO.	
6.0	HAND AUGER		▲0						
9.0								Boring Terminated at Depth 9.0 ft	

WELL LOG

CATLIN ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 1

PROJECT NO.: 203-003	STATE: NC	COUNTY: Onslow	LOCATION: MCB Camp Lejeune
PROJECT NAME: FC-40-3		LOGGED BY: Tom Stetler	WELL ID: UST FC40-03 -TW01
		DRILLER: Bobbie Fowler	
NORTHING:	EASTING:	CREW: Scott Price	
SYSTEM: N/A	BORING LOCATION: Former UST Basin		T.O.C. ELEV.: 99.71
DRILL MACHINE: Diedrich D-25	METHOD: HSA	0 HOUR DTW:	BORING DEPTH: 10.5
START DATE: 03/17/03	FINISH DATE: 03/17/03	24 HOUR DTW: 9.57	WELL DEPTH: 10.5

DEPTH	BLOW COUNT 6in	6in	6in	6in	OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
									0.0 LAND SURFACE	99.5	0.2 PVC; 0.0
0.3									0.3 ASPHALT	99.2	0.5 2" Sch. 40 PVC; 0.5
	8	10	11	13	0						
2.3											
4.0											
	4	3	4	3	0		GW/ GM		FILL consisting of brown to gray brown, v. poorly sorted, sub-angular to well rounded GRAVEL w/f. sand to silt matrix. Moist. No HCO. Man made "fabric" and clear plastic fragments noted in auger cuttings at 8'.		2" Slot .010 Sch. 40 PVC
6.0											
9.0											
	5	6	50/ .2		1.8						
10.5									10.5	89.0	10.0; 10.5; 10.5
									Boring Terminated at Elevation 89.0 ft Auger Refusal at bottom of boring = appeared to be concrete slab		

Bentonite Pellets #2 Medium Sand

CATLIN BORING LOG 203-003.GPJ CATLIN.GDT 04/21/03

APPENDIX B

NORTH CAROLINA WELL CONSTRUCTION AND ABANDONMENT RECORDS

WELL CONSTRUCTION RECORD

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

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Bobbie Fowler CERTIFICATION # 2869

WELL CONTRACTOR COMPANY NAME CATLIN Engineers & Scientists PHONE # (910) 452-5861

STATE WELL CONSTRUCTION PERMIT # (if applicable) N/A ASSOCIATED WQ PERMIT # (if applicable) N/A

UST FC40-03 -TW01

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐
   Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____
2. WELL LOCATION: (Show sketch of the location below)
   Nearest Town: MCB Camp Lejeune County: Onslow
   Bulding FC-40, Sneads Ferry Road
   (Road Name and Numbers, Community, Subdivision, Lot No., Zip Code)

Topographic/Land Setting
☐Ridge ☐Slope ☐Valley ☒Flat
(check appropriate box)

Latitude/Longitude of well location
34* 39' 25"/77* 18' 55"
(degrees*/minutes'/seconds")

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

3. OWNER: LANTDIV NAVFACENGCOM Commanding General
   Address: AC/S EMD/Marine Corps Base/PSC Box 20004
   (Street or Route No.)
   Camp Lejeune (City or Town) NC (State) 28542-0004 (Zip Code)
   _____ (Area code - Phone number)

DEPTH From To — DRILLING LOG Formation Description

4. DATE DRILLED: 3/17/03
5. TOTAL DEPTH: 10.5
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing 9.57 FT.
   (Use "+" if Above Top of Casing)
8. TOP OF CASING IS 0.21 FT. Above Land Surface*
   * Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C.0118

SEE ATTACHED

9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): Surficial Aquifer
12. DISINFECTION: Type N/A Amount N/A
13. CASING:

	Depth	Diameter	Wall Thickness or Weight/Ft.	Material
From	-0.21 To 0.5 ft.	2 in.	Sch. 40	PVC
From	____ To ____ ft.	____ in.	____	____
From	____ To ____ ft.	____ in.	____	____

14. GROUT:

	Depth	Material	Method
From	____ To ____ ft.	____	____
From	0 To 0.5 ft.	Bent. Pellets	Surface Pour

15. SCREEN:

	Depth	Diameter	Slot Size	Material
From	0.5 To 10 ft.	2 in.	Slot .010 in.	PVC
From	____ To ____ ft.	____ in.	____ in.	____

16. SAND/GRAVEL PACK:

	Depth	Size	Material
From	0.5 To 10.5 ft.	#2 Medium	Torpedo Sand
From	____ To ____ ft.	____	____

SEE ATTACHED

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

17. REMARKS: Auger Refusal at bottom of boring = appeared to be concrete slab

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

Bobbie Fowler 4-29-03

SIGNATURE OF PERSON CONSTRUCTING THE ~~WELL~~ DATE

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

Modified from: GW-1 REV.07/2001

North Carolina - Department of Environment and Natural Resources - Division of Water Quality - Groundwater Section - 1636 Mail Service Center - Raleigh, NC 27699-1639 - Phone No. (919) 733-3221

WELL ABANDONMENT RECORD

WELL CONTRACTOR Steven V. Hudson

WELL CONTRACTOR CERTIFICATION # 2161

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

2. WELL LOCATION: (Show a sketch of the location on back of form.)
Nearest Town: Jacksonville (MCB, Camp Lejeune) County Onslow
Building FC-40, Sneads Ferry Road, MCB, Camp Lejeune
(Road Name and Number, Community, Subdivision , Lot No.) Quadrangle No.

3. OWNER: LANTDIV NAVFACENGCOM Commanding General

4. ADDRESS: AC/S EMD/Marine Corps Base/PSC Box 20004

5. TOPOGRAPHY: ☐ draw, ☐ slope, ☐ hilltop, ☐ valley, ☒ flat (circle one)

6. TOTAL DEPTH: 10.5 ft. DIAMETER 2 in.

7. CASING REMOVED:

feet	diameter
0.5	2 in.

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

9. SEALING MATERIAL:

Neat Cement
bags of cement _____
gallons of water _____

Sand Cement
bags of cement _____
gallons of water _____

Other
Type material Bentonite Pellets
Amount 2 - 40 lbs. bags

10. EXPLAIN METHOD EMPLACEMENT OF MATERIAL.
Surface Pour subsequent to removal of all casing and screen. Ground surface was patched with asphalt patch following abandonment.

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

11. DATE WELL ABANDONED ~~February~~ March 25, 2003 SVH 6-13-03

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

Signature of person abandoning the well _____ Date 3-26-03 SVH 6-13-03

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

Submit original to the Division of Water Quality, Groundwater Section, one copy to the owner within 30 days from completion of abandonment.

GW-30 Revised 12/99

APPENDIX C

MONITORING WELL SAMPLING RECORDS

CATLIN
ENGINEERS and SCIENTISTS
Wilmington, North Carolina

APPENDIX C
MONITORING WELL SAMPLING RECORD

FC40-3
MCB, Camp Lejeune, NC
203-003

WELL IDENTIFICATION	UST FC40-03 -TW01				
DATE SAMPLED	3/23/03				
TIME SAMPLED	11:30				
SAMPLED BY	Tom Stetler				
WELL DIAMETER	2"				
WELL DEPTH - (A)	10.5'				
DEPTH TO WATER - (B)	9.57'				
(A-B) FT. WATER IN WELL - (C)	0.93'				
GALLONS PER FT. - (D)	0.174 gal.				
(CxD) ONE WELL VOLUME - (E)	0.16 gal.				
(3xE) THREE WELL VOLUMES - (F)	0.48 gal.				
BAILER VOLUME* - (G)	PUMP				
(F/G) BAILS REQUIRED*	N/A				
AMOUNT REMOVED	2 gal.				
TURBIDITY (clear, slight, moderate, high)	SLIGHT				
ANALYSIS and / or COMMENTS	6210D				
	625				
	VPH/EPH				
	3030C				

WELL VOLUMES gal/ft
1" WELL = 0.045
2" WELL = 0.174
4" WELL = 0.661
6" WELL = 1.501

BAILER VOLUMES gal/bail
3' x 1.5" = 0.24
4' x 1.5" = 0.37

*** - An entry of "PUMP" indicates that bailers were not used to develop/purge the well and that a pump was used to remove the volume indicated.**

SAMPLING RECORD 203-003.GPJ CATLIN.GDT 06/17/03

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

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

April 11, 2003

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

Report Number: G128-1084

Client Project ID: FC-40-3

Dear Mr. Hudson,

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

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

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

Sincerely,

Paradigm Analytical Laboratories, Inc.

Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 6210D

Client Sample ID: USTFC40-03-TW01
Client Project ID: FC-40-3
Lab Sample ID: 66391
Lab Project ID: G128-1084
Matrix: Water

Date Analyzed: 4/3/03
Analyzed By: JTF
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1.0

Compound	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	0.5	BQL
Bromobenzene	0.5	BQL
Bromochloromethane	0.5	BQL
Bromodichloromethane	0.5	BQL
Bromoform	0.5	BQL
Bromomethane	0.5	BQL
n-Butylbenzene	0.5	BQL
sec-Butylbenzene	0.5	BQL
tert-Butylbenzene	0.5	BQL
Carbon tetrachloride	0.5	BQL
Chlorobenzene	0.5	BQL
Chloroethane	0.5	BQL
Chloroform	0.5	BQL
Chloromethane	0.5	BQL
2-Chlorotoluene	0.5	BQL
4-Chlorotoluene	0.5	BQL
Dibromochloromethane	0.5	BQL
1,2-Dibromo-3-chloropropane	5	BQL
Dibromomethane	0.5	BQL
1,2-Dibromoethane (EDB)	0.5	BQL
1,2-Dichlorobenzene	0.5	BQL
1,3-Dichlorobenzene	0.5	BQL
1,4-Dichlorobenzene	0.5	BQL
1,1-Dichloroethane	0.5	BQL
1,1-Dichloroethene	0.5	BQL
1,2-Dichloroethane	0.5	BQL
cis-1,2-Dichloroethene	0.5	BQL
trans-1,2-dichloroethene	0.5	BQL
1,2-Dichloropropane	0.5	BQL
1,3-Dichloropropane	0.5	BQL
2,2-Dichloropropane	0.5	BQL
1,1-Dichloropropene	0.5	BQL
Dichlorodifluoromethane	5	BQL
Diisopropyl ether (DIPE)	0.5	BQL
Ethylbenzene	0.5	BQL
Hexachlorobutadiene	0.5	BQL
Isopropylbenzene	0.5	BQL
4-Isopropyltoluene	0.5	**0.5**
Methylene chloride	5	BQL
Methyl-tert-butyl ether (MTBE)	0.5	BQL

Reviewed by: _____

Flags: BQL = Below Quantitation Limit

Results for Volatiles

by GCMS 6210D

Client Sample ID: USTFC40-03-TW01
Client Project ID: FC-40-3
Lab Sample ID: 66391
Lab Project ID: G128-1084
Matrix: Water

Date Analyzed: 4/3/03
Analyzed By: JTF
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1.0

Compound	Quantitation Limit (ug/L)	Result (ug/L)
Naphthalene	0.5	**0.8**
n-Propyl benzene	0.5	BQL
Styrene	0.5	BQL
1,1,1,2-Tetrachloroethane	0.5	BQL
1,1,2,2-Tetrachloroethane	0.5	BQL
Tetrachloroethene	0.5	BQL
Toluene	0.5	BQL
1,2,3-Trichlorobenzene	0.5	BQL
1,2,4-Trichlorobenzene	0.5	BQL
Trichloroethene	0.5	BQL
1,1,1-Trichloroethane	0.5	BQL
1,1,2-Trichloroethane	0.5	BQL
Trichlorofluoromethane	0.5	BQL
1,2,3-Trichloropropane	0.5	BQL
1,2,4-Trimethylbenzene	0.5	BQL
1,3,5-Trimethylbenzene	0.5	BQL
Vinyl chloride	0.5	BQL
m-,p-Xylene	1	BQL
o-Xylene	0.5	BQL

Surrogate Spike Recoveries Compound	Spike Added (ug/L)	Surrogate Result (ug/L)	%Rec
Bromofluorobenzene	10.0	9.7	97
1,2-Dichloroethane-d4	10.0	10.6	106
Toluene-d8	10.0	10.0	100

Comments:

All results are corrected for dilution.

Reviewed by:

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GCMS 6210D

Client Sample ID: USTFC40-03-TW01D
Client Project ID: FC-40-3
Lab Sample ID: 66392
Lab Project ID: G128-1084
Matrix: Water

Date Analyzed: 4/3/03
Analyzed By: JTF
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1.0

Compound	Quantitation Limit (ug/L)	Result (ug/L)
Benzene	0.5	BQL
Bromobenzene	0.5	BQL
Bromochloromethane	0.5	BQL
Bromodichloromethane	0.5	BQL
Bromoform	0.5	BQL
Bromomethane	0.5	BQL
n-Butylbenzene	0.5	BQL
sec-Butylbenzene	0.5	BQL
tert-Butylbenzene	0.5	BQL
Carbon tetrachloride	0.5	BQL
Chlorobenzene	0.5	BQL
Chloroethane	0.5	BQL
Chloroform	0.5	BQL
Chloromethane	0.5	BQL
2-Chlorotoluene	0.5	BQL
4-Chlorotoluene	0.5	BQL
Dibromochloromethane	0.5	BQL
1,2-Dibromo-3-chloropropane	5	BQL
Dibromomethane	0.5	BQL
1,2-Dibromoethane (EDB)	0.5	BQL
1,2-Dichlorobenzene	0.5	BQL
1,3-Dichlorobenzene	0.5	BQL
1,4-Dichlorobenzene	0.5	BQL
1,1-Dichloroethane	0.5	BQL
1,1-Dichloroethene	0.5	BQL
1,2-Dichloroethane	0.5	BQL
cis-1,2-Dichloroethene	0.5	BQL
trans-1,2-dichloroethene	0.5	BQL
1,2-Dichloropropane	0.5	BQL
1,3-Dichloropropane	0.5	BQL
2,2-Dichloropropane	0.5	BQL
1,1-Dichloropropene	0.5	BQL
Dichlorodifluoromethane	5	BQL
Diisopropyl ether (DIPE)	0.5	BQL
Ethylbenzene	0.5	BQL
Hexachlorobutadiene	0.5	BQL
Isopropylbenzene	0.5	BQL
4-Isopropyltoluene	0.5	BQL
Methylene chloride	5	BQL
Methyl-tert-butyl ether (MTBE)	0.5	BQL

Reviewed by:

Flags: BQL = Below Quantitation Limit

Results for Volatiles

by GCMS 6210D

Client Sample ID: USTFC40-03-TW01D
Client Project ID: FC-40-3
Lab Sample ID: 66392
Lab Project ID: G128-1084
Matrix: Water

Date Analyzed: 4/3/03
Analyzed By: JTF
Date Collected: 3/25/03
Date Received: 3/25/03
Dilution: 1.0

Compound	Quantitation Limit (ug/L)	Result (ug/L)
Naphthalene	0.5	**0.7**
n-Propyl benzene	0.5	BQL
Styrene	0.5	BQL
1,1,1,2-Tetrachloroethane	0.5	BQL
1,1,2,2-Tetrachloroethane	0.5	BQL
Tetrachloroethene	0.5	BQL
Toluene	0.5	BQL
1,2,3-Trichlorobenzene	0.5	BQL
1,2,4-Trichlorobenzene	0.5	BQL
Trichloroethene	0.5	BQL
1,1,1-Trichloroethane	0.5	BQL
1,1,2-Trichloroethane	0.5	BQL
Trichlorofluoromethane	0.5	BQL
1,2,3-Trichloropropane	0.5	BQL
1,2,4-Trimethylbenzene	0.5	BQL
1,3,5-Trimethylbenzene	0.5	BQL
Vinyl chloride	0.5	BQL
m-,p-Xylene	1	BQL
o-Xylene	0.5	BQL

Surrogate Spike Recoveries Compound	Spike Added (ug/L)	Surrogate Result (ug/L)	%Rec
Bromofluorobenzene	10.0	9.0	90
1,2-Dichloroethane-d4	10.0	10.2	102
Toluene-d8	10.0	9.9	99

Comments:

All results are corrected for dilution.

Reviewed by:

Flags: BQL = Below Quantitation Limit

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTFC40-03-TW01
Client Project ID: FC-40-3
Lab Sample ID: 66391
Lab Project ID: G128-1084
Matrix: Water

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/29/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (ug/L)	Result (ug/L)
Acenaphthene	10	BQL
Acenaphthylene	10	BQL
Anthracene	10	BQL
Benzo[a]anthracene	10	BQL
Benzo[a]pyrene	10	BQL
Benzo[b]fluoranthene	10	BQL
Benzo[g,h,i]perylene	10	BQL
Benzo[k]fluoranthene	10	BQL
Bis(2-chloroethoxy)methane	10	BQL
Bis(2-chloroethyl)ether	10	BQL
Bis(2-chloroisopropyl)ether	10	BQL
Bis(2-ethylhexyl)phthalate	10	13
4-bromophenyl phenyl ether	10	BQL
Butylbenzylphthalate	10	BQL
4-Chloro-3-methylphenol	10	BQL
2-Chloronaphthalene	10	BQL
2-Chlorophenol	10	BQL
4-Chlorophenyl phenyl ether	10	BQL
Chrysene	10	BQL
Di-n-Butylphthalate	10	BQL
Di-n-octylphthalate	10	BQL
Dibenzo[a,h]anthracene	10	BQL
1,2-Dichlorobenzene	10	BQL
1,3-Dichlorobenzene	10	BQL
1,4-Dichlorobenzene	10	BQL
3,3'-Dichlorobenzidine	20	BQL
2,4-Dichlorophenol	10	BQL
Diethylphthalate	10	BQL
2,4-Dimethylphenol	10	BQL
Dimethylphthalate	10	BQL
4,6-Dinitro-2-methylphenol	50	BQL
2,4-Dinitrophenol	50	BQL
2,4-Dinitrotoluene	10	BQL
2,6-Dinitrotoluene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Hexachlorobenzene	10	BQL
Hexachlorobutadiene	10	BQL
Hexachlorocyclopentadiene	20	BQL
Hexachloroethane	10	BQL

Results for Semivolatiles
by GCMS 625

Client Sample ID: USTFC40-03-TW01
Client Project ID: FC-40-3
Lab Sample ID: 66391
Lab Project ID: G128-1084
Matrix: Water

Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/29/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (ug/L)	Result (ug/L)
Indeno(1,2,3-c,d)pyrene	10	BQL
Isophorone	10	BQL
N-Nitrosodi-n-propylamine	10	BQL
N-Nitrosodiphenylamine	10	BQL
Naphthalene	10	BQL
Nitrobenzene	10	BQL
2-Nitrophenol	10	BQL
4-Nitrophenol	50	BQL
Pentachlorophenol	50	BQL
Phenanthrene	10	BQL
Phenol	10	**17**
Pyrene	10	BQL
1,2,4-Trichlorobenzene	10	BQL
2,4,6-Trichlorophenol	10	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	10.7	107
2-Fluorophenol	10	8.5	85
Nitrobenzene-d5	10	6.0	60
Phenol-d6	10	9.2	92
2,4,6-Tribromophenol	10	11.7	117
4-Terphenyl-d14	10	9.7	97

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: _____

PARADIGM ANALYTICAL LABORATORIES, INC.

Results of Library Search for Semivolatile Compounds
by GCMS

Client Sample ID: USTFC40-03-TW01
Client Project ID: FC-40-3
Lab Sample ID: 66391
Lab Project ID: G128-1084
Matrix: Water

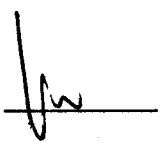
Date Collected: 3/25/2003
Date Received: 3/25/2003
Date Analyzed: 3/29/2003
Analyzed By: MRC
Dilution: 1

No.	Compound	Retention Time	CAS#	Match Probability	Result (ug/L)
1	Unknown	8.47			2800
2	Unknown	4.89			180
3	Unknown	7.61			66
4	Unknown	7.84			60
5	Unknown	9.27			40
6	Unknown	8.04			39
7	Unknown	7.25			30
8	Methylphenol, Isomer of	8.32			22
9	Unknown	9.86			18
10	Unknown	9.36			18

Comment:

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

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

Reviewed by: 

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: FC-40-3

Sample Information and Analytical Results	
Sample Identification	USTFC40-03-TW01
Sample Matrix	Water
Collection Option (for Soil)*	
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	03/28/03
Date Analyzed	03/28/03
Dry Weight	
Dilution Factor	1
C_5-C_8 Aliphatics**	< 100 (µg/L)
C_9-C_{12} Aliphatics**	170 (µg/L)
C_9-C_{10} Aromatics**	< 100 (µg/L)
Surrogate % Recovery - PID	97
Surrogate % Recovery - FID	150***

* = 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: G128-1084-66391

Reviewed By:

Attachment 2

VPH Laboratory Reporting Form

Calibration and QA/QC Information

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

Calibration Ranges and Limits

Range	MDL (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: 04/03/03

Calibration Check

Range	Levels (µg/L)	Levels (mg/Kg)	RPD
C_5-C_8 Aliphatics	200	20	3.5
C_9-C_{12} Aliphatics	150	15	16.5
C_9-C_{10} Aromatics	325	32.5	5.2

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

Reviewed By: [signature]

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: FC-40-3

Sample Information and Analytical Results	
Sample Identification	USTFC40-03-TW01
Sample Matrix	Water
Date Collected	03/25/03
Date Received	03/25/03
Date Extracted	04/01/03
Date Analyzed	04/08/03
Dry Weight	
Dilution Factor	1
C_9-C_{18} Aliphatics*	570 (µg/L)
C_{19}-C_{36} Aliphatics*	5000 (µg/L)
C_{11}-C_{22} Aromatics*	3100 (µg/L)
Aliphatic Surrogate % Recovery	53
Aromatic Surrogate % Recovery	67
Fractionation Surrogate 1 % Recovery	97

Comments:

* = Excludes any surrogates or internal standards.

Lab info: G128-1084-66391

Reviewed By:

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 03/19/03

Calibration Ranges and Limits

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

Calibration Concentration Levels

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

Calibration Check Date: 04/07/03

Calibration Check

Range	Levels (µg/mL)	Levels (mg/Kg)	RPD
C_9-C_{18} Aliphatics	0.6	10	-11.1
C_{19}-C_{36} Aliphatics	0.8	13.3	2.6
C_{11}-C_{22} Aromatics	1.7	28.3	-4.4

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

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	USTFC40-03-TW01	Analyzed By:	RML
Client Project ID:	FC-40-3	Date Collected:	3/25/03
Lab Sample ID:	66391	Date Received:	3/25/03
Lab Project ID:	G128-1084	Matrix:	Water
Batch ID:	2655		

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Chromium	BQL	0.0100	1	MG/L	6010B	3/27/03
Lead	BQL	0.0100	1	MG/L	6010B	3/27/03

Comments
BQL = Below Quantitation Limits
DF = Dilution Factor
J = Between MDL and RL
Sample prepared by 3030C.

Reviewed By:

PARADIGM ANALYTICAL LABORATORIES, INC.
2627 Northchase Parkway SE, Wilmington, NC 28405
Phone: (910)-350-1903 FAX: (910)-350-1557

Chain-of Custody Record & Analytical Request

COC# 30097
Page 1 **of** 1

Client: Catlin
Address: 220 Old Dairy Rd.
Address: Wilmington NC 28405
Quote #: DOD 101

Project ID: FC-40-3
Contact: Steve Hudson
Phone: 910-452-5861
Fax: 910-452-7563

Date: 3-25-03
Turnaround: standard
Job Number: 203-003
P.O. Number: 230205-4

Report To: Steve Hudson @ Catlin
Invoice To: Shiela @ Catlin

Sample ID	Date	Time	Matrix	Preservatives: HCl	Preservatives: Ice	Preservatives: Nitric	Preservatives	Analyses: 6210D purgeable aromatics + xylene	Analyses: 625 + TICS	Analyses: MADEP VPH/EPH	Analyses: 3030C chromium and lead							Comments: Please specify any special reporting requirements
USTFC40-03-TW01	3-25	11:30	GW	✓	✓	✓		✓	✓	✓	✓							G128-1084
USTFC40-03-TW01D	3-25	11:30	GW	✓	✓			✓										Lejeune EDD format

Relinquished By	Date	Time	Received By	Date	Time	Temperature
Tom [signature]	3/25/03	1430	[signature]	3/25/03	1430	on ice 8.8°C carry down in bag

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

March 28, 2003

Report Number: G128-1077

Client Project ID: FC-40-3

Dear Mr. Hudson,

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

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

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

Sincerely,

Paradigm Analytical Laboratories, Inc.

Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GCMS 8260B/5035

Client Sample ID: USTFC40-03-SB01
Client Project ID: FC-40-3
Lab Sample ID: 65759
Lab Project ID: G128-1077
Matrix: Soil %Solids: 90.5

Date Analyzed: 3/20/03
Analyzed By: EKR
Date Collected: 3/17/03
Date Received: 3/18/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.055	BQL
Acrolein	0.11	BQL
Acrylonitrile	0.11	BQL
Benzene	0.0055	BQL
Bromobenzene	0.0055	BQL
Bromochloromethane	0.0055	BQL
Bromodichloromethane	0.0055	BQL
Bromoform	0.0055	BQL
Bromomethane	0.0055	BQL
2-Butanone	0.028	BQL
n-Butylbenzene	0.0055	BQL
sec-Butylbenzene	0.0055	BQL
tert-Butylbenzene	0.0055	BQL
Carbon disulfide	0.0055	BQL
Carbon tetrachloride	0.0055	BQL
Chlorobenzene	0.0055	BQL
Chloroethane	0.0055	BQL
2-Chloroethyl vinyl ether	0.0055	BQL
Chloroform	0.0055	BQL
Chloromethane	0.0055	BQL
2-Chlorotoluene	0.0055	BQL
4-Chlorotoluene	0.0055	BQL
Dibromochloromethane	0.0055	BQL
1,2-Dibromo-3-chloropropane	0.0055	BQL
Dibromomethane	0.0055	BQL
1,2-Dibromoethane (EDB)	0.0055	BQL
1,2-Dichlorobenzene	0.0055	BQL
1,3-Dichlorobenzene	0.0055	BQL
1,4-Dichlorobenzene	0.0055	BQL
trans-1,4-Dichloro-2-butene	0.0055	BQL
1,1-Dichloroethane	0.0055	BQL
1,1-Dichloroethene	0.0055	BQL
1,2-Dichloroethane	0.0055	BQL
cis-1,2-Dichloroethene	0.0055	BQL
trans-1,2-dichloroethene	0.0055	BQL
1,2-Dichloropropane	0.0055	BQL
1,3-Dichloropropane	0.0055	BQL
2,2-Dichloropropane	0.0055	BQL
1,1-Dichloropropene	0.0055	BQL
cis-1,3-Dichloropropene	0.0055	BQL
trans-1,3-Dichloropropene	0.0055	BQL
Dichlorodifluoromethane	0.0055	BQL
Diisopropyl ether (DIPE)	0.0055	BQL
Ethylbenzene	0.0055	BQL
Hexachlorobutadiene	0.0055	BQL

Reviewed by: MAC

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GCMS 8260B/5035

Client Sample ID: USTFC40-03-SB01
Client Project ID: FC-40-3
Lab Sample ID: 65759
Lab Project ID: G128-1077
Matrix: Soil %Solids: 90.5

Date Analyzed: 3/20/03
Analyzed By: EKR
Date Collected: 3/17/03
Date Received: 3/18/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0055	BQL
Iodomethane	0.0055	BQL
Isopropylbenzene	0.0055	BQL
4-Isopropyltoluene	0.0055	BQL
Methylene chloride	0.022	BQL
4-Methyl-2-pentanone	0.0055	BQL
Methyl-tert-butyl ether (MTBE)	0.0055	BQL
Naphthalene	0.0055	BQL
n-Propyl benzene	0.0055	BQL
Styrene	0.0055	BQL
1,1,1,2-Tetrachloroethane	0.0055	BQL
1,1,2,2-Tetrachloroethane	0.0055	BQL
Tetrachloroethene	0.0055	BQL
Toluene	0.0055	BQL
1,2,3-Trichlorobenzene	0.0055	BQL
1,2,4-Trichlorobenzene	0.0055	BQL
Trichloroethene	0.0055	BQL
1,1,1-Trichloroethane	0.0055	BQL
1,1,2-Trichloroethane	0.0055	BQL
Trichlorofluoromethane	0.0055	BQL
1,2,3-Trichloropropane	0.0055	BQL
1,2,4-Trimethylbenzene	0.0055	BQL
1,3,5-Trimethylbenzene	0.0055	BQL
Vinyl chloride	0.0055	BQL
m-,p-Xylene	0.011	BQL
o-Xylene	0.0055	BQL

Surrogate Spike Recoveries Compound	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Bromofluorobenzene	0.0500	0.0475	95
1,2-Dichloroethane-d4	0.0500	0.0570	114
Toluene-d8	0.0500	0.0497	99

Comments:
All results are corrected for dilution.

Reviewed by: MMC

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GCMS 8260B/5035

Client Sample ID: USTFC40-03-SB01D
Client Project ID: FC-40-3
Lab Sample ID: 65760
Lab Project ID: G128-1077
Matrix: Soil %Solids: 90.2

Date Analyzed: 3/20/03
Analyzed By: EKR
Date Collected: 3/17/03
Date Received: 3/18/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acetone	0.055	BQL
Acrolein	0.11	BQL
Acrylonitrile	0.11	BQL
Benzene	0.0055	BQL
Bromobenzene	0.0055	BQL
Bromochloromethane	0.0055	BQL
Bromodichloromethane	0.0055	BQL
Bromoform	0.0055	BQL
Bromomethane	0.0055	BQL
2-Butanone	0.028	BQL
n-Butylbenzene	0.0055	BQL
sec-Butylbenzene	0.0055	BQL
tert-Butylbenzene	0.0055	BQL
Carbon disulfide	0.0055	BQL
Carbon tetrachloride	0.0055	BQL
Chlorobenzene	0.0055	BQL
Chloroethane	0.0055	BQL
2-Chloroethyl vinyl ether	0.0055	BQL
Chloroform	0.0055	BQL
Chloromethane	0.0055	BQL
2-Chlorotoluene	0.0055	BQL
4-Chlorotoluene	0.0055	BQL
Dibromochloromethane	0.0055	BQL
1,2-Dibromo-3-chloropropane	0.0055	BQL
Dibromomethane	0.0055	BQL
1,2-Dibromoethane (EDB)	0.0055	BQL
1,2-Dichlorobenzene	0.0055	BQL
1,3-Dichlorobenzene	0.0055	BQL
1,4-Dichlorobenzene	0.0055	BQL
trans-1,4-Dichloro-2-butene	0.0055	BQL
1,1-Dichloroethane	0.0055	BQL
1,1-Dichloroethene	0.0055	BQL
1,2-Dichloroethane	0.0055	BQL
cis-1,2-Dichloroethene	0.0055	BQL
trans-1,2-dichloroethene	0.0055	BQL
1,2-Dichloropropane	0.0055	BQL
1,3-Dichloropropane	0.0055	BQL
2,2-Dichloropropane	0.0055	BQL
1,1-Dichloropropene	0.0055	BQL
cis-1,3-Dichloropropene	0.0055	BQL
trans-1,3-Dichloropropene	0.0055	BQL
Dichlorodifluoromethane	0.0055	BQL
Diisopropyl ether (DIPE)	0.0055	BQL
Ethylbenzene	0.0055	BQL
Hexachlorobutadiene	0.0055	BQL

Reviewed by: JMC

Flags: BQL = Below Quantitation Limit

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles
by GCMS 8260B/5035

Client Sample ID: USTFC40-03-SB01D
Client Project ID: FC-40-3
Lab Sample ID: 65760
Lab Project ID: G128-1077
Matrix: Soil %Solids: 90.2

Date Analyzed: 3/20/03
Analyzed By: EKR
Date Collected: 3/17/03
Date Received: 3/18/03
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
2-Hexanone	0.0055	BQL
Iodomethane	0.0055	BQL
Isopropylbenzene	0.0055	BQL
4-Isopropyltoluene	0.0055	BQL
Methylene chloride	0.022	BQL
4-Methyl-2-pentanone	0.0055	BQL
Methyl-tert-butyl ether (MTBE)	0.0055	BQL
Naphthalene	0.0055	BQL
n-Propyl benzene	0.0055	BQL
Styrene	0.0055	BQL
1,1,1,2-Tetrachloroethane	0.0055	BQL
1,1,2,2-Tetrachloroethane	0.0055	BQL
Tetrachloroethene	0.0055	BQL
Toluene	0.0055	BQL
1,2,3-Trichlorobenzene	0.0055	BQL
1,2,4-Trichlorobenzene	0.0055	BQL
Trichloroethene	0.0055	BQL
1,1,1-Trichloroethane	0.0055	BQL
1,1,2-Trichloroethane	0.0055	BQL
Trichlorofluoromethane	0.0055	BQL
1,2,3-Trichloropropane	0.0055	BQL
1,2,4-Trimethylbenzene	0.0055	BQL
1,3,5-Trimethylbenzene	0.0055	BQL
Vinyl chloride	0.0055	BQL
m-,p-Xylene	0.011	BQL
o-Xylene	0.0055	BQL

Surrogate Spike Recoveries Compound	Spike Added (mg/KG)	Surrogate Result (mg/KG)	%Rec
Bromofluorobenzene	0.0500	0.0473	95
1,2-Dichloroethane-d4	0.0500	0.0565	113
Toluene-d8	0.0500	0.0501	100

Comments:
All results are corrected for dilution.

Reviewed by: MLC

Flags: BQL = Below Quantitation Limit

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTFC40-03-SB01
Client Project ID: FC-40-3
Lab Sample ID: 65759
Lab Project ID: G128-1077
Matrix: Soil %Solids: 90.5

Date Collected: 3/17/2003
Date Received: 3/18/2003
Date Analyzed: 3/20/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Acenaphthene	0.34	BQL
Acenaphthylene	0.34	BQL
Anthracene	0.34	BQL
Benzo[a]anthracene	0.34	BQL
Benzo[a]pyrene	0.34	BQL
Benzo[b]fluoranthene	0.34	BQL
Benzo[g,h,i]perylene	0.34	BQL
Benzo[k]fluoranthene	0.34	BQL
Benzoic Acid	0.69	BQL
Bis(2-chloroethoxy)methane	0.34	BQL
Bis(2-chloroethyl)ether	0.34	BQL
Bis(2-chloroisopropyl)ether	0.34	BQL
Bis(2-ethylhexyl)phthalate	0.34	BQL
4-bromophenyl phenyl ether	0.34	BQL
Butylbenzylphthalate	0.34	BQL
4-Chloroaniline	1.7	BQL
4-Chloro-3-methylphenol	0.34	BQL
2-Chloronaphthalene	0.34	BQL
2-Chlorophenol	0.34	BQL
4-Chlorophenyl phenyl ether	0.34	BQL
Chrysene	0.34	BQL
Di-n-Butylphthalate	0.34	BQL
Di-n-octylphthalate	0.34	BQL
Dibenzo[a,h]anthracene	0.34	BQL
Dibenzofuran	0.34	BQL
1,2-Dichlorobenzene	0.34	BQL
1,3-Dichlorobenzene	0.34	BQL
1,4-Dichlorobenzene	0.34	BQL
3,3'-Dichlorobenzidine	0.69	BQL
2,4-Dichlorophenol	0.34	BQL
Diethylphthalate	0.34	BQL
2,4-Dimethylphenol	0.34	BQL
Dimethylphthalate	0.34	BQL
4,6-Dinitro-2-methylphenol	1.7	BQL
2,4-Dinitrophenol	1.7	BQL
2,4-Dinitrotoluene	0.34	BQL
2,6-Dinitrotoluene	0.34	BQL
Fluoranthene	0.34	BQL
Fluorene	0.34	BQL
Hexachlorobenzene	0.34	BQL

Results for Semivolatiles
by GCMS 8270

Client Sample ID: USTFC40-03-SB01
Client Project ID: FC-40-3
Lab Sample ID: 65759
Lab Project ID: G128-1077
Matrix: Soil %Solids: 90.5

Date Collected: 3/17/2003
Date Received: 3/18/2003
Date Analyzed: 3/20/2003
Analyzed By: MRC
Dilution: 1

Compound	Quantitation Limit (mg/KG)	Result (mg/KG)
Hexachlorobutadiene	0.34	BQL
Hexachlorocyclopentadiene	0.69	BQL
Hexachloroethane	0.34	BQL
Indeno(1,2,3-c,d)pyrene	0.34	BQL
Isophorone	0.34	BQL
2-Methylnaphthalene	0.34	BQL
2-Methylphenol	0.34	BQL
3- & 4-Methylphenol	0.34	BQL
N-Nitrosodi-n-propylamine	0.34	BQL
N-Nitrosodiphenylamine	0.34	BQL
Naphthalene	0.34	BQL
2-Nitroaniline	0.34	BQL
3-Nitroaniline	1.7	BQL
4-Nitroaniline	1.7	BQL
Nitrobenzene	0.34	BQL
2-Nitrophenol	0.34	BQL
4-Nitrophenol	1.7	BQL
Pentachlorophenol	1.7	BQL
Phenanthrene	0.34	BQL
Phenol	0.34	BQL
Pyrene	0.34	BQL
1,2,4-Trichlorobenzene	0.34	BQL
2,4,5-Trichlorophenol	0.34	BQL
2,4,6-Trichlorophenol	0.34	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.6	86
2-Fluorophenol	10	8.2	82
Nitrobenzene-d5	10	8.2	82
Phenol-d6	10	8.1	81
2,4,6-Tribromophenol	10	7.5	75
4-Terphenyl-d14	10	9.1	91

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: mrc

VPH (Aliphatics/Aromatics) Laboratory Reporting Form

Client Name: Richard Catlin & Associates

Project Name: FC-40-3

Sample Information and Analytical Results	
Sample Identification	USTFC40-03-SB01
Sample Matrix	Soil
Collection Option (for Soil)*	3
Date Collected	03/17/03
Date Received	03/18/03
Date Extracted	03/17/03
Date Analyzed	03/20/03
Dry Weight	91
Dilution Factor	1
C_5-C_8 Aliphatics**	< 10 (mg/Kg)
C_9-C_{12} Aliphatics**	< 10 (mg/Kg)
C_9-C_{10} Aromatics**	< 10 (mg/Kg)
Surrogate % Recovery - PID	99
Surrogate % Recovery - FID	130

* = 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: G128-1077-65759

Reviewed By: MAC

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: 03/20/03

Calibration Check

Range	Levels (µg/L)	Levels (mg/Kg)	RPD
C_5-C_8 Aliphatics	200	20	-4.3
C_9-C_{12} Aliphatics	150	15	0.3
C_9-C_{10} Aromatics	325	32.5	4.5

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

EPH (Aliphatics/Aromatics) Results

by MDEP-EPH

Client Name: Richard Catlin & Associates

Project Name: FC-40-3

Sample Information and Analytical Results	
Sample Identification	USTFC40-03-SB01
Sample Matrix	Soil
Date Collected	03/17/03
Date Received	03/18/03
Date Extracted	03/19/03
Date Analyzed	03/20/03
Dry Weight	90.5
Dilution Factor	1
C_9-C_{18} Aliphatics*	< 10 (mg/Kg)
C_{19}-C_{36} Aliphatics*	< 10 (mg/Kg)
C_{11}-C_{22} Aromatics*	< 10 (mg/Kg)
Aliphatic Surrogate % Recovery	89
Aromatic Surrogate % Recovery	89

Comments:

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

Lab info: G128-1077-65759

Reviewed By: mlc

PARADIGM ANALYTICAL LABORATORIES, INC.

Attachment 3

EPH Laboratory Reporting Form

Calibration and QA/QC Information

Initial Calibration Date: 03/19/03

Calibration Ranges and Limits

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

Calibration Concentration Levels

Range	Levels (µg/L)	Levels (mg/Kg)	%RSD or CCC	Method of Quantitation
C_9-C_{18} Aliphatics	0.06	1	5.00	Calibration Factor
	0.15	2.5		
	0.3	5		
	0.6	10		
	1.2	20		
C_{19}-C_{36} Aliphatics	0.08	1.33	2.4	Calibration Factor
	0.2	3.33		
	0.4	6.67		
	0.8	13.3		
	1.6	26.7		
C_{11}-C_{22} Aromatics	0.12	2	0.9	Calibration Factor
	0.3	5		
	0.6	10		
	1.2	20		
	2.4	40		

Calibration Check Date: 03/20/03

Calibration Check

Range	Levels (µg/mL)	Levels (mg/Kg)	RPD
C_9-C_{18} Aliphatics	0.6	10	3.3
C_{19}-C_{36} Aliphatics	0.8	13.3	3.5
C_{11}-C_{22} Aromatics	1.2	20	4.0

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

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Metals

Client Sample ID:	USTFC40-03-SB01	Analyzed By:	RML
Client Project ID:	FC-40-3	Date Collected:	3/17/03
Lab Sample ID:	65759	Date Received:	3/18/03
Lab Project ID:	G128-1077	Matrix:	Soil
Batch ID:	2654	Solids	90.51

Metals	Result	Quantitation Limit	DF	Units	Method	Date Analyzed
Chromium	**1.96**	1.02	1	MG/KG	6010B	3/20/03
Lead	**1.82**	1.02	1	MG/KG	6010B	3/20/03

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

PARADIGM ANALYTICAL LABORATORIES, INC.
2627 Northchase Parkway SE, Wilmington, NC 28405
Phone: (910)-350-1903 FAX: (910)-350-1557

Chain-of Custody Record & Analytical Request

COC# 36907

Page 1 of 1

Client: Catlin
Address: 220 Old Dairy Rd.
Address: Wilmington NC 28405
Quote #: DOD 101

Project ID: FC-40-3
Contact: Steve Hudson
Phone: 910-452-5861
Fax: 910-452-7563

Date: 3-18-03
Turnaround: Standard
Job Number: 203-003
P.O. Number: 230205-4

Report To: Steve Hudson @ Catlin
Invoice To: Sheila @ Catlin

Sample ID	Date	Time	Matrix	Preservatives: Ice	Preservatives: methanol	Preservatives: Sodium Bis	Preservatives:	Analyses: 8260/5035 prep.	Analyses: 8270	Analyses: MADEP VPH/GPH	Analyses: 6010B/3050 prep.	Analyses:	Analyses:	Analyses:	Analyses:	Analyses:
UST FC40-03-SB01	3-17	2:00p	Soil	✓	✓	✓		✓	✓	✓	✓					
UST FC40-03-SB01D	3-17	2:00p	Soil	✓	✓	✓		✓								

Comments: Please specify any special reporting requirements

G128-1077

Lejeune E.D.D Format

Relinquished By	Date	Time	Received By	Date	Time	Temperature
Tom Stt	3-18-03	9:10	Ryan M Rum	3-18-03	0910	4.6 °C
						w Mo

State Certification Requested

NC ✓ SC ____ Other ____

SEE REVERSE FOR TERMS AND CONDITIONS

APPENDIX F

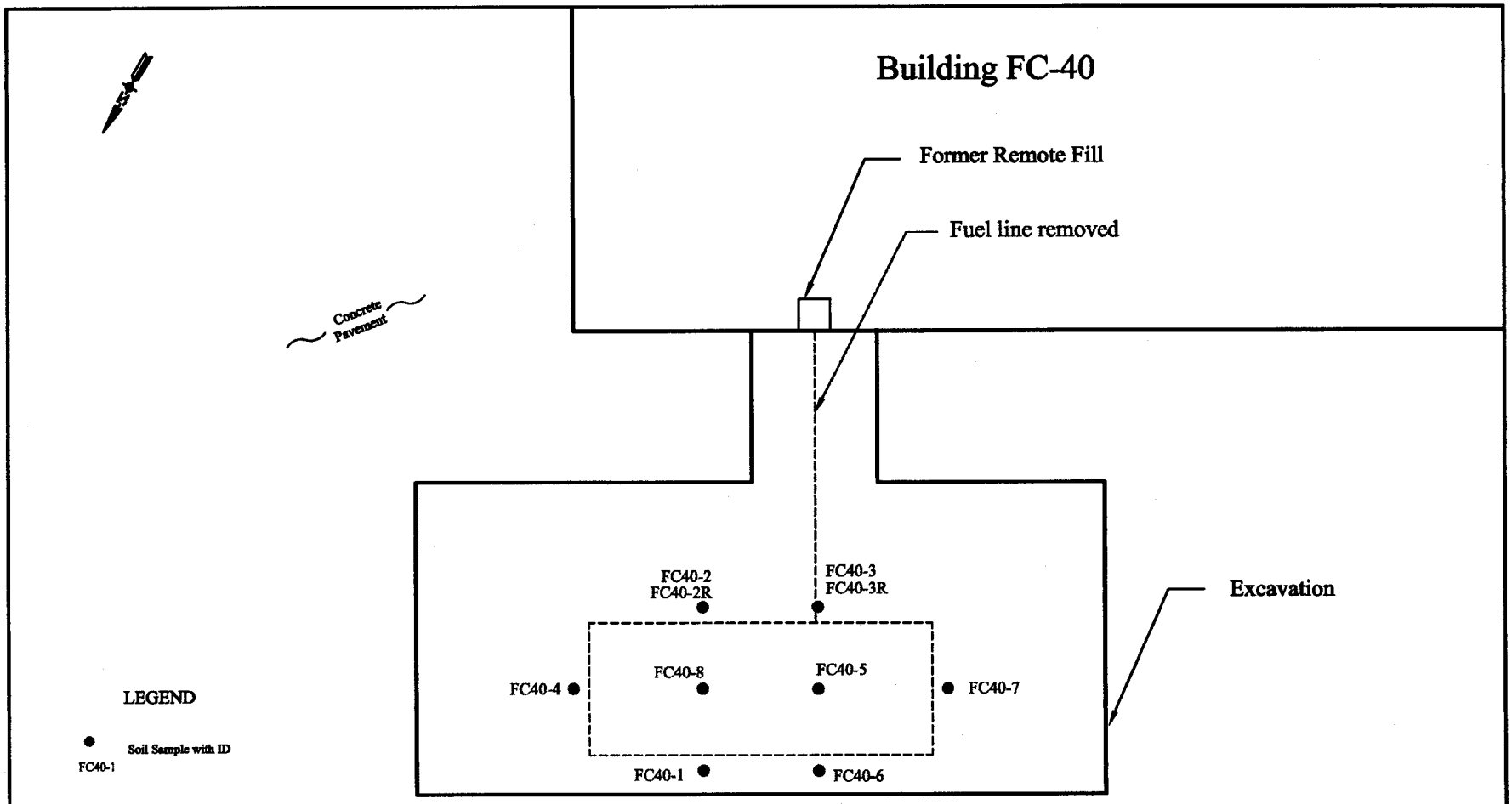
HISTORICAL SAMPLING RESULTS

UNDERGROUND STORAGE TANK CLOSURE REPORT

UST FC40-3

Marine Corps Base
Camp Lejeune, North Carolina

June 6, 2002



Sample ID	Sample Depth
FC40-1	7.5'
FC40-2	7.5'
FC40-3	7.5'
FC40-4	7'
FC40-5	9'
FC40-6	7.5'
FC40-7	7'
FC40-8	9'
FC40-2R	7.5'
FC40-3R	7.5'

Date	Revision

J.A. JONES
ENVIRONMENTAL SERVICES
CHARLOTTE, NORTH CAROLINA

CONTRACT NO: N62470-93-D-3033

PROJECT #:	TO 53
DATE:	4/3/02
PROJECT MGR:	S.F.
DESIGNED BY:	N/A
DRAWN BY:	B.M.
SCALE:	1" = 5'

UST FC40-3 REMOVAL
MARINE CORPS BASE
CAMP LEJEUNE, NC

SITE DRAWING

FIGURE 2

TABLES

Table 1 Summary of Soil Sample Analytical Results
(4/3/02 Sampling Event)

Sample ID	Date	Depth (ft bls)	TPH-DRO (ppm)	TPH-GRO (ppm)	Total Pb (ppm)	Total Cr (ppm)
FC-40-1	4/3/02	7.5	BDL	BDL	BDL	BDL
FC-40-2	4/3/02	7.5	92	BDL	BDL	BDL
FC-40-3	4/3/02	7.5	120	BDL	BDL	BDL
FC-40-4	4/3/02	7	BDL	BDL	BDL	BDL
FC-40-5	4/3/02	9	BDL	BDL	BDL	BDL
FC-40-6	4/3/02	7.5	BDL	BDL	BDL	BDL
FC-40-7	4/3/02	7	BDL	BDL	BDL	BDL
FC-40-8	4/3/02	9	BDL	BDL	BDL	BDL

BDL --- Below Detection Limit

Table 2 Summary of Soil Analytical Results
(4/17/02 Sampling Event)

SAMPLE ID	SAMPLE DATE	DAPTH	COMPOUND CONCENTRATION (in ppm)	
			C9-C22 Aromatics	C19-C36 Aliphatics
FC-40-2R	4/17/02	7.5	140	350
FC-40-3R	4/17/02	7.5	230	410
Residential Soil Cleanup Levels	---	---	469	93860
Industrial/Commercial Soil Cleanup Levels	---	---	12264	#
Soil-to-Water Maximum Contaminant Concentration	---	---	34	##

Notes:
1. Only those compounds whose concentration is above Method Detection Limit are listed
2. A no-entry-cell indicates compound concentration below Method Detection Limit
3. # Health based level >100%
4. ## Considered immobile