



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

June 11, 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** Revised Corrective Action Plan
Hadnot Point Fuel Farm
Marine Corps Base
Camp Lejeune, North Carolina

Navy Contract No. N62470-01-D-3009
Delivery Order No. 0072
CATLIN Project No. 203-047

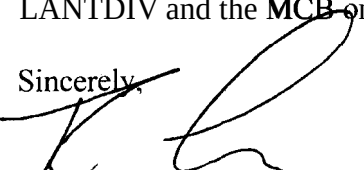
Dear Mr. Conway:

CATLIN Engineers and Scientists (CATLIN) is pleased to submit the FINAL Revised Corrective Action Plan (CAP) document for the above referenced site. We have reviewed the comments to the Draft document from our meeting on June 10, 2003 and have made the appropriate revisions to the text and figures.

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

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

Sincerely,


Richard G. Catlin, P.G., P.E.
President


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

Attachments: Final RCAP
Copy of Cover Letter to NCDENR WiRO

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

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

June 11.2003

Mr. Bruce Reed
North Carolina Department of Environment and Natural Resources
Division of Waste Management
Underground Storage Tank Section
127 Cardinal Drive
Wilmington, North Carolina 28405-3845

Re: **FINAL** Revised Corrective Action Plan
Hadnot Point Fuel Farm
Marine Corps Base
Camp Lejeune, North Carolina

Navy Contract No. N62470-01-D-3009
Delivery Order No. 0072
CATLIN Project No. 203-047
NCDENR Incident No's: 3671,10615,27788

Dear Mr. Reed:

Please find enclosed one copy of the above referenced Revised Corrective Action Plan document. This report is submitted on behalf of Nikki Hall, Marine Corps Base, Camp Lejeune, UST Program Manager.

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

Sincerely,

Richard G. Catlin, P.G., P.E.
President

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

Attachments: Final RCAP

cc Mr. Roger R. Marce, Jr. - Code AQ 135 Contracts (correspondence only)
Commanding General. Attn: Director I&E/EMD/EQB
Commander, LANTNAVFACENGCOM. Attn: EV32JC, John D. Conway, P.G.

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REVISED CORRECTIVE ACTION PLAN (CAP)

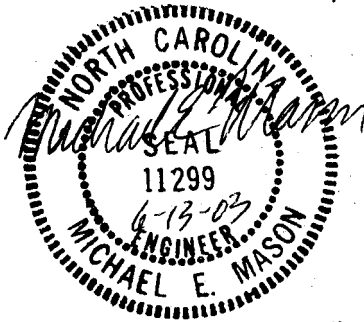
FOR

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

NCDENR UST INCIDENT NOs. 3671,10615 and 22788
FACILITY I.D. NO. 0-002740
SITE RANKING: B

June 13,2003

CONTRACT NO. N62470-01-D-3009
DELIVERY ORDER NO. 0072
CATLIN PROJECT NO. 203-047



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
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	Mooreville Regional Office
MSCC	Maximum Soil Contaminant Concentration
MSL	Mean Sea Level
MTBE	Methyl tertiary butyl ether
µg/Kg	Micrograms per Kilogram
µg/L	Micrograms per Litre
NA	Not Analyzed
N/A	Not Applicable
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCDOC	North Carolina Department of Corrections
NCDOT	North Carolina Department of Transportation
NCSP	North Carolina State Plane
NCSPA	North Carolina State Ports Authority
NE	None Established
NM	Not Measured
NMT	No Measurable Thickness
NS	Not Sampled
o-	ortho
OVA	Organic Vapor Analyzer
p-	para
PAH	Polynuclear Aromatic Hydrocarbons
Pb	Lead
PPB	Parts Per Billion
PPM	Parts Per Million

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

REVISED CORRECTIVE ACTION PLAN

A. TITLEPAGE

DATE OF REPORT: June 13,2003
Facility ID: 0-002740 UST Incident Number (if known): 3671,10615,27788
Site Name: Hadnot Point Fuel Farm
Site Location: Marine Corps Base, Camp Lejeune
Nearest City/Town: Jacksonville County: Onslow
Risk Classification: N/A Land Use Classification: N/A
Site Ranking: B

UST Owner: Commanding General – MCB Camp Lejeune
I&E/EMD/EQB
Address: PSC Box 20004
MCB Camp Lejeune, NC 28542 Phone: (9 0) 45 -5068

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

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

Property Occupant: N/A
Address: N/A Phone: Unknown

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

Release Information

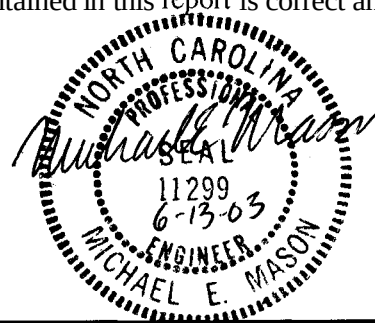
Date Discovered: 1983
Longitude: 77.3665 W Latitude: 34.6839 N
Estimated Quantity of Release: Unknown
Cause of Release: Unknown
Source of Release (e.g. Piping/UST):
Leaks in fuel lines and tanks

Sizes and contents of UST system(s) from which the release occurred:

1-600,000 gal AST, 6-12,000 gal USTs, 8-15,000 gal USTs containing diesel, gasoline, unleaded gasoline, and kerosene were present at the former Hadnot Point Fuel Farm. 1-1,000 gal UST, 2-3,000 gal USTs, 4-5,000 gal USTs containing gasoline and unknown contents were present at the Building 1115 site.

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

(Please Affix Seal and Signature)



**REVISED CORRECTIVE ACTION PLAN (CAP)
FOR
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

JUNE 13, 2003

B. EXECUTIVE SUMMARY

The Hadnot Point Fuel Farm (HPFF) and the Building 1115 project site, which has been included as part of the HPFF, have been the subject of numerous studies and reports beginning in 1985. This report provides the results of the most recent assessment activities and proposes revised corrective actions at the site to fully address contamination at the project site.

The recent assessment activities have been successful in essentially delineating the dissolved contaminant plume across the project site. The plume of dissolved contamination exhibits a east/west orientation, running parallel with groundwater flow and stretches from the former HPFF to Holcomb Boulevard. The plume extends to an approximate depth of 150 feet below land surface (BLS).

The results of a pumping test and subsequent hydrogeologic analysis of the project site, indicate that high permeability zones located beneath the site have acted as leaking artesian aquifers allowing downward leakage of contamination and horizontal spread of the plume at depth. It is suspected that former potable water wells that surrounded the Hadnot Point Industrial Area were the driving force responsible for the downward and horizontal movement of contamination.

The existing air sparging/biosparging/soil vapor extraction system was designed, constructed and has been operating at the HPFF/Building 1115 project site to reduce the dissolved contaminant plume in the core or "hot spots" of the known plume. Based on investigations performed subsequent to installation of this system, a revised remedial approach is recommended for the HPFF/Building 1115 project site to fully address the contamination.

The existing remediation system is proposed to remain and be augmented with a bio-pulse sparging system. Air will be injected in pulses through a network of strategically placed vertical wells to a depth of 150 feet BLS and allowed to diffuse upward through the contaminated groundwater. Aeration of the groundwater will not only strip volatile compounds from the contaminated groundwater but will also stimulate biological activity and bioremediation of the plume.

Hydrodynamic control is also proposed to contain the plume by pumping from a high permeability zone, located approximately 50 to 80 feet BLS. Pumping test data suggests that horizontal containment of the plume can be accomplished by converting the pumping test well, HPFF-75, into a permanent recovery well. Treatment of the recovered groundwater is proposed in the existing treatment system located on-site.

C. INTRODUCTION

1. PURPOSE OF REVISED CORRECTIVE ACTION PLAN

(Refer to Figure 1)

The purpose of this Revised CAP is to present the results of supplemental assessment of hydrocarbon contamination at the former Hadnot Point Fuel Farm (HPFF) project site, located at the Marine Corps Base, Camp Lejeune, North Carolina (see Figure 1) and to provide revised conceptual plans for additional corrective actions at the site. The additional assessment activities included tasks intended to aid in further defining the horizontal extent of petrochemical impact to groundwater in the 50 and 80 feet BLS zones and the performance of a long-term pumping test at the project site. The long-term pumping test was performed in an effort to better understand the hydrogeologic conditions over the project site and to evaluate the potential for plume control/remediation.

This Revised Corrective Action Plan provides revised conceptual plans for corrective actions in accordance with North Carolina Administrative Code (NCAC) Title 15A, Subchapter 2L, Section .0106(c) and the State of North Carolina, Department of Environmental, Health and Natural Resources, Division of Water Quality, Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater dated March 17, 1997. The design presented herein is conceptual in nature and may require field adjustment and/or modifications during construction and implementation.

2. SUMMARY OF REMEDIAL ACTIONS TO DATE

(Refer to Figures 2A and 2B)

a. Tank Removal/Soil Excavation

The Hadnot Point Fuel Farm facility was constructed in 1941 and is shown on Figure 2A along with the existing monitoring well network. The facility had a storage capacity of approximately 792,000 gallons and consisted of one 600,000-gallon capacity AST, six 12,000-gallon USTs, and eight 15,000-gallon USTs. The AST was installed at grade and was used for diesel fuel storage. All of the USTs, utilized to store leaded gasoline, unleaded gasoline, and kerosene, were originally installed at grade and were completely covered with soil. Closure of the HPFF began in 1988 and concluded in 1993 with removal of the storage tanks and associated piping located on the site. Records indicate that all soils excavated to facilitate UST removal and closure were backfilled into the old tank basins. No records indicate that excavated soils associated with closure of the HPFF were removed from the site.

Seven USTs utilized to store gasoline and possibly diesel fuel were previously located at Building 1115. These USTs consisted of two 3,000-gallon capacity USTs installed in 1947 and one 1,000-gallon capacity UST installed in 1942 utilized to store gasoline. The three USTs remained in service until 1951 when they were replaced with four 5,000-gallon USTs. The contents of the four

replacement USTs is unknown but is assumed to have been gasoline or diesel. All seven of the USTs formerly located at Building 1115 were removed on March 9, 1993. Free product was noted in the excavations at the time of UST closure activities and the excavations were backfilled with soils removed during UST removal.

b. Pipeline Removal/Abandonment

According to the Closeout Report for Removal and Abandonment of Underground Fuel Oil Pipelines (Closure Report) prepared by OHM Remediation Services Corporation (OHM) dated June 2001, remedial activities associated with abandonment of a fuel delivery system utilized to deliver fuel from the HPFF to Buildings 1115, 1502, and 1601 occurred between October and December 2000. The inactive distribution system was located along East Road, Ash Street, and West Road. As detailed in the OHM report, activities consisted of the removal or abandonment of approximately 1,000 linear feet of 3-inch pipe, 2,600 feet of 4-inch pipe, and 5,000 feet of predominantly 2-inch pipe. The entire system was leak tested and any piping not passing the leak test was excavated and removed. All of the remaining piping was abandoned in place via grouting. As documented in the Closeout Report, approximately 165 gallons of free product and 790 gallons of fuel/water mixture were recovered from the piping system.

c. Free Product Recovery

In 1991, CATLIN, as subcontractor to Woodington Inc., installed a groundwater and free product recovery and treatment remediation system and operated the system for one year. Geophex, Ltd. (Geophex) took over maintenance and operation of the remediation system in October 1992 and operated the system until September 1997 when it was discontinued in favor of AFVR activities. As of December 1996, a cumulative total of 26,541 gallons of free product had been recovered from the site. Five product recovery wells (RW-1 through RW-4 and MW-16R) were in operation.

In September 1999 the product only skimmer pumps were re-initiated in recovery wells 16R, RW-4, and RW-5. Recovery well locations are presented on Figure 2B. RW-5 is located in the general vicinity of monitoring wells MW-7 and MW-A. The exact location and details of RW-5 are unknown. According to the Draft - 2002 Annual AS/SVE Monitoring Report prepared by OHM dated October 2002, 130 gallons of product were recovered from the three wells in 2002.

Geophex also operated product skimmers in wells GT-4 and GT-5 located adjacent to Building 1115. As of October 10, 1997, 453.38 gallons of free product had been recovered. Further information on these skimmer pumps was not available.

Since October 1997, OHM Remediation Services Corp., has been conducting Aggressive Fluid/Vapor Recovery (AFVR) events to recover free product at the HPFF and the Building 1115 project sites. As of late April 1998, an approximate total of 2,000 gallons of product had been recovered from the subsurface. According to OHM in the Draft 2002 Annual AS/SVE Monitoring Report, 2,000 gallons of total product were removed in 2000, 1,387 gallons in 2001, and 900 gallons in 2002.

d. Air Sparging/Biosparging/Soil Vapor Extraction

In accordance with the Corrective Action Plan prepared by CATLIN and previous reports prepared by OHM, the air sparging/biosparging/soil vapor extraction system was installed in late 1998 and early 1999 (see Figure 2B). The system was designed and installed to reduce the contaminant concentrations in the core or “hot spot” of the known contaminant plume. The system is divided into two general areas, the Northwest Compound and the Southeast Compound.

The Northwest Compound consists of the area associated with Building 1115 and the areas northwest of Center Road. The Southeast Compound consists of the area around the former Hadnot Point Fuel Farm including the areas southeast of Center Road. The layout of the system is shown on Figure 2B.

The Northwest Compound includes five 50-foot deep air sparge (AS) wells and the associated soil vapor extraction (SVE) system, twelve 80-foot deep biosparge wells and four 100-foot deep biosparge wells. The Southeast Compound includes thirty 50-foot deep AS wells and the associated SVE system, and ten 85-foot deep biosparge wells.

According to OHM, the Northwest Compound began operation on February 11, 1999 and the Southeast Compound began operation on April 4 1999. Both systems remained in operation until November 2001, when the systems were shut down to perform geophysical testing. The vapor recovery system remained on. The systems were restarted in January-February 2003 and remain in operation as of this report.

During 1999, a total of 10,300 lbs. of hydrocarbons were reported recovered by the AS/SVE system in the Northwest Compound by OHM in the Draft 2002 Annual AS/SVE Monitoring Report. The recovery rates decreased to 3,540 lbs. in 2000, 1,900 lbs. in 2001, and 900 lbs. from January through August 2002.

OHM reports in the Draft 2002 Annual AS/SVE Monitoring Report that hydrocarbon recovery rates from the AS/SVE in the Southeast Compound ranged from 209,500 lbs. in 1999 to 436,500 lbs. in 2000, to 88,100 lbs. in 2001 and 54,900 lbs. from January through August 2002.

3. PREVIOUS REPORTS

The former HPFF has been the focus of numerous studies since leaks in fuel lines and tanks associated with the site were documented in 1983. The various studies performed at the HPFF and Building 1115 areas have produced a number of reports including the following:

1. A Verification Step Study. Prepared by Environmental Science and Engineering, Inc. (ESE), 1985.
2. Characterization Step Report. Prepared by Environmental Science and Engineering, Inc. (ESE), 1988.
3. Contaminated Groundwater Study, Marine Corps Base, Camp Lejeune, NC Hadnot Point Area. Prepared by O'Brien & Gere Engineers, Inc., December 1988.
4. Product Recovery System Design, Hadnot Point Fuel Farm, Marine Corps Base, Camp Lejeune, NC. Prepared by O'Brien and Gere Engineers, Inc., January 1990.
5. Hadnot Point Fuel Recovery System Quarterly Report for the Period of 1 January through 31 March 1993. Prepared by Geophex, Ltd.
6. Hadnot Point Fuel Recovery System, Monthly Report (February 1993). Prepared by Geophex, Ltd., April 16, 1993.
7. Five Well Plus Five Additional Well Site Check Report, Building 1115, Marine Corps Base, Camp Lejeune, NC. Prepared by Groundwater Technology Government Service, October 14, 1993.
8. Remedial Investigation Report Operable Unit No. 1 (Sites 21, 24, and 78), Marine Corps Base, Camp Lejeune, NC. Prepared by Baker Environmental, Inc., June 1994.
9. Leaking Underground Storage Tank Comprehensive Site Assessment, Tank 1115, Marine Corps Base, Camp Lejeune, NC. Prepared by Richard Catlin & Associates, Inc., March 13, 1998.
10. Leaking Underground Storage Tank Additional Site Assessment Report, Building 1115, Marine Corps Base, Camp Lejeune, NC. Prepared by Richard Catlin & Associates, Inc., March 13, 1998.
11. Leaking Underground Storage Tank Comprehensive Site Assessment, Hadnot Point Fuel Farm, Marine Corps Base, Camp Lejeune, NC. Prepared by Richard Catlin & Associates, Inc., June 20, 1997.

12. Hadnot Point Fuel Recovery System, Monthly Report (December 1996). Prepared by Geophex, Ltd., January 13, 1997.
13. Hadnot Point Fuel Recovery System, Quarterly Report, Fourth Quarter, 1996. Prepared by Geophex, Ltd., January 15, 1997.
14. Quarterly Monitoring Report, Operable Unit No. 1 (Sites 24 and 78), Marine Corps Base, Camp Lejeune, NC. Prepared by Baker Environmental, Inc., February 7, 1997.
15. Quarterly Monitoring Report, Operable Unit No. 1 (Sites 24 and 78), Marine Corps Base, Camp Lejeune, NC. Prepared by Baker Environmental, Inc., April 24, 1997.
16. Leaking Underground Storage Tank Corrective Action Plan for Soil and Groundwater Remediation Via Aggressive Fluid/Vapor Recovery, Soil Vapor Extraction, Air Sparging, and Natural Attenuation/Degradation at the Hadnot Point Fuel Farm/Building 1115. Marine Corps Base, Camp Lejeune, NC Prepared by CATLIN Engineers and Scientists, April 30, 1998.
17. Statement of Work Design. Hadnot Point Fuel Farm/Building 1115. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by CATLIN Engineers and Scientists, May 14, 1998.
18. Workplan. Construction and Operation of Biosparging, Air Sparging, and Soil Vapor Extraction Remediation Systems with Aggressive Fluid Vapor Recovery. Hadnot Point Fuel Farm Building 1115 Marine Corps Base, Camp Lejeune, North Carolina. Prepared by OHM Remediation Services Corp., August 1998.
19. Summary of Biosparging Pilot Test. Hadnot Point Fuel Farm/Building 1115. Prepared by CATLIN Engineers and Scientists, November 23, 1998
20. Leaking Underground Storage Tank Additional Site Assessment. Hadnot Point Fuel Farm/Building 1101. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by CATLIN Engineers and Scientists, December 21, 2000.
21. Summary of Findings HPFF/Building 1101 Remediation Performance Assessment. Prepared by CH2MHILL, May 23, 2001
22. Closeout Report for Removal & Abandonment of Underground Fuel Oil Pipelines, Hadnot Point Industrial Area. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by OHM Remediation Services Corporation, June 2001.

23. Well Sampling Monitoring Report. Hadnot Point Fuel Farm. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by CATLIN Engineers and Scientists, July 20, 2001.
24. Leaking Underground Storage Tank Site Assessment - Gauging All Wells at Hadnot Point Fuel Farm, 2001 Event. Prepared by CATLIN Engineers and Scientists, January 17, 2002.
25. POL Remediation for the Hadnot Point Fuel Farm – “The Solid (?) Ground Beneath Our Feet.” Prepared by Lori Reuther – LANTDIV and James A. Dunn, Jr., P.E. – IT Corporation, February 7, 2002.
26. Annual AS/SVE Monitoring Report Buildings 1115 Sites, Marine Corps Base, Camp Lejeune, Onslow County, North Carolina. OHM Remediation Services Corporation, May 2002.
27. Geophysical Investigation at the Former Fuel Farm Facility and Surrounding Areas. Hadnot Point, MCB, Camp Lejeune, NC. Prepared by Geophex, Ltd., May 2002.
28. Identification, Correlation, and Assimilation of Organic Subsurface Soils. Hadnot Point Fuel Farm. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by CATLIN Engineers and Scientists, June 19, 2002.
29. Additional Soil Sampling Activities – Letter Report (6287 BEMD) investigation completed by OHM Remediation Services Corporation, August 13, 2002
30. Characterization of Subsurface Free Product Migration Pathways. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by CATLIN Engineers and Scientists, August 14, 2002.
31. Draft – 2002 Annual AS/SVE Monitoring Report, Hadnot Point Fuel Farm/Building 1115 Sites. Marine Corps Base, Camp Lejeune, Onslow County, North Carolina. Prepared by OHM Remediation Services Corporation, October 2002.
32. Downward Migration of LNAPL at the Hadnot Point Industrial Area. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by Lori Parks Reuther-LANTDIV, October 24, 2002.
33. Air Sparge Cessation Evaluation Report Hadnot Point Fuel Farm, Marine Corps Base, Camp Lejeune, Onslow County, North Carolina. Prepared by OHM Remediation Services Corp., January 2002.

34. Hadnot Point 2002 Well Gauging, Sampling, and Additional Well Installation Report. Marine Corps Base, Camp Lejeune, North Carolina. Prepared by CATLIN Engineers and Scientists, December 13, 2002.

4. RECEPTOR INFORMATION

As defined by the NCDENR in Section .0102 of NCAC T15A:02L, potential receptors include any human, plant, animal, or structure with the potential to be adversely affected by the release or migration of contaminants. Guidance documents issued by the regulatory agency indicate that structures may include items such as utility lines, basements, and elevator shafts. Although not specifically included in the rule definition (NCAC T15A:02L .0102), regulatory officials also consider potential receptors to include environmental resources such as water supply wells, surface waters, drinking water supplies, and "regions of groundwater that have been identified for planned resource development".

Performance of the potential receptors survey involved not only an evaluation of the presence of potential receptors but also an evaluation of transport mechanisms by which the contaminants are transported from the source to the receptor. Furthermore, with respect to human receptors, the survey also involved a cursory evaluation of exposure pathways including ingestion, inhalation, and adsorption. As petroleum fuel seeps through the subsurface, adsorption onto soil particles and volatilization into pore spaces occurs. The remaining petroleum fuel moves vertically downward (in the absence of preferred lateral routes of migration) until it reaches the capillary fringe (in the absence of a permeable barrier above the capillary fringe). Petroleum fuel, now in the liquid phase, spreads throughout the capillary fringe and dissolves into the groundwater.

Exposure to contaminated soils is contingent upon site disturbance through construction or remediation activities. Potential receptors can be exposed to petroleum hydrocarbons found in the soil through inhalation of volatilized compounds and dermal contact with contaminated soil.

Water Well Inventory

No active, potable water supply wells were identified within a 1,500-foot radius of the project site. Several inactive and abandoned wells were identified within the Hadnot Point Industrial Area (HPIA), but were located outside of the 1,500 feet radius. According to the Camp Lejeune Water Plant personnel, wells HP-601, HP-602, HP-603, HP-608, HP-630, HP-634, and HP-660, which were located in the HPIA, have been permanently abandoned in accordance with the State of North Carolina Well Construction Standards. The only nearby, active supply well, HP-642, is located up-gradient of groundwater flow, approximately 2,600 feet east-southeast of the project site.

Utility Survey

Based on the CATLIN field observation/survey and information provided by the MCB Engineering Office, underground utilities located within the HPFF/Building 1115 area appear to be located at depths above the water table, except for the steam tunnels. Utilities in the area were documented in the CAP dated April 30, 1998.

Depth to groundwater beneath the site ranges from four to 12 feet below grade. The subterranean utilities (except the steam tunnels) are reportedly installed less than five feet below grade and, therefore, are not considered a potential receptor or a preferential pathway for contaminant migration.

Surface Water Bodies

The nearest mapped body of surface water is Beaverdam Creek, located approximately 1,400 feet to the west of the Hadnot Point Fuel Farm/Building 1115 area.

Existing Buildings

Since the contaminant plumes for soil and groundwater at the project area extend underneath numerous existing buildings, in particular, Buildings 1101, 1108, 1200, 1201, 1202 and 1301, there exists the potential for these buildings to be adversely affected by petroleum hydrocarbon vapors. The main control building (northeast of Building 1005) for the Temporary Fuel Farm has been evacuated for the presence of petroleum hydrocarbon vapors. A forced air ventilation system has been installed to exhaust petroleum hydrocarbon vapors from a utility manhole outside the building. Additionally, during the later part of November 1999 petroleum odors were noted inside Building 1101 at levels that required evacuation of building personnel. In response to the vapor impact, a SVE system was installed along the entire length of the northeastern side of the building.

Basements

The majority of the buildings in the vicinity of the site appear to be slab-on-grade construction and, therefore, no accumulation of vapors into a subterranean structure is likely. However, a number of buildings in the vicinity, including Buildings 1101, 1108, 1200, 1201 and 1301, were constructed in a manner in which the slab-on-grade was situated on roughly four feet of fill surrounded by a foundation wall constructed on existing grade. The resultant structure is susceptible to accumulation of vapors.

D. ADDITIONAL ASSESSMENT ACTIVITIES

1. PURPOSE OF ASSESSMENT ACTIVITIES

The purpose of the additional assessment activities performed as part of this investigation was to aid in further defining the horizontal extent of petrochemical impact to groundwater in the 50 feet and 80 feet BLS zones. Monitoring wells HPFF-73 (50 feet deep), HPFF-74 (80 feet deep), HPFF-76 (50 feet deep), and HPFF-77 (50 feet deep) were installed. Assessment activities additionally included installation of pilot testing monitoring well HPFF-75 (80 feet deep) and the performance of a long-term pumping test at the project site. Previous aquifer testing, including pumping tests and slug testing, has been conducted at various locations on the project site; however, these tests primarily targeted the shallow (less than 40 feet deep) groundwater zones, and were limited in duration. A long-term pumping test was conducted and was intended to provide valuable data necessary to understand hydrogeologic conditions and evaluate the potential use of pumping for plume control and remediation in the deeper (greater than 30 feet BLS) portions of the site.

2. SOIL ASSESSMENT ACTIVITIES

(Refer to table 2 and Appendices C and F)

This site has historically been subject to the Soil Clean Up Levels as established in the March 1997 Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater. These Guidelines set forth the Soil Clean Up Levels of 10 ppm for TPH-gasoline and 40 ppm for TPH-diesel. Soil assessment activities completed as part of this investigation are detailed below.

a. Soil Sample Collection

Field screening was conducted on the split-spoon samples obtained at 5-feet intervals during the drilling of the monitoring well boreholes to determine if organic vapors were present. Each split-spoon sample was placed in a labeled, air tight, plastic bag and left undisturbed for several minutes to allow the organic vapors to equilibrate. The bag was then pierced with the tip of either an Organic Vapor Analyzer (OVA) or a Photo Ionization Detector (PID) and the reading was recorded on the boring logs. The results of the field screening are included on the boring logs included in Appendix C.

Results of the field screening in conjunction with field observation including physical evidence of petroleum impact or soil moisture content were utilized to select soil samples collected from the split-spoon sampler to be submitted for laboratory analysis. One representative soil sample was collected from within the vadose zone from each boring and submitted for laboratory analysis. A duplicate sample was selected additionally from boring HPFF-73. All submitted soil samples were submitted to the laboratory for analysis for total petroleum hydrocarbons (TPH) gasoline range organics (GRO) per EPA Method 5030 and TPH diesel range organics (DRO) per EPA Method 3550.

b. Results of Soil Laboratory Analyses

Results of laboratory soil analysis conducted during this investigation are presented on Table 2. The only sample reported with concentrations above laboratory quantitation limits during this investigation was HPFF-75 (3-5') that had a TPH-DRO concentration of 8.0 mg/kg, which is below the Action Level for TPH-DRO of 40 mg/kg. Laboratory reports and chain of custody documentation are included in Appendix F.

3. GROUNDWATER ASSESSMENT ACTIVITIES

(Refer to Tables 1, 4, 5 and 6 and Appendices C, D and F)

Groundwater assessment activities completed as part of this investigation are detailed below.

a. Monitoring Well Installation

In an effort to identify the horizontal extent of known petroleum contamination identified at depths of 50 feet and 80 feet BLS, three 50 feet deep Type III monitoring wells (HPFF-73, 76, and 77) and one 80 feet deep Type III monitoring well (HPFF-74) were installed as part of this investigation. One additional pilot test monitoring well (HPFF-75) was installed to a depth of 80 feet BLS to facilitate completion of a long term pumping test. The monitoring wells were installed utilizing a combination of mud rotary and hollow stem auger drilling techniques in conjunction with split spoon sampling.

Pilot borings were advanced in all Type III monitoring wells to a depth of 40 feet BLS to allow for collection of split spoon samples. A geologist trained in visual classification of soils described all samples in the field. Following termination of the pilot borings, six-inch diameter Schedule 40 PVC casings were advanced to 40 feet BLS and grouted in place with neat cement. After sufficient time elapsed to allow the grout to cure, the boring for the 80 feet deep monitoring well was advanced through the six-inch casing to a depth of 70 feet and a four-inch diameter schedule 40 PVC casing was installed to the bottom of the boring and grouted in place. After a minimum of 24 hours, a boring was advanced to either 50 feet BLS or 80 feet BLS and five feet of Schedule 40 PVC, slot .010 inch well screen and two inch Schedule 40 PVC riser was installed to the bottom of the boring and backfilled with medium torpedo sand (+/- seven feet), bentonite pellets (+/- two to eight feet), and neat cement (to the surface).

The pilot test well (HPFF-75) was installed to a depth of 80 feet BLS and constructed with six-inch diameter schedule 40 PVC casing and 0.010 inch slotted well screen. A pilot boring was advanced as previously described to a depth of 80 feet and subsequently over-reamed to allow for the placement of the well materials that consisted of casing from land surface to 55 feet BLS,

well screen from 55 feet to 75 feet BLS, and sediment trap (extended casing) from 75 to 80 feet BLS.

All wells were allowed to remain undisturbed for a minimum of 24 hours following completion then developed by a combination of low-yield pumping and surging to remove fine sediments and grade the gravel pack.

Boring logs with monitoring well as-builts and North Carolina Well Construction Records for wells HPFF-73 through HPFF-77 are included in Appendix C. A summary of monitoring well construction data for these wells, along with monitoring wells previously constructed at the site, are included in Table 1.

Upon review of the pumping test results, it was determined that the pilot test well could be utilized as a pumping/recovery well that will be incorporated as part of the remedial system. In order to establish well HPFF-75 as a recovery well, a North Carolina Application for Permit to Construct a Recovery Well System has been completed and included in Appendix D.

b. Groundwater Sample Collection

The groundwater sampling conducted during this investigation consisted of collecting groundwater samples from the four newly installed Type III monitoring wells (HPFF-73, HPFF-74, HPFF-76 and HPFF-77) and the one newly installed 80 feet deep pilot test well (HPFF-75). Prior to collection of the groundwater sample, each well was gauged to determine the depth to water and the volume of water in each well was calculated. To ensure that representative groundwater samples were collected, three well volumes of water were purged from each monitoring well utilizing either a low volume submersible pump or a disposable Teflon bailer. As the wells were purged, groundwater turbidity was visually monitored and recorded. Groundwater samples were placed in the appropriate laboratory glassware, labeled, and then kept on ice (<4°C) during transportation to the analytical laboratory. All groundwater samples were transported with the appropriate chain-of-custody (COC) and analyzed at Paradigm Analytical Laboratories, Inc. of Wilmington, North Carolina. The appropriate containers for each analysis are as follows:

Analytical Method	Bottle Type and Size	Total Number of Bottles per Sample	Preservative
EPA 601	Clear Glass Vial/ 40 ml	3	HCl
EPA 602 + Xylenes and MTBE	Clear Glass Vial/ 40 ml		
EPA 625 + 10 TICs	Amber Glass Jar/ 1 Liter	1	<4°C

c. Results of Groundwater Laboratory Analyses

EPA Method 602 (Purgeable Aromatics)

Benzene was the only EPA Method 602 analyte identified in the groundwater samples collected from the newly installed wells at levels above the 2L GWQS.

Benzene was identified at levels of 650 µg/L in the groundwater sample collected from HPFF-75 and 71 µg/L in the groundwater sample collected from HPFF-76. The current 2L GWQS for benzene is 1.0 µg/L. Diisopropyl ether was the only additional purgeable aromatic identified during this sampling event at levels above the laboratory method detection limit. The groundwater sample collected from HPFF-76 was reported to contain 6.4 µg/L of diisopropyl ether. The current 2L GWQS for diisopropyl ether is 70 µg/L. Laboratory results are summarized on Table 4. Laboratory reports and COC documentation are presented in Appendix F.

EPA Method 610 (Polynuclear Aromatic Hydrocarbons)

No analytes identified from EPA Method 610 analysis were identified at levels above laboratory quantitation limits during this sampling event. Laboratory reports and COC documentation are presented in Appendix F and summarized on Table 5.

EPA Method 601 (Purgeable Halocarbons)

Compounds identified via EPA Method 601 analysis were identified in groundwater samples collected from three monitoring wells during this investigation. Chloroform was detected in the groundwater sample from HPFF-74 at a concentration of 1.1 µg/L, which is in excess of the 2L GWQS of 0.19 µg/L. Analyte 1,2-Dichloroethane was identified at concentrations of 20 µg/L in the groundwater sample collected from HPFF-75. The current 2L GWQS for 1,2-Dichloroethane is 0.38 µg/L. Trichloroethene was identified at a concentration of 170 µg/L in the groundwater sample collected from HPFF-76. The current 2L GWQS for trichloroethene is 2.8 µg/L. Laboratory reports and COC documentation are presented in Appendix F. Laboratory results are summarized on Table 6.

4. HYDROGEOLOGIC ASSESSMENT ACTIVITIES (Refer to Appendix A)

a. Performance of Pumping Test

In order to better understand the hydrogeologic conditions over the project site and to evaluate the potential for plume control/remediation, a pumping test of the shallow limestone unit underlying the site was performed in early May 2003.

A six-inch diameter test well was constructed near the existing Hadnot Point groundwater treatment system, centrally located in the shallow hydrocarbon plume. The well was installed and screened across the limestone unit from 55-75 feet BLS. (See HPFF-75 on Figure 2A for pumping test well location).

A portable treatment unit capable of treating contaminated groundwater with discharge to the Camp Lejeune sanitary sewer system was installed for the two-week test duration. A submersible pump was installed near the bottom of the well and a control valve and flow meter was installed in the discharge line.

After a step drawdown test was performed on May 5, 2003, a constant flow rate of 30 GPM was selected for the test. This flow stabilized drawdown levels in the pumping well at 50 feet below top of casing. Top of screen was constructed at 55 feet BLS.

Prior to beginning the pumping test, all project monitoring wells were gauged to determine pre-pumping water levels. At start-up of the pumping test, several wells were selected for frequent drawdown measurement. Monitoring well 78GW32-02, which is screened from 64-74 feet BLS across most of the tested zone and only 300 feet from the pumping well, was selected as the primary observation well for time/drawdown analysis. Other frequently monitored wells provided general information for constructing a hydrogeologic model either by showing limited connection to the tested zone at 55-75 feet BLS or by exhibiting varied responses at different screened depths.

The pumping test started May 7, 2003 and lasted for 14 days. All project monitoring wells were gauged prior to terminating pumping to help understand the overall effects of long term pumping at various depths and to provide empirical data to check calculated hydrogeologic predictions. Additionally, water withdrawn from the pumping well was analyzed prior to start-up and again during pumping to determine contaminant concentrations.

The overall goals of the test were:

- Determine if pumping from the shallow limestone zone could accomplish hydrodynamic plume control;
- Determine location, flow, and number of pumping wells necessary to control the plume;
- Develop a hydrogeologic model for the site that could explain plume geometry;
- Determine general leakance gradients;
- Determine pre- and end pumping potentiometric surfaces for various depths; and
- Provide a general understanding of subsurface hydrogeologic and contamination dynamics to help develop additional remediation strategies.

b. Evaluation of Pumping Test

Evaluation of data from the pumping test performed on HPFF-75 from May 7, 2003 through May 21, 2003 was approached both analytically and empirically.

Data utilized for pumping test evaluation are included in Appendix A – Hydrogeologic Analysis of this report. Data includes:

- Hydrogeologic calculations.
- Full logarithmic 3x5 field data plot of time vs. drawdown for primary observation well 78GW32-02 located 300 feet from pumping well and screened generally in the same strata.
- Drawdown measurements for monitoring/observation wells prior to initiation of pumping test and prior to pumping test termination 14 days later.
- Well logs of selected observation wells for empirical verification of model.
- Time/Drawdown plots for other wells.

A type-curve graphical solution was chosen to verify hydrogeologic assumptions as well as to calculate aquifer constants. The field plot of observation well 78GW-32-02 fit best with type curves for a leaky artesian aquifer, which is also supported by boring log data across the project. As presented in Appendix A, calculated aquifer constants for the shallow sand/limestone unit boundary generally found from 55 to 75 feet BLS, provided a transmissivity of 867 ft²/day, and a storativity of 0.0058.

Further calculation predicted a 0.5 foot drawdown 1,363 feet from HPFF-75 after 14 days of constant withdrawal of 30 GPM. To empirically test this model, several observation wells generally screened in this zone of relative

permeability were checked for cumulative drawdown from pre-pumping to just prior to pumping test termination. Two wells at 1,230 feet to 1,260 feet from the pumping well showed from 0.96 feet to 0.53 feet of drawdown, respectively, after 14 days of pumping, providing good empirical verification of predicted 14 day influence.

Calculation of projected drawdown at the estimated boundary (2,000 feet from HPFF-75) after 30 days of constant withdrawal of 30 GPM yields a drawdown of 0.51 feet. Based on calculations and empirically measured effects, it appears that the test well (HPFF-75), pumped at a constant discharge rate (Q) of 30 GPM, should provide influence over the entire plume.

Hydrogeologic representations shown in Figures 28 and 29 summarize the hydrogeologic regime at this site in a schematic graphic. Vertical leakage from both the relatively impermeable upper sediments and lower strata are further evidenced by potentiometric differentials from the tested aquifer (high permeability zone; HPZ) and observation points screened above and below the HPZ. Hydraulic connectivity between upper and lower strata with the HPZ vary considerably across the site with the greatest variability in the upper sediments. However potentiometric levels generally show a hydraulic potential for downward and, to a lesser extent, upward leakage into the HPZ.

An additional tool to evaluate aquifer analysis includes contouring potentiometric surfaces at various depths before pumping and after 14 days of continuous pumping. Figures 8 through 11 show pre-pumping potentiometric surfaces at various depths, and Figures 12 through 15 show potentiometric surfaces after 14 days of pumping.

The shallow groundwater contours of wells less than 30 feet deep after 14 days of pumping depict a very significant relationship between the surficial water table aquifer and the HPZ at 55-75 feet BLS. As seen in Figure 12, actual depressions in the water table surface identify zones of relatively high leakance. The largest zone of leakance unfortunately exists in the general vicinity of the initial hydrocarbon release. This zone of leakance coupled with data from nearby (and now abandoned) production wells screened in the same high permeability zone of sandy limestone underlying the plume, could explain how vertical and horizontal contamination migration at depth reached the present day plume geometry.

Samples collected from the pumping well showed that the HPZ at 55-75 feet BLS is contaminated. Pre-pumping analysis yielded 650 ppb Benzene. After seven days of pumping at 30 GPM, concentrations had risen to 1,300 ppm Benzene. Laboratory results are included on Table 4.

E. SUMMARY OF CONTAMINATION ASSESSMENT ACTIVITIES

1. FREE PRODUCT CONTAMINATION

(Refer to Table 3 and Figures 4 through 7)

Review of data generated during the groundwater gauging events conducted on May 2 and May 21 2003 indicates a substantial reduction in the scale of the free product plumes. Free product plumes for 1997-2000 are shown on Figure 4, for 2000 on Figure 5, and for 2002 on Figure 6. As depicted on Figure 7, at the conclusion of the pumping test, measurable thicknesses of free product were limited to monitoring wells MW-18 (0.12 ft.), HPFF-15 (0.50 ft.), and HPFF-72 (0.76 ft.). A number of additional monitoring wells were noted to contain sorbent. These wells include: 1115-07, HPFF-25, HPFF-28, MW-A, MW-01, MW-02, MW-10R, MW-12, and MW-15. It is not known if measurable amounts of free product have been identified in these wells. A follow-up gauging event will be performed to observe these wells without sorbents. Monitoring well gauging data is presented on Table 3.

2. SOIL CONTAMINATION

(Refer to Table 2, Figure 3, and Appendix E)

Soil contamination associated with the present plume has only been identified in two soil samples near the original source area of the plume. Based on soil samples obtained since 2000, Figure 3 shows the location of detected soil contamination.

While a number of soil samples obtained throughout the life of this project have shown varying levels of hydrocarbon concentrations (see Table 2 and soil data obtained by OHM in Appendix E), the majority of these were taken from the smear zone at or near the highest recorded water table elevations in the area of past free product accumulations and are not represented as soil contamination on Figure 3.

Only soil laboratory results above the 4 to 6 feet BLS range near the original area of release and free product plume area are considered as soil contamination for this Revised Corrective Action Plan. The two locations where actual vadose zone contamination exceeding action levels was found are at HPFF-29 and HPFF-65, both of which are located within the influence of the existing soil venting system.

One additional area of soil contamination associated with HPFF-45 was identified, however, it is not likely associated with the releases at the HPFF. This apparent soil contamination will be handled as a separate incident.

3. SITE HYDROGEOLOGY

The subsurface sediments, not unlike most East Coast depositional environments, present a complex, interfingered, irregular, and alternating profile of sands, silts, clays, peats and limestone units to at least 160 feet below the Hadnot Point area.

The aquifer test conducted at this site integrated conditions over a large area and provided insight into subsurface water bearing zones that were otherwise difficult to deduce from the complex variation of split-spoon samples from hundreds of borings.

From aquifer test results, geologic data, historical production well construction records and trend analysis of plume geometry over time, a simplified aquifer model has emerged to help explain and to remediate what has been a very perplexing contaminant plume.

Hydrogeologically speaking, the site subsurface consists of three leaky artesian zones (or aquifers) separated by zones of lesser permeability. The first high permeability zone (HPZ) begins at a depth of 50 to 55 feet BLS across the site and ends at a depth ranging from 75 to 80 feet BLS. This HPZ is a sandy limestone aquifer with a calculated transmissivity of 867 feet²/day. It transmits water, contaminants, and air readily.

Above this HPZ, exists interbedded silts, sands, and clays to the land surface. These sediments are relatively impermeable and were the initial zone of contamination impact.

Below the first HPZ is a relatively impermeable zone of silty sands to a depth of approximately 95 feet BLS. At 95 feet, a thin weathered limestone with a thickness of approximately 10 feet produces a second zone of increased permeability.

Below this zone to a depth of roughly 140 feet BLS, interbedded sands and silty sands with cemented lenses form another lower permeability zone before a sandy third zone of higher permeability is encountered.

Historic data from nearby water supply production wells (now abandoned) summarizes these water bearing zones into three screened water bearing production zones at average bracket depths of 60 to 70 feet, 100 to 110 feet, and 130 to 145 feet BLS.

Past withdrawal of water from these wells lowered the potentiometric surface in each of these leaky artesian zones and created a hydraulic potential for downward migration of hydrocarbon contamination. Area-wide potentiometric gradients at all depths have also caused horizontal contamination migration generally to the west. The largest areal extent of contamination is found in wells screened near 50 feet BLS. This may be due to induced flow from past pumping or to proximity to the upper HPZ along with area wide gradients.

While most data from soil observations and recovery efforts in the upper sediments from 0 to 30 feet suggest a low permeability in this zone, contamination has found pathways to the underlying HPZ. Variations in the shallow water table contours near the end of the recent pumping test demonstrate the differentials of leakage potential across the site. Possible explanations for these leakage zones include man-made pathways from old, ungrouted geotechnical foundation borings and foundation pilings, as well as naturally occurring depositional anomalies.

The highest levels of contamination in the deepest zones appear to be concentrated directly below the original source area and are probably due to long-term vertical gradients during past groundwater withdrawals. Pumping test data suggests that withdrawal from HPFF-75, centrally located in the original plume area, will induce an upward gradient from the impacted lowest zones directly beneath the area approximately 500 to 600 feet in diameter around the pumping well. Additionally, pumping test data suggests that horizontal containment of all other portions of the plume may be possible with constant pumping of HPFF-75.

4. GROUNDWATER CONTAMINATION

(Refer to Tables 4,5 and 6 and Figures 16 through 27)

Groundwater samples utilized to establish petroleum contamination limits for this investigation were collected during four sampling events conducted between February 2002 and April 2003. The events occurred in February 2002 (conducted by OHM during a scheduled monitoring event), March 2002 (by CATLIN following installation of additional monitoring wells), July 2002 (by CATLIN during a scheduled sampling event) and April 2003 (by CATLIN during this current investigation). All groundwater samples were laboratory analyzed for Purgeable Aromatics by EPA Method 602 and Polynuclear Aromatic Hydrocarbons by EPA Method 610. Numerous monitoring wells were additionally sampled for Purgeable Halocarbons per EPA Method 601. Groundwater sampling results are presented on Table 4 (EPA 602), Table 5 (EPA 610), and Table 6 (EPA 601). All summary tables additionally contain historical analytical results for all active monitoring wells located at the HPFF site.

a. Shallow Conditions

Analysis of groundwater samples collected from the shallow monitoring wells (Type II) revealed numerous constituents from all sample parameters above 2L GWQS. Concentrations of benzene identified by EPA Method 602 analysis have been utilized as an indicator constituent to define dissolved plume geometry and magnitude. Benzene concentrations identified during the sampling events were plotted on a site map and concentration isopleths were interpolated between the monitoring points. Contours were established by interpreting a “compliance boundary” based on the current 2L GWQS for benzene of 1.0 mg/L.

As presented on Figure 16, the shallow dissolved plume of EPA 602 constituents has essentially been delineated. No 602 compounds were identified at levels in excess of 2L GWQS if benzene was not identified within the same sample. The plume exhibits an east/west orientation that is parallel with the groundwater flow trend. The highest levels of benzene impact were identified in the southeast sector of the project site near the former HPFF tank basins. Groundwater sampling results for Purgeable Aromatics per EPA Method 602 are presented on Table 4.

Groundwater samples (from the Type II shallow wells) were analyzed per EPA Method 610 and the concentrations were plotted on Figure 20. The estimated areal extent of contamination, as shown on Figure 20, is based on the concentration of naphthalene detected in the samples. Groundwater impacted by EPA 610 constituents appears to be adequately delineated. Groundwater identified with EPA 610 constituents above 2L GWQS is limited to the immediate area around the former tank basin extending hydraulically down gradient to Building 1108. Groundwater sampling results for Polynuclear Aromatic Hydrocarbons per EPA Method 610 are presented on Table 5.

Groundwater samples (from the Type II shallow wells) were collected and analyzed from only five Type II monitoring wells in March 2002 per EPA Method 601. Results of the sampling are presented on Figure 24. Due to the limited number of sampling points, the horizontal extent of impacted groundwater was not established. Groundwater sampling results for Purgeable Halocarbons per EPA Method 601 are presented on Table 6. Only the sample from HPFF-72 exhibited a contaminant concentration in excess of the 2L GWQS. 1,2-Dichloroethane was detected at 590 µg/L, which is above the 2L GWQS of 0.38 µg/L.

b. 50 Feet Deep Conditions

As presented on Figure 17, the extent of the dissolved EPA 602 constituents groundwater plume is essentially delineated in the 50 feet deep zone. Concentrations of benzene have been used as an indicator compound to establish the extent of dissolved EPA 602 constituents. The plume geometry displays the same general trend as that noted in the shallow zone. The highest concentrations of benzene were identified in the sample collected from 1115-20 (15,000 mg/L) located between building 1101 and 1108 and from the sample collected from HPFF-8 (12,300 mg/L) located within the former HPFF tank basin. Groundwater sampling results for Purgeable Aromatics per EPA Method 602 are presented on Table 4.

Groundwater samples collected from 50 feet deep Type III monitoring wells were analyzed per EPA Method 610. The total concentrations of identified 610 compounds and estimated areal extent of naphthalene above the 2L GWQS were plotted on Figure 21. The plume has been delineated with the exception of the area around HPFF-57. The naphthalene concentration identified in the groundwater sample collected from HPFF-57 was 33 mg/L that is slightly above the 2L GWQS of 21 mg/L for naphthalene. Groundwater sampling results for Polynuclear Aromatic Hydrocarbons per EPA Method 610 are presented on Table 5.

Results of the EPA 601 analysis conducted on groundwater samples collected from 50 feet deep Type III monitoring wells are presented on Figure 25. Only groundwater samples collected from wells HPFF-47, HPFF-57, HPFF-66, and HPFF-76 contained EPA 601 analytes above 2L GWQS. Due to the limited number of sampling points, the horizontal extent of impacted groundwater was not established. Groundwater sampling results for Purgeable Halocarbons per EPA Method 601 are summarized on Table 6.

c. 70 - 90 Feet Deep Conditions

The geometry of the dissolved groundwater plume, per EPA Method 602, has been essentially established. However, as depicted on Figure 18, the areal extent of the plume has not been delineated to the east of the subject site. Benzene concentrations identified in groundwater samples collected from within the 70-90 feet zone were generally lower than those identified within the shallow and 50 feet zones. Groundwater sampling results for Purgeable Aromatics per EPA Method 602 are summarized on Table 4.

The concentrations of EPA 610 compounds identified in groundwater samples collected from monitoring wells screened between 70 and 90 feet BLS were plotted on Figure 22. All groundwater samples collected from within the 70-90 feet deep zone, with the exception of the sample collected from 78GW-32-2, contained no measurable concentrations (BQL) of EPA 610 compounds. Naphthalene was identified in the groundwater sample collected from 78GW-32-2 at a concentration of 16 **mg/L**, which is less than the 2L GWQS for naphthalene of 21 **mg/L**. Groundwater sampling results for Polynuclear Aromatic Hydrocarbons per EPA Method 610 are summarized on Table 5.

Groundwater samples collected from the Type III monitoring wells screened between 70 to 90 feet were additionally analyzed per EPA Method 601. Results of the sampling are presented on Figure 26. Numerous groundwater samples analyzed per EPA 601 contained constituents above 2L GWQS. The wells located in the northern and western portions of the site exhibited the greatest impact. Groundwater sampling results for Purgeable Halocarbons per EPA Method 601 are presented on Table 6.

d. Greater than 100 Feet Deep Conditions

Benzene concentrations identified from groundwater samples collected from monitoring wells screened greater than 100 feet deep are presented on Figure 19. The estimated areal extent of the dissolved EPA 602 plume is substantially smaller in magnitude than the plumes identified above 100 feet deep. The highest concentrations of benzene within the zone was identified in the groundwater sample collected from well HPFF-60 that is located immediately west (hydraulically down gradient) of the former tank basin. The dissolved EPA 602 plume is delineated to the northwest and southwest. However, based on the declining trend in the benzene concentrations in an easterly and

hydraulically upgradient direction, the estimated plume boundary has been drawn with a high confidence level. No benzene concentrations above 2L GWQS were identified to the northwest of Holcomb Boulevard. Groundwater sampling results for Purgeable Aromatics per EPA Method 602 are presented on Table 4.

The concentrations of EPA 610 compounds identified in groundwater sampled collected from monitoring wells greater than 100 feet deep were plotted on Figure 23. With the exception of the groundwater sample collected from well HPFF-60, all groundwater samples collected from within the 150 feet deep zone contained no measurable concentrations (BQL) of EPA 610 compounds. The groundwater sample collected from HPFF-60 contained 36 **mg/L** of naphthalene, which is slightly above the 2L GWQS for naphthalene of 21 **mg/L**. No other EPA 610 compounds were identified in the sample. Groundwater sampling results for Polynuclear Aromatic Hydrocarbons per EPA Method 610 are presented on Table 5.

Groundwater samples collected from monitoring wells greater than 100 feet deep were additionally analyzed per EPA Method 601. Results of the most recent sampling event are summarized on Figure 27. Samples collected from monitoring wells HPFF-60 and HPFF-56 contained concentrations of EPA 601 analytes above 2L GWQS. No EPA 601 analytes were identified in the groundwater samples collected from the additional wells. Due to the limited number of sampling points, the horizontal extent of impacted groundwater was not established. Groundwater sampling results for Purgeable Halocarbons per EPA Method 601 are presented on Table 6.

F. PROPOSED CORRECTIVE ACTION REVISIONS

1. OBJECTIVES

The objective of this Revised CAP is to propose revisions to existing remediation systems by which free product can be removed from the subsurface to the extent practical, contaminated soils can be reduced to below State Action Levels and groundwater contamination levels can be reduced to or below 2L GWQS.

2. EVALUATION OF PAST REMEDIAL ACTIONS

(Refer to Tables 7 through 10, Figures 3 through 10, and Figures 30 through 33)

a. Tank Removal/Soil Remediation

Tank removal activities conducted in 1993 successfully eliminated a primary source of contamination, namely, the USTs at both the Hadnot Point Fuel Farm and Building 1115. Currently, vadose zone soil contamination appears to be limited to the areas around wells HPFF-29 and HPFF-65 (see Figure 3).

Existing soil vapor recovery lines in the vicinity of this contamination is intended to accelerate the reduction of these contaminants.

b. Free Product Recovery

Free product recovery has been ongoing at the site since 1991. As of February 7, 2002, 11,400 gallons of free product have been collected via AFVR (Reuther, 2002). These recovery efforts have successfully reduced the extent of free product to three isolated areas. Figures 4 through 7 show the reduction in free product spatial extents from 1997 through 2003.

c. Groundwater Remediation

Groundwater remediation to date has focused on reducing the dissolved petroleum contamination in the “hot spots” of the plume and was not intended to totally address the plume through active remediation. As discussed in Section C.2.d. Air Sparging/Biosparging/Soil Vapor Extraction, 805,640 pounds of hydrocarbons were recovered from 1999 to August 2002. Recovery data and historic dissolved petroleum concentrations indicate groundwater remediation efforts have been relatively successful where used; however, contamination below 100 feet BLS and outside the radius of influence from the existing system have not been targeted to date. Tables 7 through 10 and Figures 30 through 33 depict historical trends in dissolved benzene concentrations at various depths.

3. EVALUATION OF REMEDIATION ALTERNATIVES

Numerous technologies that address the remediation of petrochemically contaminated soil and ground water are available. Some of the technologies have demonstrated an acceptable level of success when implemented in the field, while others appear to have been ineffective. In certain instances, implementation of any available remediation technology by itself will not suffice. Hence, a combination of treatment technologies is at times more effective. Site specific conditions, nature, and extent of contamination together with an analysis of a particular remediation technology's record of success, allows the screening of technically feasible alternative technologies. The best remedial strategy is the one that can fulfill the established remediation objectives at the least cost.

a. Free Product Contamination

The following alternatives were evaluated as the mechanism for removing free product from the subsurface at this site:

- AFVR
- Skimmer Pumps

Due to the apparent limited extent of free product contamination and the historical success of AFVR at this site, continued product recovery via AFVR is proposed. Wells which historically have free product will be gauged weekly and AFVR events will be performed as necessary.

b. Soil Contamination

As discussed in Section E.2, vadose zone soil contamination associated with this project has only been found in samples collected from wells HPFF-29 and HPFF-65. This vadose zone contamination exists within the zone of influence of the existing soil vapor collection system; therefore, continued operation of the soil vapor collection system is proposed to address this contamination.

c. Groundwater Contamination

Numerous groundwater remediation technologies were evaluated to address dissolved petroleum contamination at this site. Many otherwise cost effective options were deemed insufficient for this site due to the magnitude (i.e. excessive horizontal and vertical extent of contamination) and complex geology. In order to efficiently remediate petroleum contaminated groundwater at depths of 150 feet BLS, a bio-pulse sparge system is proposed. A pulsed system will promote treatment at depth and the geology is expected to enhance the effectiveness of such a system in the shallow zone.

4. PROPOSED REMEDIATION

(Refer to Figures 2B, and 34 through 38)

The objectives of remediation for this project focuses on the collection of free product and the treatment of contaminated groundwater and soils at the Hadnot Point Fuel Farm site. The goal of this design is to remove free product from the subsurface to the extent practical, reduce levels of petroleum contaminated groundwater to the 2L GWQS, and reduce TPH soil contamination to below State Action Levels. A number of remediation methods including the existing air sparge/biosparge/vapor extraction system, bio-pulse sparging/vapor control, hydrodynamic control through groundwater recovery, and AFVR were selected as the most appropriate option for this site based on existing treatment system performances, subsurface conditions, current plume boundaries, contaminant properties and pilot test results.

a. Existing Systems

Due to the apparent effectiveness of the existing sparge/biosparge/vapor extraction treatment systems, the continued operation of these systems is proposed. These systems are intended to volatilize shallow groundwater contamination, enhance bio-degradation of petroleum contamination down to 100 feet BLS and reduce soil contamination within the vadose zone. The areas affected by these systems are the former Hadnot Point Fuel Farm, the gravel staging area northwest of the former HPFF, the area surrounding Building 1108, and within the vicinity of Building 1115 (see Figure 2B for a site map with the existing remediation system).

b. Bio-Pulse Sparging/Vapor Control

Bio-pulse sparging consists of air being injected (as a pulse) into the aquifer through a network of 25 strategically placed vertical wells (see Figure 34). Unlike conventional biosparging, where air is injected continuously at a constant rate, during pulsed biosparging, air is injected at a constant pressure, allowing flow to continuously increase until the pulse is terminated.

For a typical pulse sparging application, during each pulse, as air is injected into the subsurface, a de-watered sphere grows around the sparge point. If allowed, this spherical volume of air will continue to grow, displacing groundwater until the top of the sphere breaks through into the vadose zone. Upon “breakthrough”, the de-watered sphere will short circuit into the vadose zone. To maximize the radial influence from each sparge point, pulses are terminated prior to breakthrough. At completion of each pulse, the sparged zones are allowed to recharge, or resaturate, prior to the next pulse.

For the HPFF site, air is proposed to be injected at a depth of 150 feet BLS (see proposed bio-pulse sparge well detail on Figure 38). The sphere around the bio-pulse sparge well is expected to expand within the HPZ at 150 feet and allowed to grow laterally and vertically upward through the interbedded sediments until it reaches the lower boundary of the HPZ at approximately 75 feet BLS. At this point, the pulse of air will be terminated, the “sphere area” allowed to resaturate as the sparge air diffuses through the contaminated groundwater to the surface.

Appendix G contains design calculations which predicts the pressure and air requirements with the radii of influence; however, a bio-pulse sparge pilot test will need to be performed prior to design to confirm essential design parameters.

Based on the predicted air flow requirements (322 CFM) and the expansive nature of the site, installing a central bio-pulse sparge system is not practical. Therefore, a mobile bio-pulse sparge system is proposed. This mobile sparge system shall consist of all equipment and controls required to provide the design flow and pressure at each sparge well location (the pulse sparging system schematic is shown on Figure 37). The proposed design calls for sparge wells being pulsed one at a time starting with the outer ring of wells moving inward, while not consecutively sparging adjacent or close proximity wells.

The injection of air through petroleum contaminated groundwater is expected to create vapors in locations where known receptors exist. Most notably, buildings with slab on fill or crawl space foundations are prime locations for vapors to be trapped and potentially affect the inhabitants/receptors. Such buildings within the estimated extent of sparge influence shall be protected by vapor control systems. Figure 35 shows buildings selected for vapor protection and a vapor control system detail is shown on Figure 38.

An additional benefit from the installation of the proposed bio-pulse sparge wells will be the delineation of the plume at 150 feet BLS. The groundwater from each of the bio-pulse sparge wells will be sampled and analyzed per EPA Methods 601, 602 and 610 following installation. Given the wide-spread spacing and spatial coverage of the proposed bio-pulse sparge wells, it is expected that the horizontal extent of dissolved contamination at this depth will be ascertained.

c. Hydrodynamic Control

Hydrodynamic control will be provided to contain the plume in the first HPZ and prevent further downgradient movement. Based on an extended pumping test performed on well HPFF-75 (screened within the HPZ), a radius of influence of 2,000 feet is estimated at a 30 gpm recovery rate. This radius of influence extends past the estimated extent of petroleum contaminated groundwater in the 50-80 feet deep HPZ. Potentiometric surface elevations measured within the deep and shallow aquifers during the extended pumping test also indicated zones of leakance both downward from the shallow zone and upward from the deep zone. These zones of leakance within the shallow aquifer will create depressions in the groundwater table where by free product will tend to collect. Centralizing free product will help enhance continued AFVR events. The fluid recovered from hydrodynamic control efforts (30 gpm) will be sent to the existing Hadnot Point Fuel Farm Groundwater Treatment System, which is proposed for rehabilitation. Treated effluent shall be discharged into the sanitary sewer at the manhole located adjacent to the Southeast Compound (see Figure 36 for the groundwater recovery/treatment system schematic).

d. Aggressive Fluid Vapor Recovery (AFVR)

Due to the apparent effectiveness of AFVR at this site and the current relatively limited extent of free product contamination, continuation of AFVR events is proposed for free product removal. AFVR events shall be performed when needed until free product is recovered to the extent possible.

5. MONITORING PLAN

a. Goals of Monitoring Plan

The goals of the monitoring plan are to track plume migration and the reduction of contaminant concentrations and to ensure that the remediation system is operating as designed.

b. Monitoring Activities

The monitoring activities are as follows:

- Gauging of selected monitoring wells in order to check for free product, confirm direction and rate of ground water flow and contaminant migration.
- Sampling of selected monitoring wells and analysis for EPA Method 602 parameters to confirm remediation progress. Field measurements of dissolved oxygen will also be taken to demonstrate the effectiveness of the sparging/biosparging systems.
- The vapor collection/soil vapor extraction system(s) off-gas will be sampled per EPA Method TO 18 and analyzed for TPH-GRO using EPA Method 8015M, and volatile organic compounds using Method 8260M.
- Equipment checks will be performed for system adjustment and maintenance to ensure optimum system performance.
- At bio-pulse sparge start-up, vapor monitoring of site buildings will be performed as necessary.

c. Monitoring Schedule

PROPOSED MONITORING SCHEDULE				
HADNOT POINT FUEL FARM				
Activity	Start-Up	Weekly	Semi-Annual	Annual
Monitoring Well Gauging	X		X	X
Monitoring Well Sampling	X		X	X
Sampling Vapor Extraction Unit Off-Gas	X		X	X
Equipment Check	X	X		
Building Vapor Monitoring	X	X*		
Submit Monitoring Report				X

* As necessary.

d. Reporting

Preparation of a monitoring report for submission to the NCDENR is planned on an annual basis. This report will include, but not be limited to, the following:

- A brief summary to include a history of the site and any additional assessment activities which have occurred during the last year.
- System operation and results including any problems encountered during the past period.
- Groundwater monitoring results including gauging and sampling results. It will also include a brief discussion of the methods utilized in obtaining samples.
- The report will include the laboratory analysis in a table listed by well identification number and include the results, the laboratory's detection limit, the contaminant levels, and a column for 2L GWQS. Results which exceed the 2L GWQS will be so indicated by shading or highlighting.
- Conclusions including how the contamination plume is moving or changing in concentration and how the site is progressing towards meeting the desired end points.
- A recommendations section for additional assessment activities, optimization of system equipment and remediation methods.
- The report will include maps depicting the following:
 1. Distribution of dissolved volatile organic compounds contaminant plume, with separate isopleth maps for select constituents that are detected above the 2L GWQS.
 2. Thickness of petroleum product layer (if applicable).
 3. Water table and hydraulic head contour maps, with water levels shown in each well.

6. SCHEDULE

SCHEDULE WITH TARGET DATES OF CORRECTIVE ACTION PLAN	
HADNOT POINT FUEL FARM	
ITEM	DATE
NCDENR review and approval of the Revised CAP	Unknown
Camp Lejeune acquisition of funding, negotiation and award of design and construction contracts	Unknown
Design rehabilitation of existing groundwater treatment system	Within 3 months of award
Rehabilitate existing groundwater treatment system and initiate hydrodynamic control	Within 3 months of award
Complete bio-pulse sparge pilot testing	Within 4 months of award
Design bio-pulse sparge system and vapor collection system	Within 3 months of award
Install bio-pulse sparge wells and provide mobile sparging system (pulsing can begin prior to completion of all wells)	Within 6-9 months of award
Install vapor collection system	Concurrent with bio-pulse sparge well installation
Achievement of clean-up goals	10 years after system start-up
Project completion	11 years after system start-up

G. PUBLIC NOTICE

Public notice is required by the NCDENR if the responsible party proposes cleanup of soil contamination to an alternate standard (other than the lower of the Residential or Soil-to-Groundwater MSCC). As we are proposing cleanup to the Residential MSCC, public notice is required. The following parties are required to be notified:

- the local health director;
- the chief administrative officer of each political jurisdiction in which the contamination occurs; and
- all property owners and occupants contiguous to the area containing the contamination.

Public notification will be provided by the MCB Camp Lejeune, Installations and Environment Department, Environmental Quality Branch, Environmental Management Division.

H. PERMITS

The following permits may be required prior to system installation and operation.

- Air Quality Notification
- Local Base Permits
- Construction Permits
- Permission to Discharge to the Base Sanitary Sewer
- Recovery Well Permit (see Appendix D)

I. CONSTRUCTION COST ESTIMATE

The preliminary construction cost estimate is as follows:

<u>Item</u>	<u>Estimated Cost</u>
1. Installation of bio-pulse sparge wells (25 @ \$17,000 each)	\$425,000
2. Provide mobile sparging system	\$125,000
3. Provide electrical service at 25 bio-pulse sparge wells	\$60,000
4. Install vapor protection for existing buildings	\$600,000
5. Rehabilitate existing groundwater treatment system	\$25,000
Sub-Total	\$1,235,000
20% Contingencies	\$250,000
Total	\$1,485,000

J. LIMITATIONS

The soil and groundwater samples analyzed as part of this investigation only provide isolated data points and may not represent conditions at every location in the project area. Analyses and conclusions of this report, being based on interpolation between data points at the project area, may not be completely representative of all site conditions. Conclusions and recommendations of this investigation and report are based on the best available data in an effort to comply with current regulatory requirements.

K. 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.
- Dowler, D.A., Hook, T.A., *Pulsed Air Sparging with Remote Soil Vapor Extraction: Theory and Pilot Test Case Study*, 1997.
- State of North Carolina, Department of Environment, Health and Natural Resources, Division of Water Quality, Groundwater Section, *Guidelines for the Investigation and Remediation of Soil and Groundwater*, March 17, 1997.
- North Carolina Department of Environment and Natural Resources, *Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section* (Effective July 1, 2001).
- Stuckey, J.L., 1965, *North Carolina- It's Geology and Mineral Resources*, Raleigh, North Carolina: Department of Conservation and Development, 550 p.
- Winner, M.D., Jr., and Coble, R.W., 1989, *Hydrogeologic Framework of the North Carolina Coastal Plain Aquifer System: U.S. Geological Survey Open-File Report 87-690*, 155 p.

TABLES

TABLE 1

MONITORING WELL CONSTRUCTION DATA

HADNOT POINT FUEL FARM

Marine Corps Base, Camp Lejeune, North Carolina

WELL IDENTIFICATION	DATE INSTALLED	TOTAL DEPTH (Ft BLS)	RISER DEPTH (Ft BLS)	SCREEN INTERVAL (Ft BLS)	TOP OF CASING ELEV. (ft. MSL)	OUTER CASING DEPTH (Ft BLS) (Type III)	THIRD CASING DEPTH (Ft BLS) (Triple Cased Type III)
1101-01		13.0	3.0	3.0 - 13.0	27.17		
1101-02		13.0	3.0	3.0 - 13.0	27.36		
1101-03		13.0	3.0	3.0 - 13.0	26.82		
1115-01	11/29/93	15.0	5.0	5.0 - 15.0	26.11		
1115-02	11/29/93	14.0	4.0	4.0 - 14.0	25.97		
1115-03	12/14/93	20.0	5.0	5.0 - 20.0	26.17		
1115-04	11/30/93	15.0	5.0	5.0 - 15.0	27.31		
1115-05	11/30/93	15.0	5.0	5.0 - 15.0	26.37		
1115-06	12/16/93	20.0	5.0	5.0 - 20.0	28.20		
1115-07	12/14/93	20.0	5.0	5.0 - 20.0	26.28		
1115-08	12/15/93	20.0	5.0	5.0 - 20.0	27.89		
1115-09	12/02/93	20.0	5.0	5.0 - 20.0	28.48		
1115-10	11/29/93	14.0	4.0	4.0 - 14.0	25.92		
1115-11	12/14/93	20.0	5.0	5.0 - 20.0	27.89		
1115-12	11/30/93	15.0	5.0	5.0 - 15.0	26.17		
1115-13	12/09/93	51.0	46.0	46.0 - 51.0	25.90	40.0	
1115-14	12/06/93	51.0	46.0	46.0 - 51.0	27.96	40.0	
1115-15	12/02/93	51.0	46.0	46.0 - 51.0	25.93	40.0	
1115-16	12/13/93	40.0	3.5	3.5 - 40.0	26.85		
1115-17	06/01/95	50.0	45.0	45.0 - 50.0	26.19	40.0	
1115-18	06/08/95	50.0	45.0	45.0 - 50.0	27.61	40.0	
1115-19	06/09/95	50.0	45.0	45.0 - 50.0	26.11	40.0	
1115-20	06/12/95	50.0	45.0	45.0 - 50.0	26.24	40.0	
1115-21	06/07/95	50.0	45.0	45.0 - 50.0	25.89	40.0	
1115-22	07/11/95	80.0	75.0	75.0 - 80.0	27.48	70.0	
1115-23	07/11/95	80.0	75.0	75.0 - 80.0	27.90	70.0	
1115-24	06/29/95	80.0	75.0	75.0 - 80.0	26.18	70.0	
1115-25	07/05/95	80.0	75.0	75.0 - 80.0	26.16	70.0	
78GW-12	11/18/86	25.0	5.0	5.0 - 25.0	30.11		
78GW-13	11/17/86	25.0	5.0	5.0 - 25.0	25.79		
78GW-14	11/05/86	25.0	5.0	5.0 - 25.0	24.51		
78GW-15	11/06/86	25.0	5.0	5.0 - 15.0	26.43		
78GW-16		25.0	5.0	5.0 - 25.0	32.39		
78GW-17 -01	11/06/86	25.0	5.0	5.0 - 25.0	29.99		
78GW-17 -02			53.0	53.0 - 73.0	32.16		
78GW-19	11/06/86	25.0	5.0	5.0 - 25.0	29.18		
78GW-21	11/19/86	25.0	5.0	5.0 - 25.0	33.79		

TABLE 1

MONITORING WELL CONSTRUCTION DATA

HADNOT POINT FUEL FARM

Marine Corps Base, Camp Lejeune, North Carolina

WELL IDENTIFICATION	DATE INSTALLED	TOTAL DEPTH (Ft BLS)	RISER DEPTH (Ft BLS)	SCREEN INTERVAL (Ft BLS)	TOP OF CASING ELEV. (ft. MSL)	OUTER CASING DEPTH (Ft BLS) (Type III)	THIRD CASING DEPTH (Ft BLS) (Triple Cased Type III)
78GW-22 -02			7.0	7.0 - 17.0	28.93		
78GW-31 -02	12/17/90	78.0	65.0	65.0 - 75.0	26.25		
78GW-31 -03	12/17/90	158.0	140.0	140.0 - 150.0	26.01		
78GW-32 -02	12/20/90	77.0	64.0	64.0 - 74.0	27.20		
78GW-32 -03	12/20/90	153.0	140.0	140.0 - 150.0	27.20		
GT-01	06/15/93	20.0	5.0	5.0 - 20.0	26.75		
GT-02	06/15/93	20.0	5.0	5.0 - 20.0	25.59		
GT-03	06/15/93	20.0	5.0	5.0 - 20.0	26.58		
GT-04	06/15/93	20.0	5.0	5.0 - 20.0	26.50		
GT-05	06/15/93	20.0	5.0	5.0 - 20.0	26.51		
GT-06	06/15/93	20.0	5.0	5.0 - 20.0	26.59		
GT-07	06/15/93	19.0	4.0	4.0 - 19.0	26.24		
GT-08	06/16/93	19.5	4.5	4.5 - 19.5	26.97		
GT-09	06/16/93	20.0	5.0	5.0 - 20.0	26.48		
GT-10	06/16/93	20.0	5.0	5.0 - 20.0	26.40		
HPFF-01	11/21/95	15.0	5.0	5.0 - 15.0	28.46		
HPFF-02	11/21/95	15.0	5.0	5.0 - 15.0	29.47		
HPFF-03	11/21/95	16.0	6.0	6.0 - 16.0	31.21		
HPFF-04	11/21/95	15.0	5.0	5.0 - 15.0	31.02		
HPFF-05	11/21/95	15.0	5.0	5.0 - 15.0	27.33		
HPFF-06	11/08/95	50.0	45.0	45.0 - 50.0	30.93	40.0	
HPFF-07	11/10/95	49.5	44.5	44.5 - 49.5	28.28	40.0	
HPFF-08	11/17/95	49.5	44.5	44.5 - 49.5	34.90	40.0	
HPFF-09	11/16/95	50.0	45.0	45.0 - 50.0	27.13	40.0	
HPFF-10	07/17/97	80.0	75.0	75.0 - 80.0	32.50	70.0	40.0
HPFF-11	07/28/97	110.0	105.0	105.0 - 110.0	32.28	100.0	40.0
HPFF-12	07/16/97	110.0	105.0	105.0 - 110.0	27.12	100.0	40.0
HPFF-13	07/10/97	110.0	105.0	105.0 - 110.0	26.32	100.0	40.0
HPFF-14	06/25/97	15.0	5.0	5.0 - 15.0	27.02		
HPFF-15	06/25/97	15.0	5.0	5.0 - 15.0	27.69		
HPFF-16	06/25/97	15.0	5.0	5.0 - 15.0	27.93		
HPFF-17	06/26/97	15.0	5.0	5.0 - 15.0	27.61		
HPFF-19	07/08/97	15.0	5.0	5.0 - 15.0	26.43		
HPFF-20	07/08/97	15.0	5.0	5.0 - 15.0	28.74		
HPFF-21	01/17/00	14.5	4.5	4.5 - 14.5	27.27		
HPFF-22	01/17/00	14.0	4.0	4.0 - 14.0	26.82		
HPFF-23	01/19/00	12.5	2.5	2.5 - 12.5	26.44		

TABLE 1

MONITORING WELL CONSTRUCTION DATA

HADNOT POINT FUEL FARM

Marine Corps Base, Camp Lejeune, North Carolina

WELL IDENTIFICATION	DATE INSTALLED	TOTAL DEPTH (Ft BLS)	RISER DEPTH (Ft BLS)	SCREEN INTERVAL (Ft BLS)	TOP OF CASING ELEV. (ft. MSL)	OUTER CASING DEPTH (Ft BLS) (Type III)	THIRD CASING DEPTH (Ft BLS) (Triple Cased Type III)
HPFF-24	01/20/00	15.3	5.3	5.3 - 15.3	31.37		
HPFF-25	01/20/00	15.3	5.3	5.3 - 15.3	31.41		
HPFF-26	01/21/00	15.3	5.3	5.3 - 15.3	31.57		
HPFF-27	01/28/00	14.0	4.0	4.0 - 14.0	30.54		
HPFF-28	01/19/00	14.0	4.0	4.0 - 14.0	27.48		
HPFF-29	01/21/00	14.0	4.0	4.0 - 14.0	27.67		
HPFF-30	01/21/00	12.0	2.0	2.0 - 12.0	26.80		
HPFF-31	01/21/00	14.0	4.0	4.0 - 14.0	28.45		
HPFF-32	01/26/00	14.0	4.0	4.0 - 14.0	29.65		
HPFF-33	01/26/00	14.0	4.0	4.0 - 14.0	29.74		
HPFF-34	01/26/00	14.0	4.0	4.0 - 14.0	26.58		
HPFF-35	01/31/00	14.0	4.0	4.0 - 14.0	26.72		
HPFF-36	02/02/00	13.9	3.9	3.9 - 13.9	26.63		
HPFF-37	02/02/00	13.8	3.8	3.8 - 13.8	26.00		
HPFF-38	01/31/00	14.0	4.0	4.0 - 14.0	30.31		
HPFF-39	02/29/00	15.0	5.0	5.0 - 15.0	24.85		
HPFF-40	02/09/00	15.0	5.0	5.0 - 15.0	27.90		
HPFF-41	03/02/00	15.0	5.0	5.0 - 15.0	29.59		
HPFF-42	03/03/00	15.0	5.0	5.0 - 15.0	27.71		
HPFF-43	03/07/02	80.0	75.0	75.0 - 80.0	23.01	70.0	39.0
HPFF-44	10/08/01	50.0	45.0	45.0 - 50.0	23.00	40.0	
HPFF-45	03/07/02	80.0	75.0	75.0 - 80.0	24.80	70.0	38.0
HPFF-46	03/07/02	150.0	145.0	145.0 - 150.0	24.53	140.0	40.0
HPFF-47	10/09/01	50.0	45.0	45.0 - 50.0	24.99	40.0	
HPFF-48	10/10/01	15.0	5.0	5.0 - 15.0	23.82		
HPFF-49	02/24/02	80.0	75.0	75.0 - 80.0	23.40	70.0	40.0
HPFF-50	10/09/01	50.0	45.0	45.0 - 50.0	23.51	40.0	
HPFF-51	10/10/01	15.0	5.0	5.0 - 15.0	27.72		
HPFF-52	02/24/02	150.0	145.0	145.0 - 150.0	28.36	140.0	40.0
HPFF-53	10/12/01	50.0	45.0	45.0 - 50.0	27.71	40.0	
HPFF-54	10/10/01	17.0	2.0	2.0 - 17.0	27.41		
HPFF-55	02/24/02	80.0	75.0	75.0 - 80.0	27.50	70.0	40.0
HPFF-56	02/06/02	150.0	145.0	145.0 - 150.0	27.93	140.0	40.0
HPFF-57	10/08/01	50.0	45.0	45.0 - 50.0	26.05	40.0	
HPFF-58	02/06/02	80.0	75.0	75.0 - 80.0	26.34	70.0	40.0
HPFF-59	02/06/02	80.0	75.0	75.0 - 80.0	27.94	70.0	40.0
HPFF-60	10/17/01	150.0	145.0	145.0 - 150.0	27.19	140.0	40.0

TABLE 1
MONITORING WELL CONSTRUCTION DATA
HADNOT POINT FUEL FARM
Marine Corps Base, Camp Lejeune, North Carolina

WELL IDENTIFICATION	DATE INSTALLED	TOTAL DEPTH (Ft BLS)	RISER DEPTH (Ft BLS)	SCREEN INTERVAL (Ft BLS)	TOP OF CASING ELEV. (ft. MSL)	OUTER CASING DEPTH (Ft BLS) (Type III)	THIRD CASING DEPTH (Ft BLS) (Triple Cased Type III)
HPFF-61	10/17/01	50.0	45.0	45.0 - 50.0	27.34	40.0	
HPFF-62	02/06/02	155.0	150.0	150.0 - 155.0	26.86	145.0	75.0
HPFF-63	10/09/01	50.0	45.0	45.0 - 50.0	29.73	40.0	
HPFF-64	10/10/01	50.0	45.0	45.0 - 50.0	27.58	40.0	
HPFF-65	02/06/02	80.0	75.0	75.0 - 80.0	29.79	70.0	40.0
HPFF-66	10/09/01	50.0	45.0	45.0 - 50.0	27.41	40.0	
HPFF-67	02/06/02	80.0	75.0	75.0 - 80.0	27.40	70.0	38.0
HPFF-68	10/11/01	25.0	5.0	5.0 - 25.0	27.37		
HPFF-69	10/03/01	50.0	45.0	45.0 - 50.0	29.87	40.0	
HPFF-70	10/03/01	50.0	45.0	45.0 - 50.0	30.76	40.0	
HPFF-71	02/06/02	80.0	75.0	75.0 - 80.0	30.74	69.0	40.0
HPFF-72	03/06/02	30.0	18.0	18.0 - 30.0	27.84		
HPFF-73	04/15/03	50.0	45.0	45.0 - 50.0	25.27	40.0	
HPFF-74	04/16/03	80.0	75.0	75.0 - 80.0	25.38	69.0	39.0
HPFF-75	03/31/03	80.0	55.0	55.0 - 75.0	30.01		
HPFF-76	04/18/03	50.0	45.0	45.0 - 50.0	23.55	39.0	
HPFF-77	04/10/03	50.0	45.0	45.0 - 50.0	29.44	31.0	
MW-01	02/24/88	17.0	7.0	7.0 - 17.0	30.18		
MW-02	02/24/88	17.0	7.0	7.0 - 17.0	31.86		
MW-03	02/25/88	15.0	5.0	5.0 - 15.0	29.22		
MW-04	02/25/88	15.0	5.0	5.0 - 15.0	31.22		
MW-05	02/25/88	15.0	5.0	5.0 - 15.0	28.17		
MW-06	03/01/88	15.0	5.0	5.0 - 15.0	30.10		
MW-07	03/01/88	15.0	5.0	5.0 - 15.0	27.37		
MW-08	03/01/88	15.0	5.0	5.0 - 15.0	26.35		
MW-09	02/25/88	15.0	5.0	5.0 - 15.0	29.37		
MW-10R	03/30/95	15.0	5.0	5.0 - 15.0	33.96		
MW-11	03/02/88	25.0	5.0	5.0 - 25.0	28.74		
MW-12	03/07/88	25.0	5.0	5.0 - 25.0	28.73		
MW-13	03/09/88	25.0	5.0	5.0 - 25.0	30.56		
MW-14	03/08/88	25.0	5.0	5.0 - 25.0	27.70		
MW-15	03/08/88	25.0	5.0	5.0 - 25.0	30.45		
MW-16R	03/10/88	25.0	5.0	5.0 - 25.0	26.47		
MW-17	03/09/88	25.0	5.0	5.0 - 25.0	31.33		
MW-18	03/11/88	25.0	5.0	5.0 - 25.0	31.97		
MW-19	03/15/88	25.0	5.0	5.0 - 25.0	32.18		
MW-20	03/14/88	24.0	4.0	4.0 - 24.0	31.23		

TABLE 1
MONITORING WELL CONSTRUCTION DATA
HADNOT POINT FUEL FARM
Marine Corps Base, Camp Lejeune, North Carolina

WELL IDENTIFICATION	DATE INSTALLED	TOTAL DEPTH (Ft BLS)	RISER DEPTH (Ft BLS)	SCREEN INTERVAL (Ft BLS)	TOP OF CASING ELEV. (ft. MSL)	OUTER CASING DEPTH (Ft BLS) (Type III)	THIRD CASING DEPTH (Ft BLS) (Triple Cased Type III)
MW-21	12/14/89	19.0	4.0	4.0 - 19.0	26.69		
MW-23	12/14/89	18.0	8.0	8.0 - 18.0	27.24		
MW-A			4.0	4.0 - 14.0	28.61		

TABLE 2

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - SOIL (TPH)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

SAMPLE ID	Date Sampled	ANALYTE	
		Gasoline Range Organics	Diesel Range Organics
STANDARDS (mg/kg)		10	40
HPFF-21 (3-5)	1/00-2/00	BQL	BQL
HPFF-22 (2.5-4.5)	1/00-2/00	740	594
HPFF-23 (3-5)	1/00-2/00	BQL	BQL
HPFF-24 (5.3-5.8)	1/00-2/00	BQL	BQL
HPFF-25 (0.5-4)	1/00-2/00	BQL	8
HPFF-26 (4.5-6.5)	1/00-2/00	BQL	BQL
HPFF-27 (4-8)	1/00-2/00	BQL	BQL
HPFF-28 (3-5)	1/00-2/00	BQL	9
HPFF-29 (0.5-2.5)	1/00-2/00	290	966
HPFF-30 (3-4)	1/00-2/00	BQL	BQL
HPFF-31 (4-5)	1/00-2/00	BQL	BQL
HPFF-32 (9-9.5)	1/00-2/00	BQL	BQL
HPFF-33 (9-10)	1/00-2/00	BQL	BQL
HPFF-34 (6-7)	1/00-2/00	BQL	BQL
HPFF-35 (6-7)	1/00-2/00	BQL	BQL
HPFF-36 (5-6)	1/00-2/00	BQL	BQL
HPFF-37 (3-4)	1/00-2/00	BQL	BQL
HPFF-38 (6-7)	1/00-2/00	BQL	BQL
HPFF-39 (2-8)	1/00-2/00	BQL	BQL
HPFF-40 (2-4)	1/00-2/00	BQL	BQL
HPFF-41 (3.5-8)	1/00-2/00	BQL	BQL
HPFF-42 (4-11)	1/00-2/00	BQL	BQL
HPFF-43 4-6	1/2/02	<7.2	<7.5
HPFF-43D 4-6	1/2/02	<7.1	<7.0
HPFF-44 0-2	9/27/01	<6.6	17
HPFF-44 4-6	9/27/01	<7.2	<7.4
HPFF-45 0-2	12/20/01	10	90
HPFF-45D 0-2	12/20/01	26	65
HPFF-46 0-2	12/21/01	<7.0	30
HPFF-46D 0-2	12/21/01	<7.2	119
HPFF-47 0-2	9/27/01	<6.6	37
HPFF-47 4.5-6.5	9/27/01	<8.2	<12
HPFF-48 0-2'	9/21/01	<7	16
HPFF-48 4-5'	9/21/01	<7.2	<7.3

TABLE 2

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - SOIL (TPH)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

SAMPLE ID	Date Sampled	ANALYTE	
		Gasoline Range Organics	Diesel Range Organics
STANDARDS (mg/kg)		10	40
HPFF-49 4-6	12/19/01	400	282
HPFF-49D 4-6	12/19/01	89	352
HPFF-50 0-2'	9/21/01	<7.1	<7.1
HPFF-50 2.5-4.5'	9/21/01	<7.9	<11
HPFF-51 0-2'	9/21/01	<7	10
HPFF-51 4-6'	9/21/01	<6.7	<6.5
HPFF-52	12/13/01	<6.9	<7.3
HPFF-53 4-6	9/28/01	<7.8	<8.5
HPFF-54	9/18/01	<6.9	<7.5
HPFF-55	12/13/01	<6.7	<6.8
HPFF-56	12/13/01	<7.1	<7.4
HPFF-57 1-3	10/1/01	<6.7	<7.4
HPFF-57 5-7	10/1/01	<7.2	<7.4
HPFF-58	12/13/01	20	128
HPFF-59 1-3	1/3/02	<7.2	<7.1
HPFF-61 0-2	9/27/01	<6.9	10
HPFF-61 4-6	9/27/01	51	103
HPFF-62 0-2	10/18/01	<6.5	25
HPFF-62 0-2 DUP	10/18/01	<6.5	20
HPFF-62 3-5	10/18/01	<6.9	<7.3
HPFF-62 3-5 DUP	10/18/01	<7.2	9
HPFF-63 0-2	9/28/01	<7.3	<6.8
HPFF-63 0-2	10/1/01	<6.8	30
HPFF-63 5-7	10/1/01	<6.9	<7.6
HPFF-64 0-2	9/25/01	<12	30
HPFF-64 3.5-5.5	9/25/01	94	49
HPFF-65 0-2	12/17/01	<6.5	300
HPFF-66 0-2	10/1/01	<6.6	<6.5
HPFF-67 0-2	12/18/01	<6.8	<6.5
HPFF-67D 0-2	12/18/01	<6.9	10
HPFF-68	9/18/01	<6.9	9
HPFF-69 0-2	9/26/01	<7.5	<7.6
HPFF-69 3.5-5.5	9/26/01	<3.2	<3.5
HPFF-70 0-2	9/26/01	<6.6	<6.9
HPFF-70 3.5-5.5	9/26/01	<6.1	<5.8

TABLE 2

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - SOIL (TPH)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	Date Sampled	ANALYTE	
		Gasoline Range Organics	Diesel Range Organics
STANDARDS (mg/kg)		10	40
HPFF-71 4-6	12/18/01	<6.8	<6.6
HPFF-71D 4-6	12/18/01	<6.8	<6.2
HPFF-73 (3-5')	4/14/03	<7.8	<8.4
HPFF-73 (3-5') Dup	4/14/03	<8.4	<9.0
HPFF-74 (3-5')	4/7/03	<7.8	<7.9
HPFF-75 (3-5')	3/27/03	<7.2	8
HPFF-76 (3-5')	4/7/03	<7.1	<7.3
HPFF-77 (3-5')	4/2/03	<6.8	<7.0

All results in mg/kg.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
1101-01	27.17	5/2/03	7.18		19.99
1101-02	27.36	5/2/03	7.56		19.80
1101-03	26.82	5/2/03	7.16		19.66
1115-01	26.11	5/2/03	7.01		19.10
1115-02	25.97	5/2/03	6.73		19.24
1115-03	26.17	5/2/03	6.41		19.76
1115-04	27.31	5/2/03	2.52		24.79
1115-05	26.37	5/2/03	4.05		22.32
1115-06	28.20	5/2/03	7.41		20.79
1115-07	26.28	5/2/03	6.08	+	20.21
1115-08	27.89	5/2/03	7.38		20.51
1115-09	28.48	5/2/03	7.97		20.51
1115-10	25.92	5/2/03	4.40		21.52
1115-11	27.89	5/2/03	7.10		20.79
1115-12	26.17	5/2/03	4.15		22.02
1115-13	25.90	5/2/03	6.79		19.11
1115-14	27.96	5/2/03	8.74		19.22
1115-15	25.93	5/2/03	6.52		19.41
1115-17	26.19	5/2/03	7.68		18.51
1115-18	27.61	5/2/03	7.90		19.71
1115-19	26.11	5/2/03	6.65		19.46
1115-20	26.24	5/2/03	7.16		19.08
1115-21	25.89	5/2/03	7.35		18.54
1115-22	27.48	5/2/03	9.56		17.92
1115-23	27.90	5/2/03	8.59		19.31
1115-24	26.18	5/2/03	8.56		17.62
1115-25	26.16	5/2/03	7.57		18.59
78GW-12	30.11	5/2/03	10.08		20.03
78GW-13	25.79	5/2/03	10.19		15.60
78GW-14	24.51	5/2/03	6.55		17.96
78GW-15	26.43	5/2/03	7.61		18.82
78GW-17 -01	29.99	5/2/03	10.35		19.64
78GW-19	29.18	5/2/03	6.92		22.26
78GW-21	33.79	5/2/03	9.45		24.34
78GW-31 -02	26.25	5/2/03	8.92		17.33

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
78GW-31 -03	26.01	5/2/03	8.76		17.25
78GW-32 -02	27.20	5/2/03	8.15		19.05
GT-01	26.75	5/2/03	3.31		23.44
GT-02	25.59	5/2/03	4.35		21.24
GT-03	26.58	5/2/03	3.98		22.60
GT-04	26.50	5/2/03	4.97		21.53
GT-05	26.51	5/2/03	4.81		21.70
GT-06	26.59	5/2/03	3.89		22.70
GT-07	26.24	5/2/03	3.99		22.25
GT-08	26.97	5/2/03	5.00		21.97
GT-09	26.48	5/2/03	4.64		21.84
HPFF-01	28.46	5/2/03	3.61		24.85
HPFF-02	29.47	5/2/03	5.56		23.91
HPFF-03	31.21	5/2/03	8.62		22.59
HPFF-04	31.02	5/2/03	10.03		20.99
HPFF-05	27.33	5/2/03	6.26		21.07
HPFF-06	30.93	5/2/03	9.25		21.68
HPFF-07	28.28	5/2/03	7.84		20.44
HPFF-08	34.90	5/2/03	14.65		20.25
HPFF-09	27.13	5/2/03	8.35		18.78
HPFF-11	32.28	5/2/03	12.21		20.07
HPFF-12	27.12	5/2/03	7.60		19.52
HPFF-13	26.32	5/2/03	8.50		17.82
HPFF-14	27.02	5/2/03	4.25		22.77
HPFF-15	27.69	5/2/03	5.31	0.06	22.43
HPFF-16	27.93	5/2/03	6.27		21.66
HPFF-17	27.61	5/2/03	6.43		21.18
HPFF-19	26.43	5/2/03	4.29		22.14
HPFF-20	28.74	5/2/03	6.43		22.31
HPFF-21	27.27	5/2/03	4.07		23.20
HPFF-23	26.44	5/2/03	5.48		20.96
HPFF-24	31.37	5/2/03	10.44		20.93
HPFF-25	31.41	5/2/03	11.09	+	20.33
HPFF-28	27.48	5/2/03	5.73	+	21.76
HPFF-30	26.80	5/2/03	3.26		23.54

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
HPFF-31	28.45	5/2/03	8.05		20.40
HPFF-32	29.65	5/2/03	9.23		20.42
HPFF-34	26.58	5/2/03	7.42		19.16
HPFF-35	26.72	5/2/03	7.27		19.45
HPFF-36	26.63	5/2/03	7.24		19.39
HPFF-37	26.00	5/2/03	6.97		19.03
HPFF-38	30.31	5/2/03	6.32		23.99
HPFF-39	24.85	5/2/03	3.26		21.59
HPFF-40	27.90	5/2/03	4.65		23.25
HPFF-42	27.71	5/2/03	5.05		22.66
HPFF-43	23.01	5/2/03	9.00		14.01
HPFF-44	23.00	5/2/03	7.63		15.37
HPFF-45	24.80	5/2/03	8.11		16.69
HPFF-46	24.53	5/2/03	7.98		16.55
HPFF-47	24.99	5/2/03	8.35		16.64
HPFF-48	23.82	5/2/03	5.00		18.82
HPFF-49	23.40	5/2/03	6.04		17.36
HPFF-50	23.51	5/2/03	5.42		18.09
HPFF-51	27.72	5/2/03	7.79		19.93
HPFF-52	28.36	5/2/03	8.30		20.06
HPFF-53	27.71	5/2/03	8.03		19.68
HPFF-54	27.41	5/2/03	1.69		25.72
HPFF-55	27.50	5/2/03	7.83		19.67
HPFF-56	27.93	5/2/03	10.08		17.85
HPFF-57	26.05	5/2/03	7.77		18.28
HPFF-58	26.34	5/2/03	7.30		19.04
HPFF-59	27.94	5/2/03	7.91		20.03
HPFF-60	27.19	5/2/03	7.94		19.25
HPFF-61	27.34	5/2/03	8.26		19.08
HPFF-62	26.86	5/2/03	8.22		18.64
HPFF-63	29.73	5/2/03	12.58		17.15
HPFF-64	27.58	5/2/03	8.59		18.99
HPFF-65	29.79	5/2/03	10.08		19.71
HPFF-66	27.41	5/2/03	8.11		19.30
HPFF-67	27.40	5/2/03	9.01		18.39

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
HPFF-68	27.37	5/2/03	5.22		22.15
HPFF-69	29.87	5/2/03	10.05		19.82
HPFF-70	30.76	5/2/03	10.39		20.37
HPFF-71	30.74	5/2/03	11.93		18.81
HPFF-72	27.84	5/2/03	8.01		19.83
HPFF-73	25.27	5/2/03	9.59		15.68
HPFF-74	25.38	5/2/03	9.76		15.62
HPFF-76	23.55	5/2/03	7.52		16.03
HPFF-77	29.44	5/2/03	10.15		19.29
MW-02	31.86	5/2/03	9.78		22.08
MW-03	29.22	5/2/03	7.61		21.61
MW-04	31.22	5/2/03	8.05		23.17
MW-06	30.10	5/2/03	7.44		22.66
MW-09	29.37	5/2/03	8.85		20.52
MW-10R	33.96	5/2/03	9.65		24.31
MW-11	28.74	5/2/03	6.20		22.54
MW-12	28.73	5/2/03	7.37	+	21.37
MW-15	30.45	5/2/03	7.05	+	23.41
MW-17	31.33	5/2/03	10.05		21.28
MW-18	31.97	5/2/03	10.08		21.89
MW-19	32.18	5/2/03	10.42		21.76
MW-20	31.23	5/2/03	7.31		23.92
MW-21	26.69	5/2/03	1.97		24.72
MW-A	28.61	5/2/03	5.58	+	23.04
1115-07	26.28	5/9/03	5.70		20.58
1115-19	26.11	5/9/03	6.45		19.66
78GW-17 -02	32.16	5/9/03	12.19		19.97
78GW-32 -02	27.20	5/9/03	8.42		18.78
78GW-32 -03	27.20	5/9/03	8.71		18.49
HPFF-12	27.12	5/9/03	9.15		17.97
HPFF-14	27.02	5/9/03	5.11		21.91
HPFF-15	27.69	5/9/03	5.66	0.24	22.21
HPFF-58	26.34	5/9/03	8.26		18.08
HPFF-60	27.19	5/9/03	7.00		20.19
HPFF-61	27.34	5/9/03	9.31		18.03

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
HPFF-62	26.86	5/9/03	9.04		17.82
HPFF-64	27.58	5/9/03	7.00		20.58
1101-01	27.17	5/21/03	7.37		19.80
1101-02	27.36	5/21/03	7.52		19.84
1101-03	26.82	5/21/03	7.40		19.42
1115-01	26.11	5/21/03	7.60		18.51
1115-02	25.97	5/21/03	7.54		18.43
1115-03	26.17	5/21/03	6.71		19.46
1115-04	27.31	5/21/03	5.14		22.17
1115-05	26.37	5/21/03	4.37		22.00
1115-06	28.20	5/21/03	8.26		19.94
1115-07	26.28	5/21/03	6.87		19.41
1115-08	27.89	5/21/03	8.25		19.64
1115-09	28.48	5/21/03	9.20		19.28
1115-10	25.92	5/21/03	4.98		20.94
1115-11	27.89	5/21/03	7.75		20.14
1115-12	26.17	5/21/03	4.64		21.53
1115-13	25.90	5/21/03	7.88		18.02
1115-14	27.96	5/21/03	9.71		18.25
1115-15	25.93	5/21/03	7.50		18.43
1115-17	26.19	5/21/03	8.66		17.53
1115-18	27.61	5/21/03	4.60		23.01
1115-19	26.11	5/21/03	7.25		18.86
1115-20	26.24	5/21/03	7.76		18.48
1115-21	25.89	5/21/03	8.18		17.71
1115-22	27.48	5/21/03	10.72		16.76
1115-23	27.90	5/21/03	10.15		17.75
1115-24	26.18	5/21/03	9.59		16.59
1115-25	26.16	5/21/03	8.82		17.34
78GW-12	30.11	5/21/03	10.52		19.59
78GW-13	25.79	5/21/03	10.87		14.92
78GW-14	24.51	5/21/03	7.15		17.36
78GW-15	26.43	5/21/03	7.67		18.76
78GW-16	32.39	5/21/03	11.24		21.15
78GW-17 -01	29.99	5/21/03	10.35		19.64

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
78GW-17 -02	32.16	5/21/03	13.27		18.89
78GW-19	29.18	5/21/03	7.85		21.33
78GW-21	33.79	5/21/03	9.57		24.22
78GW-31 -02	26.25	5/21/03	9.72		16.53
78GW-31 -03	26.01	5/21/03	9.56		16.45
78GW-32 -02	27.20	5/21/03	9.05		18.15
78GW-32 -03	27.20	5/21/03	9.48		17.72
GT-01	26.75	5/21/03	3.66		23.09
GT-02	25.59	5/21/03	4.90		20.69
GT-03	26.58	5/21/03	4.71		21.87
GT-04	26.50	5/21/03	5.40		21.10
GT-05	26.51	5/21/03	5.43		21.08
GT-06	26.59	5/21/03	4.49		22.10
GT-07	26.24	5/21/03	5.40		20.84
GT-08	26.97	5/21/03	5.46		21.51
GT-09	26.48	5/21/03	5.09		21.39
HPFF-01	28.46	5/21/03	4.25		24.21
HPFF-02	29.47	5/21/03	6.28		23.19
HPFF-03	31.21	5/21/03	9.05		22.16
HPFF-04	31.02	5/21/03	9.00		22.02
HPFF-05	27.33	5/21/03	6.34		20.99
HPFF-06	30.93	5/21/03	10.16		20.77
HPFF-07	28.28	5/21/03	8.99		19.29
HPFF-08	34.90	5/21/03	15.01		19.89
HPFF-09	27.13	5/21/03	7.98		19.15
HPFF-10	32.50	5/21/03	14.19		18.31
HPFF-11	32.28	5/21/03	14.18		18.10
HPFF-12	27.12	5/21/03	10.02		17.10
HPFF-13	26.32	5/21/03	9.24		17.08
HPFF-14	27.02	5/21/03	5.87		21.15
HPFF-15	27.69	5/21/03	5.90	0.50	22.18
HPFF-16	27.93	5/21/03	6.58		21.35
HPFF-17	27.61	5/21/03	6.86		20.75
HPFF-19	26.43	5/21/03	5.11		21.32
HPFF-20	28.74	5/21/03	6.72		22.02

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
HPFF-21	27.27	5/21/03	4.27		23.00
HPFF-23	26.44	5/21/03	5.90		20.54
HPFF-24	31.37	5/21/03	10.87		20.50
HPFF-25	31.41	5/21/03	11.72	+	19.70
HPFF-28	27.48	5/21/03	5.88	+	21.61
HPFF-30	26.80	5/21/03	4.00		22.80
HPFF-31	28.45	5/21/03	8.05		20.40
HPFF-32	29.65	5/21/03	9.43		20.22
HPFF-33	29.74	5/21/03	9.84		19.90
HPFF-34	26.58	5/21/03	7.50		19.08
HPFF-35	26.72	5/21/03	7.31		19.41
HPFF-36	26.63	5/21/03	7.50		19.13
HPFF-37	26.00	5/21/03	7.12		18.88
HPFF-38	30.31	5/21/03	6.32		23.99
HPFF-39	24.85	5/21/03	3.69		21.16
HPFF-40	27.90	5/21/03	5.30		22.60
HPFF-41	29.59	5/21/03	7.51		22.08
HPFF-42	27.71	5/21/03	5.58		22.13
HPFF-43	23.01	5/21/03	8.70		14.31
HPFF-44	23.00	5/21/03	8.31		14.69
HPFF-45	24.80	5/21/03	8.29		16.51
HPFF-46	24.53	5/21/03	8.48		16.05
HPFF-47	24.99	5/21/03	8.51		16.48
HPFF-48	23.82	5/21/03	6.19		17.63
HPFF-49	23.40	5/21/03	6.21		17.19
HPFF-50	23.51	5/21/03	5.95		17.56
HPFF-51	27.72	5/21/03	9.05		18.67
HPFF-52	28.36	5/21/03	9.60		18.76
HPFF-53	27.71	5/21/03	9.05		18.66
HPFF-54	27.41	5/21/03	3.77		23.64
HPFF-55	27.50	5/21/03	8.89		18.61
HPFF-56	27.93	5/21/03	9.77		18.16
HPFF-57	26.05	5/21/03	8.24		17.81
HPFF-58	26.34	5/21/03	9.18		17.16
HPFF-59	27.94	5/21/03	9.41		18.53

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 3

WATER LEVEL GAUGING INFORMATION

HADNOT POINT FUEL FARM

Marine Corps Base
Camp Lejeune, North Carolina

MONITORING WELL IDENTIFICATION	TOP OF CASING ELEV. (ft. MSL) *	GAUGING DATE	DEPTH TO WATER	FREE PRODUCT THICKNESS **	WATER ELEV. (ft. MSL)
HPFF-60	27.19	5/21/03	8.40		18.79
HPFF-61	27.34	5/21/03	9.98		17.36
HPFF-62	26.86	5/21/03	9.43		17.43
HPFF-63	29.73	5/21/03	11.00		18.73
HPFF-64	27.58	5/21/03	8.12		19.46
HPFF-65	29.79	5/21/03	12.61		17.18
HPFF-66	27.41	5/21/03	8.06		19.35
HPFF-67	27.40	5/21/03	9.53		17.87
HPFF-68	27.37	5/21/03	5.93		21.44
HPFF-69	29.87	5/21/03	9.50		20.37
HPFF-70	30.76	5/21/03	10.16		20.60
HPFF-71	30.74	5/21/03	11.84		18.90
HPFF-72	27.84	5/21/03	8.70	0.76	19.73
HPFF-73	25.27	5/21/03	10.10		15.17
HPFF-74	25.38	5/21/03	10.54		14.84
HPFF-75	30.01	5/21/03	50.09		-20.08
HPFF-76	23.55	5/21/03	8.11		15.44
HPFF-77	29.44	5/21/03	10.77		18.67
MW-01	30.18	5/21/03	8.52	+	21.67
MW-02	31.86	5/21/03	10.20	+	21.67
MW-03	29.22	5/21/03	7.06		22.16
MW-04	31.22	5/21/03	8.69		22.53
MW-05	28.17	5/21/03	4.67		23.50
MW-06	30.10	5/21/03	8.10		22.00
MW-09	29.37	5/21/03	9.37		20.00
MW-10R	33.96	5/21/03	12.04	+	21.93
MW-11	28.74	5/21/03	6.36		22.38
MW-12	28.73	5/21/03	8.20	+	20.54
MW-15	30.45	5/21/03	7.50	+	22.96
MW-17	31.33	5/21/03	9.94		21.39
MW-18	31.97	5/21/03	10.58	0.12	21.48
MW-19	32.18	5/21/03	10.37		21.81
MW-20	31.23	5/21/03	7.78		23.45
MW-21	26.69	5/21/03	2.63		24.06
MW-A	28.61	5/21/03	6.12	+	22.50

* - Reference Point for Elevation Measurements (Brass Monument E-4), Assumed Elevation: (26.475ft. MSLft.)

** - If free product is present in a well, ground water elevation was calculated by:
[Top of Casing Elevation - Depth to Water] + [Free Product Thickness x (0.77)]

+ - Indicates sorbent present in well.

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
1101-1	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	<1	<1	<1	<2	<1	<2
1101-2	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
1101-3	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
1115-1	6/5/97	1.3	BQL	BQL	BQL	1	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/2002 +	6	ND	<1	ND	<1	<3
1115-2	6/5/97	0.9	BQL	BQL	BQL	1	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/2002 +	11.9	ND	0.6	ND	<1	<3
1115-3	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	11	3	BQL	BQL	BQL	BQL
1115-4	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/2002 +	23	ND	2	ND	<1	1.7J
1115-5	2/23/00	1,500	BQL	5,700	BQL	6,700	18,700
	11/20/00	1,900	250	2,400	BQL	7,100	7,400
	11/20/00 dup	1,800	130	2,300	BQL	6,300	7,000
1115-6	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/22/00	5	BQL	BQL	BQL	BQL	BQL
	11/13/00	81	5	BQL	BQL	BQL	BQL
	11/13/00 dup	67	4	BQL	BQL	BQL	BQL
1115-7	11/15/00	3,000	310	1,100	BQL	7,700	3,700
	7/17/02	6,000	<500*	2,200	<1000*	16,000	7,300
1115-8	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
1115-9	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	710	BQL	BQL	BQL	BQL	BQL
	11/14/00	800	21	11	BQL	23	11
	7/18/02	140	<8	<8	<16	<8	<16
	7/18/02 dup	150	<8	<8	<16	<8	<16
1115-10	6/4/97	3.1	BQL	8.3	BQL	0.9	10.4
	2/17/00	11	BQL	13	BQL	BQL	15
	11/15/00	200	15	35	BQL	2	BQL
1115-11	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	150	BQL	BQL	BQL	BQL	BQL
	11/15/00	140	14	3	BQL	6	15
1115-12	2/23/00	4,200	BQL	460	BQL	6,500	950
	11/15/00	2,000	25	240	BQL	1,400	780
	11/15/00 dup	4,300	BQL	490	BQL	6,700	1,000
1115-13	6/4/97	10,800	BQL	680	BQL	240	1,320
	2/17/00	14,000	1,200	850	BQL	BQL	BQL
	11/20/00	10,000	660	810	BQL	89	496
	2/2/2002 +	298	ND	41	ND	3	17
1115-14	6/4/97	11,760	BQL	1,440	BQL	16,020	4,420
	2/15/00	120	73	41	BQL	130	141
	11/20/00	300	270	36	BQL	99	111
	11/20/00 dup	310	270	37	BQL	96	116
	7/18/02	6,600	790	390	<400*	<200	450
	7/18/02	6,700	810	390	<400*	<200	450
1115-15	6/4/97	16,500	BQL	934	BQL	338	2,026
	2/23/00	10,000	1,700	BQL	BQL	BQL	BQL
	11/20/00	6,100	1,100	450	BQL	14	91
	7/18/02	2,300	1,100	280	<160	<80	<160
1115-17	6/4/97	7,900	BQL	670	BQL	145	1,360
	2/15/00	7,800	970	550	BQL	BQL	BQL
	11/13/00	9,400	1,000	1,000	BQL	66	890
	2/23/00	3,900	BQL	1,800	BQL	12,000	8,400
	2/2/2002 +	8,670	ND	973	ND	<100	1,050

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
1115-18	6/5/97	4,820	BQL	6.2	BQL	420	380
	2/22/00	280	280	BQL	BQL	BQL	BQL
	11/13/00	280	240	13	BQL	1	8
	2/2/2002 +	30.2	ND	1.3	ND	1.2	<3
1115-19	6/5/97	13,900	BQL	986	BQL	9,400	3,456
	2/22/00	15,000	2,500	BQL	BQL	10,000	BQL
	11/16/00	2,200	860	120	2	33	113
	7/17/02	2,400	1,500	200	<200	<100	250
1115-20	6/5/97	15,000	BQL	1,650	BQL	20,600	6,300
	2/23/00	19,000	13,000	BQL	BQL	28,000	BQL
	11/16/00	23,000	11,000	2,200	16	31,000	8,200
	7/18/02	15,000	7,700	1,500	<1600*	16,000	5,300
1115-21	6/5/97	890	BQL	BQL	BQL	3.8	BQL
	2/15/00	1,300	640	BQL	BQL	BQL	BQL
	11/13/00	1,600	690	1	BQL	1	BQL
	2/2/2002 +	1,920	ND	<5	ND	<5	<15
1115-22	6/4/97	1,640	BQL	BQL	BQL	100	BQL
	2/15/00	890	BQL	BQL	BQL	BQL	BQL
	11/13/00	1,100	20	7	BQL	5	BQL
	2/2/2002 +	1,250	ND	3.4	ND	3.5	<3
1115-23	6/5/97	9,700	BQL	340	BQL	4,320	1,720
	2/22/00	480	170	BQL	BQL	BQL	BQL
	11/13/00	6	64	6	BQL	BQL	BQL
	2/2/2002 +	22	ND	<5	ND	<5	<15
1115-24	6/5/97	708	BQL	BQL	BQL	BQL	BQL
	2/15/00	2,700	1,300	BQL	BQL	BQL	BQL
	2/15/00 dup	2,800	1,300	BQL	BQL	BQL	BQL
	11/13/00	3,100	1,100	7	BQL	BQL	BQL
	2/2/2002 +	2,480.0	ND	5.2	ND	<5	<15
1115-25	6/4/97	86	BQL	1.4	BQL	1.5	BQL
	2/22/00	340	BQL	BQL	BQL	BQL	BQL
	11/20/00	770	23	1	BQL	8	BQL
	2/2/2002 +	3.1	ND	0.57J	ND	<1	<3

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
78GW-12	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-13	6/5/97	BQL	BQL	BQL	BQL	0.6	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-14	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-15	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-16	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-17-1	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-17-2	2/22/00	3	BQL	2	BQL	8	11
	11/15/00	1	BQL	BQL	BQL	BQL	BQL
	11/15/00 dup	1	BQL	BQL	BQL	BQL	BQL
	7/18/02	2	3	<1	<2	<1	<2
78GW-19	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	25	1	BQL	BQL	BQL	BQL
78GW-21	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
78GW-22-2	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/23/00	17	2	5	BQL	BQL	4
	11/13/00	28	3	BQL	BQL	BQL	BQL
	2/2/02+	22.8	ND	<1	ND	<1	<3

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
78GW-31-2	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00 dup	BQL	BQL	BQL	BQL	BQL	BQL
	8/28/02	<1	<1	<1	<2	<1	<2
78GW-31-3	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	8/28/02	<1	<1	<1	<2	<1	<2
78GW-32-2	6/4/97	64.2	BQL	28.3	BQL	59.3	113.6
	2/18/00	6	82	BQL	BQL	BQL	BQL
	11/14/00	23	220	BQL	BQL	BQL	BQL
	2/9/02 +	228	ND	<10	ND	95.2	984
78GW-32-3	6/4/97	5.1	BQL	0.7	BQL	2.6	BQL
	2/9/02 +	2.7	ND	<1	ND	2.2	4.1
GT-1	6/5/97	BQL	BQL	1.3	BQL	1.2	2.9
	2/15/00	14	9	4	BQL	BQL	4
	11/14/00	120	5	44	BQL	35	71
	2/2/02	4	ND	3	ND	<1	<3
GT-2	2/17/00	43,000	BQL	14,000	BQL	100,000	50,000
	11/14/00	21,000	10	9,800	BQL	51,000	37,000
GT-3	6/4/97	109	BQL	28	BQL	8	129
	2/17/00	920	BQL	920	BQL	5,800	3,200
	11/14/00	1,800	350	880	BQL	3,900	3,800
GT-4	6/4/97	22	BQL	150	BQL	11	134
	2/17/00	140	BQL	1,100	BQL	420	9,300
	11/15/00	120	15	98	BQL	140	550
GT-5	6/4/97	4.2	BQL	BQL	BQL	2.7	2.3
	2/17/00	20	2	8	BQL	1	43
	11/14/00	7	2	27	BQL	4	203
GT-6	2/17/00	8,400	BQL	4,700	BQL	25,000	12,400
	11/14/00	4,000	6	3,000	9	9,500	9,900

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
GT-7	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	540	23	BQL	BQL	68	BQL
	11/15/00	1,000	78	11	BQL	21	12
GT-8	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	1	BQL	BQL	BQL	2	BQL
	11/13/00	4	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
GT-9	6/4/97	BQL	BQL	BQL	BQL	1.6	2.4
	2/16/00	96	21	BQL	BQL	BQL	BQL
	11/13/00	3	13	BQL	BQL	BQL	BQL
HPFF-1	12/1/95	BDL	BDL	BDL	BDL	BDL	BDL
	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	<1	<1	<1	<2	<1	<2
HPFF-2	12/1/95	BDL	BDL	BDL	BDL	BDL	BDL
	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
HPFF-3	12/1/95	0.5	BDL	BDL	BDL	0.5	BDL
	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
HPFF-4	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL
	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-5	12/1/95	6.6	BDL	0.9	BDL	4.8	BDL
	6/5/97	1.3	BQL	BQL	BQL	BQL	BQL
	2/17/00	2	5	BQL	14	4	2
	11/14/00	140	14	6	12	3	3
	7/17/02	3	11	<1	3	<1	<2

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
HPFF-6	11/30/95	0.7	BQL	BQL	BQL	1.6	1.9
	6/5/97	5.6	BQL	BQL	BQL	1.3	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
HPFF-7	12/1/95	320	BQL	150	BQL	32	128
	6/5/97	41.5	BQL	44.9	BQL	2.6	20.5
	2/22/00	13	BQL	38	BQL	BQL	BQL
	11/15/00	6	BQL	33	BQL	1	3
	2/9/02 +	24.9	ND	15.5	ND	36.4	15.0
HPFF-8	11/30/95	812.5	BQL	117.5	BQL	367.5	367.5
	6/5/97	2,500	BQL	178	BQL	262	336
	2/22/00	11,000	3,700	BQL	BQL	1,700	BQL
	11/15/00	8,500	2,200	600	BQL	1,200	1,520
	2/9/02 +	12,300	ND	714	ND	725	882
HPFF-9	12/1/95	8,170	BQL	185	BQL	567.5	142.5
	6/5/97	10,500	BQL	432	BQL	376	244
	2/18/00	18,000	2,000	1,100	BQL	2,300	BQL
	11/14/00	17,000	1,900	1,300	13	2,400	1,200
	11/14/00 dup	17,000	2,000	1,300	12	2,300	1,170
	7/17/02	8,100	1,300	400	<400*	<200	<400
HPFF-10	8/21/97	168.0	BQL	5.7	BQL	11.0	5.8
	2/18/00	1,400	BQL	BQL	BQL	BQL	BQL
	11/20/00	2,000	12	34	BQL	38	8
	11/20/00 dup	2,000	12	34	BQL	46	11
	7/17/02	580	<40	<40*	<80	<40	<80
HPFF-11	8/21/97	25.9	BQL	1.6	BQL	BQL	BQL
	2/18/00	130	BQL	13	BQL	73	35
	11/16/00	59.0	1.0	1.0	BQL	BQL	BQL
	7/17/02	370	<10	<10	<20	<10	<20

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
HPFF-12	8/21/97	51.8	BQL	BQL	BQL	1.6	BQL
	2/23/00	1,500	BQL	BQL	BQL	BQL	BQL
	11/15/00	1,600	44	19	BQL	110	81
	11/15/00 dup	1,700	44	5	BQL	57	12
	7/17/02	3,000	<100*	<100*	<200	240	<100
HPFF-13	8/21/97	14.7	BQL	BQL	BQL	0.8	BQL
	2/22/00	150	10	BQL	BQL	BQL	BQL
	11/13/00	180	10	BQL	BQL	BQL	BQL
	7/18/02	160	<10	<10	<20	<10	<20
	7/18/02 dup	160	<10	<10	<20	<10	<20
HPFF-14	2/17/00	1,400	BQL	1,300	BQL	7,500	9,000
	11/15/00	1,400	29	960	BQL	5,000	4,900
HPFF-15	8/20/97	23,900	BQL	3,000	BQL	35,700	13,700
HPFF-16	8/20/97	BQL	BQL	BQL	BQL	2.9	BQL
	2/16/00	19	1	1	BQL	BQL	BQL
	11/15/00	580	12	44	BQL	21	25
HPFF-17	8/20/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	880	96	120	BQL	730	480
	11/16/00	540	48	99	BQL	360	350
HPFF-18	8/20/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	WELL DAMAGED					
HPFF-19	8/20/97	17,900	BQL	2,270	BQL	27,050	9,815
	2/23/00	19,000	4,700	BQL	BQL	29,000	5,300
	11/14/00	20000	4700	3100	BQL	30,000	13,300
	2/9/2002 +	15,000	ND	1,780	ND	20,300	9,300
HPFF-20	8/20/97	4,850	BQL	1,440	BQL	23,500	8,100
	2/18/00	13,000	2,000	BQL	BQL	34,000	6,500
	2/18/00 dup	4,700	BQL	BQL	BQL	12,000	2,600
	11/15/00	5,800	1,000	820	BQL	18,000	5,400
	2/9/2002 +	3,070	ND	656	ND	11,400	4,570
HPFF-21	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	6	BQL	1	BQL	17	10

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
HPFF-22	1/28/00	11,000	BQL	BQL	BQL	12,000	4,100
	11/15/00	11,000	220	790	BQL	11,000	5,300
HPFF-23	1/28/00	9,200	BQL	BQL	BQL	22,000	5,500
	11/16/00	5,200	1,100	1,100	BQL	17,000	9,200
HPFF-24	1/31/00	3,600	BQL	BQL	BQL	3,100	BQL
	11/16/00	1,700	440	110	BQL	2,200	3,100
HPFF-25	1/28/00	16,000	BQL	3,600	BQL	41,000	15,200
	11/16/00	13,000	4,800	3,400	BQL	36,000	16,700
HPFF-26	1/31/00	5	BQL	3	BQL	20	15
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-27	2/2/00	11	BQL	7	BQL	36	42
	11/14/00	45	BQL	BQL	BQL	1	BQL
HPFF-28	1/28/00	29,000	18,000	3,600	BQL	51,000	15,600
HPFF-29	1/28/00	24,000	BQL	BQL	BQL	55,000	8,600
	11/16/00	23,000	6,800	6,700	1,600	47,000	28,300
HPFF-30	1/28/00	510	BQL	BQL	BQL	55	96
	11/15/00	150	12	4	BQL	13	47
HPFF-31	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
HPFF-32	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-33	1/31/00	BQL	BQL	BQL	BQL	2	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-34	1/31/00	5	BQL	9	BQL	38	34
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-35	2/1/00	BQL	BQL	BQL	BQL	2	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-36	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-37	2/1/00	1	BQL	BQL	BQL	7	5
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
HPFF-38	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	<1	<1	<1	<2	1	<2
HPFF-39	3/7/00	BQL	BQL	BQL	BQL	BQL	2
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	<1	<1	<1	<2	<1	<2
HPFF-40	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-41	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	86	15	1	BQL	11	16
HPFF-42	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-43	3/26/02	<1	1	<1	<2	<1	<2
HPFF-44	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-45	3/26/02	710	38	<8	<16	<8	<16
HPFF-46	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-47	3/26/02	1,300	120	<20	<40	<20	<40
HPFF-48	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-49	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-50	3/26/02	28	<1	3	<2	5	3
HPFF-51	3/25/02	<1	<1	<1	<2	<1	<2
HPFF-52	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-53	3/26/02	1	<1	<1	<2	<1	<2
HPFF-54	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-55	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-56	3/26/02	<1	<1	<1	<2	<1	<2
HPFF-57	3/26/02	3,100	250	<40*	<80	<40	<80
HPFF-58	3/26/02	7	<1	<1	<2	<1	<2
HPFF-59	3/27/02	210	<8	21	<16	8	<16
HPFF-60	3/27/02	3,000	100	75	<80	<40	<80
	7/17/02	2,700	110	<80*	<160	<80	<160
HPFF-61	3/27/02	<1	<1	<1	<2	1	<2
	3/27/02 dup	<1	<1	<1	<2	1	<2

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
HPFF-62	3/26/02	1	<1	<1	<2	1	<2
HPFF-63	3/26/02	6	<1	<1	<2	<1	<2
HPFF-64	3/27/02	46	1	9	<2	1	15
HPFF-65	3/27/02	21	<1	<1	<2	<1	<2
HPFF-66	3/27/02	3,000	910	96	<80	52	<80
	3/27/02 dup	3,100	920	99	<80	53	<80
HPFF-67	3/27/02	<1	<1	<1	<2	<1	<2
HPFF-68	3/25/02	30	3	19	<2	33	71
HPFF-69	3/27/02	1	1	<1	<2	<1	<2
HPFF-70	3/27/02	<1	<1	<1	<2	<1	<2
HPFF-71	3/27/02	<1	<1	<1	<2	<1	<2
HPFF-72	3/25/02	15,000	2,100	2,600	<4000*	33,000	7,000
	7/18/02	21,000	2,200	2,800	<2000*	33,000	10,900
HPFF-73	4/23/03	<1	<1	<1	<2	<1	<4
	4/23/03 dup	<1	<1	<1	<2	<1	<4
HPFF-74	4/23/03	<1	<1	<1	<2	<1	<4
HPFF-75	5/7/03	650	<25	<25	<50	<25	<100
	5/14/03	1,300	650	BQL	BQL	BQL	BQL
HPFF-76	4/23/03	71	6.4	<2	<4	<2	<4
HPFF-77	4/23/03	<1	<1	<1	<2	<1	<4
MW-1	2/17/00	11,000	BQL	6,300	BQL	39,000	28,300
	2/9/2002 +	3,280	ND	1,460	ND	14,100	7,370
MW-2	2/18/00	40,000	7,600	4,300	BQL	120,000	27,000
MW-3	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL
	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	<1	<1	<1	<2	<1	<2
MW-4	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL
	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BOL	BOL	BOL	BOL	BOL	BOL

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
MW-5	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL
MW-6	11/30/95	30	BQL	147.5	BQL	87.5	466.5
	6/4/97	9.3	BQL	49.8	BQL	11.3	111.8
	2/22/00	9	BQL	31	BQL	17	62
	11/16/00	28	BQL	17	BQL	7	33
	7/17/02	<10*	<10	29	<20	22	59
MW-9	11/30/95	1	BDL	0.7	BDL	0.9	2
	6/5/97	BQL	BQL	BQL	BQL	1.1	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	<1	<1	<1	<2	<1	<2
MW-10R	6/5/97	700	BQL	1,400	BQL	4,800	6,600
	2/17/00	3,400	1,000	2,900	BQL	13,000	17,200
	11/16/00	3,800	220	1,200	BQL	8,000	6,500
	2/9/2002 +	4,410	ND	1,120	ND	5,530	6,040
MW-11	11/30/95	2.1	BQL	BQL	BQL	BQL	1.9
	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	1,500	40	250	BQL	620	1,010
	11/16/00	550	73	450	4	2,200	2,040
	2/9/2002 +	64.4	ND	11.0	ND	71.0	31.0
MW-15	11/30/95	18.5	BQL	51	BQL	77	229
	6/5/97	BQL	BQL	5.5	BQL	8.5	17.9
MW-17	11/30/95	5,750	BQL	3,555	BQL	30,150	12,800
	6/5/97	5,340	BQL	1,930	BQL	25,250	8,370
	2/18/00	32,000	6,400	BQL	BQL	56,000	5,700
	11/15/00	15,000	BQL	560	65	13,000	3,700
	2/9/2002 +	12,200	ND	675	ND	14,000	4,100
MW-18	6/5/97	20,450	BQL	2,850	BQL	35,250	11,700
	2/17/00	20,000	5,100	13,000	BQL	89,000	82,000
	11/16/00	15,000	1,800	2,200	BQL	34,000	14,200
	2/9/2002 +	18,900	ND	1,830	ND	36,100	10,700

TABLE 4

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 602)

**HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

WELL ID	Date Sampled	ANALYTE					
		Benzene	Diisopropyl ether	Ethylbenzene	Methyl-tert-butyl ether	Toluene	Total Xylenes
2L GWQS (mg/L)		1	70	29	200	1,000	530
MW-19	11/30/95	3.3	BQL	BQL	BQL	BQL	BQL
	6/5/97	5.6	BQL	BQL	BQL	1.8	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	210	56	18	<32	250	48
MW-20	11/30/95	4.9	BDL	BDL	BDL	BDL	BDL
	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	4	<1	1	<2	12	3
MW-21	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL
MW-23	6/5/97	3.8	BQL	BQL	BQL	2.2	BQL
	2/23/00	BQL	5	BQL	BQL	BQL	BQL
MW-A	11/13/00	2,900	38	1,600	BQL	7,200	9,000

All results in µg/L

Shaded areas indicate concentrations in excess of 2L GWQS.

BQL = Below Quantitation Limits. Refer to analytical report for a complete list of compounds and quantitation limits.

* Laboratory practical quantitation limit is higher than the 2L GWQS.

Shading indicates detected concentration greater than 2L GWQS.

+ Wells sampled by Shaw Environmental & Infrastructure.

ND = No Data

J = Estimated

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
1101-1	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
1101-2	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1101-3	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
1115-1	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND
1115-2	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND
1115-3	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-4	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5.5	ND	ND

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
1115-5	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	720	1400	1800	BQL	BQL	BQL
	11/20/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	870	1600	2000	BQL	BQL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	180	380	790	BQL	BQL	BQL
1115-6	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-7	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	43	70	170	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	44	92	350	BQL	BQL	BQL
1115-8	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-9	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
	7/18/02 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
1115-10	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.3	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	16	11	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	25	17	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
1115-11	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-12	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	25	46	140	BQL	BQL	BQL
	2/23/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	25	45	130	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	11	17	44	BQL	BQL	BQL
1115-13	6/4/97	12.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.3	BDL	BDL	520	1.9	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	54	80	940	BQL	BQL	BQL
	11/20/00	21	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	57	80	980	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	79.4	ND	ND	ND
1115-14	6/4/97	17.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	8.2	BDL	BDL	530	BDL	BDL	BDL
	2/15/00	22	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	28	45	130	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	26	BQL	BQL	BQL
	11/20/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	25	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	13	20	BQL	BQL	BQL
1115-15	6/4/97	18.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	11	BDL	BDL	235	BDL	BDL	BDL
	2/23/00	10	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	11	20	160	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	12	14	140	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	11	59	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
1115-17	6/4/97	28.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	13.5	BDL	BDL	210	1.9	BDL	BDL
	2/15/00	46	BQL	BQL	BQL	BQL	BQL	BQL	BQL	23	37	54	480	BQL	BQL	BQL
	11/13/00	34	BQL	BQL	BQL	BQL	BQL	BQL	BQL	18	36	47	470	BQL	BQL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	110	200	360	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	31.2	ND	ND	ND
1115-18	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	23.6	BDL	BDL	BDL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/22/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND
1115-19	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	220	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	17	29	230	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	22	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	29	BQL	BQL	BQL
1115-20	6/5/97	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	120	BDL	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	16	26	250	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	15	19	240	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	13	200	BQL	BQL	BQL
1115-21	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.8	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	14	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	12	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.1	ND	ND	ND

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
1115-22	6/4/97	1	3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2.5	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND
1115-23	6/5/97	0.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1	BDL	BDL	16.7	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5.5	ND	ND	ND
1115-24	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	13	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND
1115-25	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND
78GW-12	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-13	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
78GW-14	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-15	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-16	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-17-1	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-17-2	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-19	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-21	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
78GW-22-2	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND
78GW-31-2	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	8/28/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
78GW-31-3	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	8/28/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
78GW-32-2	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.2	BDL	BDL	BDL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	16	ND	ND	ND
78GW-32-3	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
GT-1	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4.5	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND	ND
GT-2	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	210	430	1000	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	23	BQL	170	320	740	19	22	BQL
GT-3	6/4/97	3.7	BDL	BDL	BDL	BDL	BDL	BDL	3.8	2.3	BDL	BDL	25.5	3.8	1.1	BDL
	2/17/00	29	BQL	20	23	13	15	19	92	28	98	220	310	90	61	BQL
	11/14/00	25	BQL	22	32	21	26	25	92	20	100	210	220	89	100	BQL
GT-4	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	26.5	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	23	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	17	BQL	BQL	BQL
GT-5	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	32	BQL	BQL	BQL
GT-6	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	44	87	310	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	20	29	130	BQL	BQL	BQL
GT-7	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
GT-8	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
GT-9	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-1	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-2	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-3	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-4	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-5	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-6	11/30/95	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-7	11/30/95	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	2.38	BQL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND
HPFF-8	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	17.9	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	16	31	200	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	16	25	170	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND	ND
HPFF-9	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	48.4	BDL	BDL	BDL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	170	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	82	BQL	BQL	BQL
	11/14/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	93	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	25	BQL	BQL
	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

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HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-10	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-11	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-12	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	4.9	BDL	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/23/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-13	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.2	BDL	BDL	1.3	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-14	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	90	130	220	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	57	75	190	BQL	BQL	BQL
HPFF-15	8/20/97	5.3	1.3	BDL	BDL	BDL	BDL	BDL	0.9	1.9	BDL	BDL	374	4.3	0.6	BDL
HPFF-16	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	32	BQL	BQL	BQL
HPFF-17	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	10	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-18	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	WELL DAMAGED														
HPFF-19	8/20/97	1.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	392	1.0	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	57	100	330	BQL	BQL	BQL
	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	88	150	360	BQL	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	326	ND	ND	ND
HPFF-20	8/20/97	BDL	13.1	BDL	BDL	BDL	BDL	BDL	BDL	0.7	BDL	BDL	167	BDL	BDL	BDL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	40	70	190	BQL	BQL	BQL
	2/18/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	35	59	190	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	38	63	190	BQL	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	207	ND	ND	ND
HPFF-21	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-22	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	33	61	250	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	37	55	250	BQL	BQL	BQL
HPFF-23	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	39	69	270	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	36	53	210	BQL	BQL	BQL
HPFF-24	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	23	38	130	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	26	57	120	BQL	BQL	BQL
HPFF-25	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	130	270	470	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	440	750	1000	BQL	BQL	BQL
HPFF-26	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-27	11/14/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/2/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-28	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	680	1300	1900	BQL	BQL	BQL
HPFF-29	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	44	85	290	BQL	BQL	BQL
	11/16/00	56	20	BQL	BQL	BQL	BQL	BQL	20	65	2300	4000	5800	73	16	BQL
HPFF-30	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-31	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-32	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-33	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-34	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-35	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-36	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-37	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-38	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-39	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL
HPFF-40	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-41	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-42	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-43	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-44	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-45	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-46	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-47	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	27	BQL	BQL	BQL
HPFF-48	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-49	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-50	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-51	3/25/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-52	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-53	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-54	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-55	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-56	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-57	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	33	BQL	BQL	BQL
HPFF-58	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-59	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-60	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	36	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	36	BQL	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
HPFF-61	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
	3/27/02 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-62	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-63	3/26/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-64	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-65	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-66	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
	3/27/02 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-67	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-68	3/25/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-69	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-70	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-71	3/27/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	<10	<10	<10	BQL	BQL	BQL
HPFF-72	3/25/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	49	100	500	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	39	81	450	BQL	BQL	BQL
HPFF-73	4/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	4/23/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-74	4/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF -75	5/7/03	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	5/14/03	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-76	4/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-77	4/22/03	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-1	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	190	340	740	BQL	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	584	ND	ND	ND

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
MW-2	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	98	230	810	BQL	BQL	BQL
MW-3	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-4	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-5	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-6	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	24	BDL	BDL	BDL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	29	71	BQL	BQL	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	41	78	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	21	55	<10	BQL	BQL	BQL
MW-9	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/13/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/17/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-10R	6/5/97	0.9	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	420	2.6	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	150	260	38	13	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	12	BQL	250	370	460	21	12	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	286	ND	ND	ND

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
MW-11	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	11	48	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<5	ND	ND
MW-15	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	9.3	BDL	BDL
MW-17	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	270	BDL	BDL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	29	54	260	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	28	50	270	BQL	BQL
MW-18	6/5/97	2.1	4.6	2.5	BDL	BDL	BDL	BDL	3.9	2.1	BDL	BDL	1000	5.8	4.2	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	950	1800	3000	BQL	BQL
	11/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	310	560	1400	10	BQL
	2/9/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	685	ND	ND	ND
MW-19	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-20	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	11/20/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	7/18/02	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-21	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 5

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 610)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE														
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Chrysene	Fluoranthene	Fluorene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	All Other Analytes
2L GWQS mg/L		80	210	2100	0.05	0.0047	0.047	5	280	280	NE	28	21	210	210	Varies
MW-23	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-A	11/15/00	13	BQL	BQL	BQL	BQL	BQL	BQL	BQL	17	430	650	1100	23	BQL	BQL

* Results in ug/L.

** All compounds listed in laboratory analytical reports.

Shaded areas indicate concentrations in excess of 2L GWQS.

BQL = Below Quantitation Limits. Refer to analytical report for a complete list of compounds and quantitation limits.

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
1115-1	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	8.9	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	11	BQL	BQL
1115-2	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-3	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	2	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-4	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-5	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	4	BQL	BQL	BQL
1115-6	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-8	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-9	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-10	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5	1.3	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	3	BQL	BQL
1115-11	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	11	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-12	2/23/00	BQL	BQL	BQL	BQL	BQL	260	BQL	BQL	BQL	78	BQL	BQL	BQL
	2/23/00 dup	BQL	BQL	BQL	BQL	BQL	260	BQL	BQL	BQL	59	BQL	BQL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
1115-13	6/4/97	BDL	BDL	BDL	BDL	BDL	300	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	250	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-14	6/4/97	BDL	BDL	BDL	BDL	BDL	140	BDL	BDL	BDL	BDL	BDL	160	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	19	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-15	6/4/97	BDL	BDL	BDL	BDL	BDL	836	BDL	BDL	310	56	BDL	BDL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	570	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-17	6/4/97	BDL	BDL	BDL	BDL	BDL	255	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	150	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-18	6/5/97	BDL	BDL	BDL	BDL	BDL	480	BDL	BDL	BDL	18.8	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	260	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-19	6/5/97	BDL	BDL	BDL	BDL	BDL	654	BDL	BDL	BDL	26	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-20	6/5/97	BDL	BDL	BDL	BDL	BDL	650	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	1000	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-21	6/5/97	BDL	BDL	BDL	BDL	BDL	64.5	BDL	BDL	BDL	2.3	BDL	18.7	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	47	BQL	BQL	BQL	BQL	BQL	4	BQL
1115-22	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	6	BQL	BQL	BQL	BQL	BQL	BQL	BQL
1115-23	6/5/97	BDL	BDL	BDL	BDL	BDL	860	BDL	BDL	BDL	12.8	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	580	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
1115-24	6/5/97	BDL	BDL	BDL	BDL	BDL	44	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	96	BQL	BQL	BQL	BQL	BQL	21	BQL
	2/15/00 dup	BQL	BQL	BQL	BQL	BQL	97	BQL	BQL	BQL	BQL	BQL	21	BQL
1115-25	6/4/97	BDL	BDL	BDL	BDL	BDL	1.7	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	24	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-12	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-13	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-14	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-15	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.4	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	1	BQL
78GW-16	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-17-1	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-17-2	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	6	BQL	BQL	BQL	BQL	BQL	BQL
78GW-19	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.1	BDL	BQL
	6/4/97 dup	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.2	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
78GW-21	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-22-2	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	1.1	BDL	BDL	BDL	BDL	BDL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-31-2	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00 dup	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
78GW-31-3	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-32-2	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
78GW-32-3	6/4/97	BDL	BDL	BDL	BDL	BDL	2.9	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
GT-1	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5.4	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	2	BQL	BQL	BQL	BQL	4	1	BQL
GT-2	2/17/00	BQL	BQL	BQL	BQL	420	590	BQL	BQL	BQL	330	BQL	BQL	BQL
GT-3	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
GT-4	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
GT-5	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	11	4	BQL
GT-6	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	73	BQL	BQL
GT-7	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
GT-8	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	4	BQL	BQL	BQL	BQL	BQL
GT-9	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	16	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-1	12/1/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-2	12/1/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-3	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-4	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
HPFF-5	12/1/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-6	11/30/95	BDL	BDL	1.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	1	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-7	12/1/95	BQL	36	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-8	11/30/95	BQL	BQL	BQL	BQL	BQL	15	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	6/5/97	BQL	BQL	BQL	BQL	BQL	68	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	260	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-9	12/1/95	BQL	BQL	BQL	BQL	BQL	365	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	6/5/97	BQL	BQL	BQL	BQL	BQL	482	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	160	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-10	8/21/97	BDL	BDL	BDL	BDL	BDL	2.6	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	12	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-11	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
HPFF-12	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	27	BQL	BQL	BQL	BQL	BQL	27	BQL
	2/23/00 dup	BQL	BQL	BQL	BQL	BQL	26	BQL	BQL	BQL	BQL	BQL	27	BQL
HPFF-13	8/21/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	2	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-14	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-15	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
HPFF-16	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-17	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-18	8/20/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	WELL DAMAGED												BQL
HPFF-19	8/20/97	BQL	BQL	BQL	BQL	BQL	875	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	1500	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-20	8/20/97	BQL	BQL	BQL	BQL	BQL	102	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/18/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-21	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-22	1/28/00	BQL	BQL	BQL	BQL	BQL	380	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-23	1/28/00	BQL	BQL	BQL	BQL	BQL	89	BQL	BQL	BQL	BQL	BQL	BQL	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
HPFF-24	1/31/00	BQL	BQL	BQL	BQL	BQL	14	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-25	1/28/00	BQL	BQL	BQL	BQL	100	200	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-26	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-27	2/2/00	BQL	BQL	BQL	BQL	BQL	78	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-28	1/28/00	BQL	BQL	BQL	BQL	150	1400	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-29	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-30	1/28/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-31	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-32	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-33	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-34	1/31/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	15	BQL
HPFF-35	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-36	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-37	2/1/00	4	BQL	16	1	BQL	BQL	BQL	BQL	BQL	BQL	BQL	13	BQL
HPFF-38	2/1/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-39	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-40	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-41	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-42	3/7/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-43	3/26/02	<1	<2	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	BQL
HPFF-44	3/26/02	<1	<2	<1	<1	<1	<1	<1	4	<1	<1	<1	<1	BQL

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SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
HPFF-45	3/26/02	<5	<10	<5	<5	<5	<5	<5	40	<5	<5	<5	110	BQL
HPFF-46	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-47	3/26/02	<25	<50	<25	<25	<25	<25	<25	170	<25	<25	<25	330	BQL
HPFF-48	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-49	3/26/02	<8	<16	<8	<8	<8	<8	<8	130	<8	<8	<8	<8	BQL
HPFF-50	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-51	3/25/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-52	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-53	3/26/02	<1	<2	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	BQL
HPFF-54	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-55	3/26/02	<1	<2	13	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-56	3/26/02	<1	<2	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-57	3/26/02	<1	<2	<1	<1	<1	<1	<1	1	<1	4	<1	4	BQL
HPFF-58	3/26/02	<1	<2	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	BQL
HPFF-59	3/27/02	<1	<2	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	BQL
HPFF-60	3/27/02	<1	<2	<1	<1	<1	25	<1	<1	<1	<1	<1	<1	BQL
HPFF-61	3/27/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
	3/27/2002 dup	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-62	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-63	3/26/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-64	3/27/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
HPFF-65	3/27/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-66	3/27/02	<4	<8	<4	<4	<4	59	<4	<4	<4	<4	<4	<4	BQL
	3/27/2002 dup	<4	<8	<4	<4	<4	48	<4	<4	<4	<4	<4	<4	BQL
HPFF-67	3/27/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-68	3/25/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-69	3/27/02	<1	<2	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	BQL
HPFF-70	3/27/02	<1	<2	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	BQL
HPFF-71	3/27/02	<1	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-72	3/25/02	<160	<320	<160	<160	<160	590	<160	<160	<160	<160	<160	<160	BQL
HPFF-73	4/23/03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
	4/23/03 dup	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-74	4/23/03	<1	<1	1.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
HPFF-75	5/7/03	<1	<2	<1	<1	<1	20	<1	<1	<1	<1	<1	<1	BQL
	5/14/03	BQL	BQL	BQL	BQL	BQL	27	BQL	BQL	BQL	BQL	BQL	BQL	BQL
HPFF-76	4/23/03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	170	BQL
HPFF-77	4/22/03	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	BQL
MW-1	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/18/00 dup	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-2	2/18/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
MW-3	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-4	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-5	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-6	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/4/97	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/22/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-9	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-10R	6/5/97	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-11	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/4/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/15/00	BQL	BQL	BQL	BQL	BQL	85	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-15	12/6/95	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL

TABLE 6

SUMMARY OF HISTORICAL ANALYTICAL RESULTS - GROUNDWATER (EPA METHOD 601)

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	Date Sampled	ANALYTE												
		Bromodichloromethane	Bromoform	Chloroform	Dibromochloromethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,2-Dichloropropane	Tetrachloroethene	Trichloroethene	All Other Analytes
2L GWQS (ug/L)		0.6	0.19	0.19	0.41	0.0004	0.38	7	70	70	0.56	0.7	2.8	Varies
MW-17	11/30/95	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/18/00	BQL	BQL	BQL	BQL	BQL	910	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-18	6/5/97	BQL	BQL	BQL	BQL	BQL	400	BQL	BQL	BQL	BQL	BQL	BQL	BQL
	2/17/00	BQL	BQL	BQL	BQL	180	250	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-19	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/17/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-20	11/30/95	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-21	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/16/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL
MW-23	6/5/97	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BQL
	2/23/00	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

* Results in ug/L.

** All compounds listed in laboratory analytical reports.

Shaded areas indicate concentrations in excess of 2L GWQS.

BQL = Below Quantitation Limits. Refer to analytical report for a complete list of compounds and quantitation limits.

TABLE 7
HISTORICAL BENZENE TRENDS - TYPE II WELLS ONLY

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

<u>Well</u>	<u>INITIAL SAMPLING EVENT</u>		<u>MOST RECENT SAMPLING EVENT</u>		<u>Logarithmic Change in Concentration</u>
	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	
GT-02	2/17/00	43000	11/14/00	21000	DECREASED 4.34
MW-01	2/17/00	11000	2/9/02	3280	DECREASED 3.89
HPFF-29	1/28/00	29000	11/16/00	23000	DECREASED 3.78
GT-06	2/17/00	8400	11/14/00	4000	DECREASED 3.64
HPFF-23	1/28/00	9200	11/16/00	5200	DECREASED 3.6
HPFF-25	1/28/00	16000	11/16/00	13000	DECREASED 3.48
HPFF-19	8/20/97	17900	2/9/02	15000	DECREASED 3.46
1115-12	2/23/00	4200	11/15/00	2000	DECREASED 3.34
HPFF-24	1/31/00	3600	11/16/00	1700	DECREASED 3.28
HPFF-20	8/20/97	4850	2/9/02	3070	DECREASED 3.25
MW-18	6/5/97	20450	2/9/02	18900	DECREASED 3.19
HPFF-30	1/28/00	510	11/15/00	150	DECREASED 2.56
MW-06	11/30/95	30	7/17/02	9	DECREASED 1.32
MW-15	11/30/95	19	6/5/97	0	DECREASED 1.28
HPFF-26	1/31/00	5	11/16/00	0	DECREASED 0.7
HPFF-34	1/31/00	5	11/13/00	0	DECREASED 0.7
MW-23	6/5/97	4	2/23/00	0	DECREASED 0.6
HPFF-05	12/1/95	6.6	7/17/02	3	DECREASED 0.56
HPFF-37	2/1/00	1	11/13/00	0	DECREASED 0
MW-09	11/30/95	1	7/17/02	0	DECREASED 0
MW-20	11/30/95	5	7/18/02	4	DECREASED 0
1101-01	11/14/00	0	7/17/02	0	UNCHANGED
1101-03	11/13/00	0	7/18/02	0	UNCHANGED
1115-08	6/4/97	0	11/13/00	0	UNCHANGED
78GW-12	6/5/97	0	11/13/00	0	UNCHANGED
78GW-13	6/5/97	0	11/16/00	0	UNCHANGED
78GW-14	6/5/97	0	11/13/00	0	UNCHANGED
78GW-15	6/5/97	0	11/13/00	0	UNCHANGED
78GW-16	6/5/97	0	11/13/00	0	UNCHANGED
78GW-17 -01	6/5/97	0	11/16/00	0	UNCHANGED
78GW-21	6/5/97	0	11/15/00	0	UNCHANGED
GT-08	6/4/97	0	7/18/02	0	UNCHANGED
HPFF-01	12/1/95	0	7/17/02	0	UNCHANGED
HPFF-02	12/1/95	0	7/18/02	0	UNCHANGED
HPFF-03	6/5/97	0	7/18/02	0	UNCHANGED
HPFF-04	11/30/95	0	11/13/00	0	UNCHANGED
HPFF-14	2/17/00	1400	11/15/00	1400	UNCHANGED
HPFF-22	1/28/00	11000	11/15/00	11000	UNCHANGED
HPFF-31	1/31/00	0	7/18/02	0	UNCHANGED
HPFF-32	1/31/00	0	11/13/00	0	UNCHANGED
HPFF-33	1/31/00	0	11/13/00	0	UNCHANGED
HPFF-35	2/1/00	0	11/13/00	0	UNCHANGED
HPFF-36	2/1/00	0	11/13/00	0	UNCHANGED
HPFF-38	2/1/00	0	7/17/02	0	UNCHANGED
HPFF-39	3/7/00	0	7/18/02	0	UNCHANGED
HPFF-40	3/7/00	0	11/15/00	0	UNCHANGED
HPFF-42	3/7/00	0	11/15/00	0	UNCHANGED
MW-03	11/30/95	0	7/17/02	0	UNCHANGED
MW-04	11/30/95	0	11/13/00	0	UNCHANGED
MW-05	6/5/97	0	11/16/00	0	UNCHANGED
MW-21	6/5/97	0	2/16/00	0	UNCHANGED
GT-05	6/4/97	4.2	11/14/00	7	INCREASED 0.45

TABLE 7
HISTORICAL BENZENE TRENDS - TYPE II WELLS ONLY

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

<u>Well</u>	<u>INITIAL SAMPLING EVENT</u>		<u>MOST RECENT SAMPLING EVENT</u>		<u>Logarithmic Change in Concentration</u>
	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	
GT-09	6/4/97	0	11/13/00	3	INCREASED 0.48
GT-01	6/5/97	0	2/2/02	4	INCREASED 0.6
1115-01	6/5/97	1.3	2/2/02	6	INCREASED 0.67
HPFF-21	1/28/00	0	11/16/00	6	INCREASED 0.78
1115-03	6/5/97	0	11/13/00	11	INCREASED 1.04
1115-02	6/5/97	0.9	2/2/02	12	INCREASED 1.05
1115-04	6/4/97	0	2/2/02	23	INCREASED 1.36
78GW-19	6/4/97	0	11/13/00	25	INCREASED 1.4
HPFF-27	2/2/00	11	11/14/00	45	INCREASED 1.53
MW-11	11/30/95	2	2/9/02	64	INCREASED 1.79
1115-06	6/4/97	0	11/13/00	81	INCREASED 1.91
HPFF-41	3/7/00	0	11/16/00	86	INCREASED 1.93
GT-04	6/4/97	22	11/15/00	120	INCREASED 1.99
1115-11	6/4/97	0	11/15/00	140	INCREASED 2.15
1115-09	6/4/97	0	7/18/02	150	INCREASED 2.18
1115-10	6/4/97	3.1	11/15/00	200	INCREASED 2.29
MW-19	11/30/95	3	7/18/02	210	INCREASED 2.32
1115-05	2/23/00	1500	11/20/00	1900	INCREASED 2.6
HPFF-17	8/20/97	0	11/16/00	540	INCREASED 2.73
HPFF-16	8/20/97	0	11/15/00	580	INCREASED 2.76
GT-07	6/4/97	0	11/15/00	1000	INCREASED 3
GT-03	6/4/97	109	11/14/00	1800	INCREASED 3.23
1115-07	11/15/00	3000	7/17/02	6000	INCREASED 3.48
MW-10R	6/5/97	700	2/9/02	4410	INCREASED 3.57
HPFF-72	3/25/02	15000	7/18/02	21000	INCREASED 3.78
MW-17	11/30/95	5750	2/9/02	12200	INCREASED 3.81

TABLE 8
HISTORICAL BENZENE TRENDS - WELLS 50 FEET DEEP

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

<u>Well</u>	INITIAL SAMPLING EVENT		MOST RECENT SAMPLING EVENT		Logarithmic Change in Concentration
	<u>Date</u>	<u>Benzene</u> <u>Concentration</u> <u>(ppb)</u>	<u>Date</u>	<u>Benzene</u> <u>Concentration</u> <u>(ppb)</u>	
1115-15	6/4/97	16500	7/18/02	2300	DECREASED 4.15
1115-19	6/5/97	13900	7/17/02	2400	DECREASED 4.06
1115-13	6/4/97	10800	2/2/02	298	DECREASED 4.02
1115-14	6/4/97	11760	7/18/02	6700	DECREASED 3.7
1115-18	6/5/97	4820	2/2/02	30	DECREASED 3.68
HPFF-07	12/1/95	320	2/9/02	25	DECREASED 2.47
HPFF-09	12/1/95	8170	7/17/02	8100	DECREASED 1.85
1115-20	6/5/97	15000	11/16/00	15000	UNCHANGED
HPFF-06	11/30/95	0.7	7/18/02	0.7	UNCHANGED
1115-17	6/4/97	7900	2/2/02	8670	INCREASED 2.89
1115-21	6/5/97	890	2/2/02	1920	INCREASED 3.01
HPFF-08	11/30/95	812.5	2/9/02	12300	INCREASED 4.06

TABLE 9

HISTORICAL BENZENE TRENDS - WELLS 70-90 FEET DEEP

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

<u>Well</u>	INITIAL SAMPLING EVENT		MOST RECENT SAMPLING EVENT		Logarithmic Change in Concentration
	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	
1115-23	6/5/97	9722	2/2/02	22	DECREASED 3.99
1115-22	6/4/97	1640	2/2/02	1250	DECREASED 2.59
1115-25	6/4/97	86	2/2/02	3	DECREASED 1.92
78GW-17 -02	2/22/00	3	7/18/02	2	DECREASED 0
78GW-31 -02	6/4/97	0	8/28/02	0	UNCHANGED
78GW-22-02	6/5/97	0	2/2/02	23	INCREASED 1.36
78GW-32 -02	6/4/97	64.2	2/9/02	228	INCREASED 2.21
HPFF-10	8/21/97	168	7/17/02	580	INCREASED 2.61
1115-24	6/5/97	708	2/2/02	2480	INCREASED 3.25

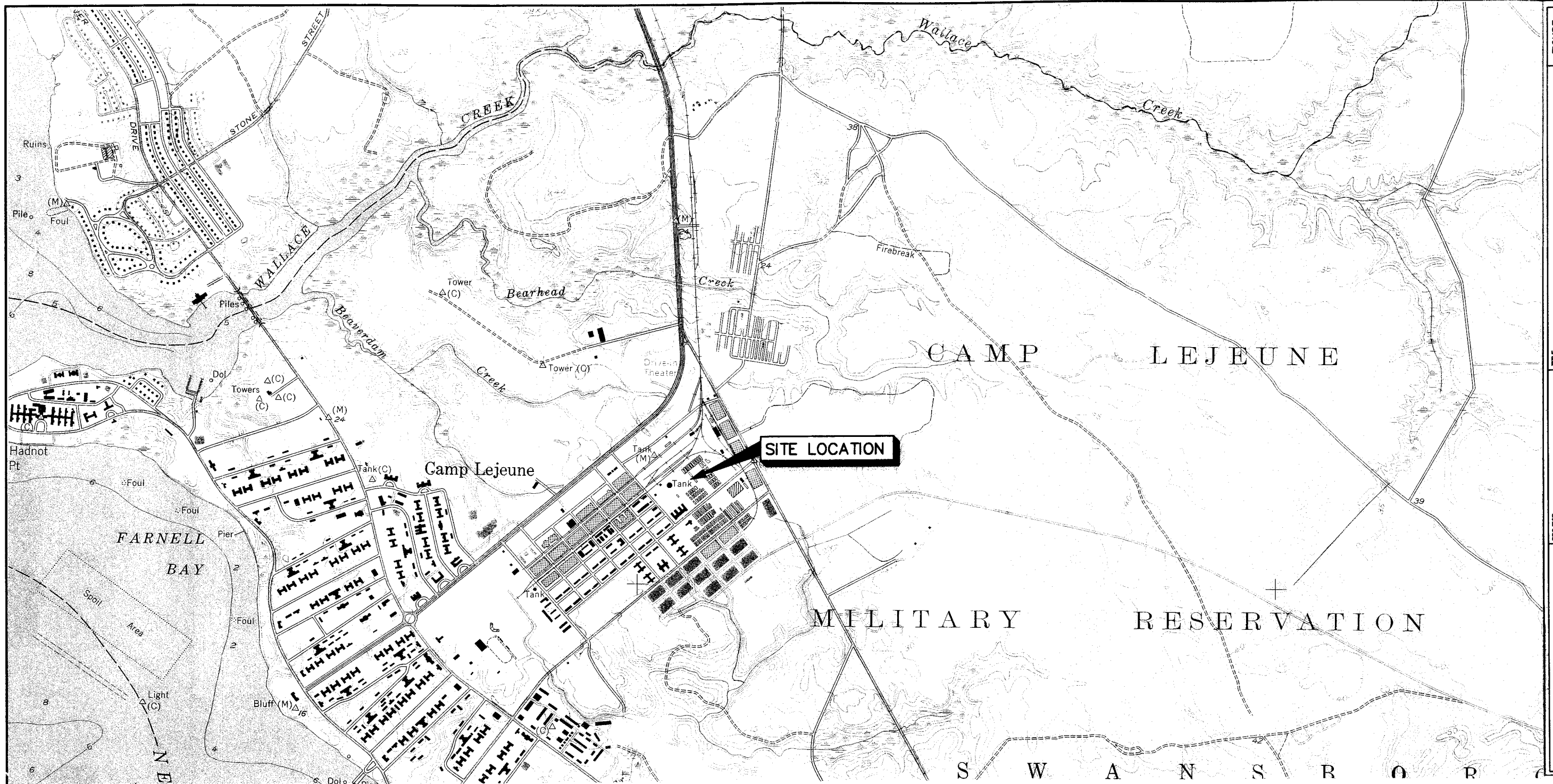
TABLE 10

HISTORICAL BENZENE TRENDS - WELLS GREATER THAN 100 FEET DEEP

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

<u>Well</u>	INITIAL SAMPLING EVENT		MOST RECENT SAMPLING EVENT		Logarithmic Change in Concentration
	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	<u>Date</u>	<u>Benzene Concentration (ppb)</u>	
HPFF-60	3/27/02	3000	7/17/02	2700	DECREASED 2.48
78GW-32 -03	6/4/97	5.1	2/9/02	3	DECREASED 0.32
78GW-31 -03	6/4/97	0	8/28/02	0	UNCHANGED
HPFF-13	8/21/97	14.7	7/18/02	160	INCREASED 2.16
HPFF-11	8/21/97	25.9	7/17/02	370	INCREASED 2.54
HPFF-12	8/21/97	51.8	7/17/02	3000	INCREASED 3.47

FIGURES



FIGURE

1

GENERAL LOCATION

USGS TOPOGRAPHIC

QUADRANGLE

TITLE

PROJECT

REVISED

CORRECTIVE ACTION PLAN

HADNOT POINT FUEL FARM

MARINE CORPS BASE

CAMP LEJEUNE, N.C.

SCALE: AS SHOWN

DATE: JUNE 2003

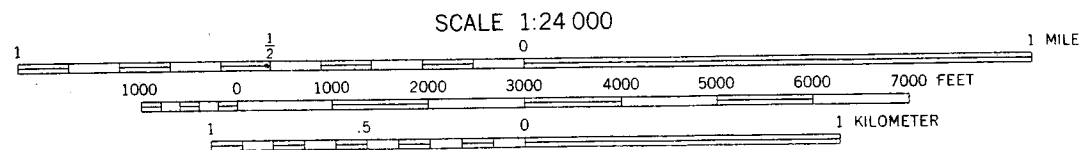
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CHECKED BY: SVH

WILMINGTON, NORTH CAROLINA

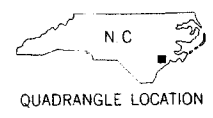
UTM GRID AND 1971 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

MN
GN
5 1/2°
98 MILS
1° 19'
23 MILS



CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS 2 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



ROAD CLASSIFICATION

Heavy-duty 4 LANE 16 LANE Light-duty

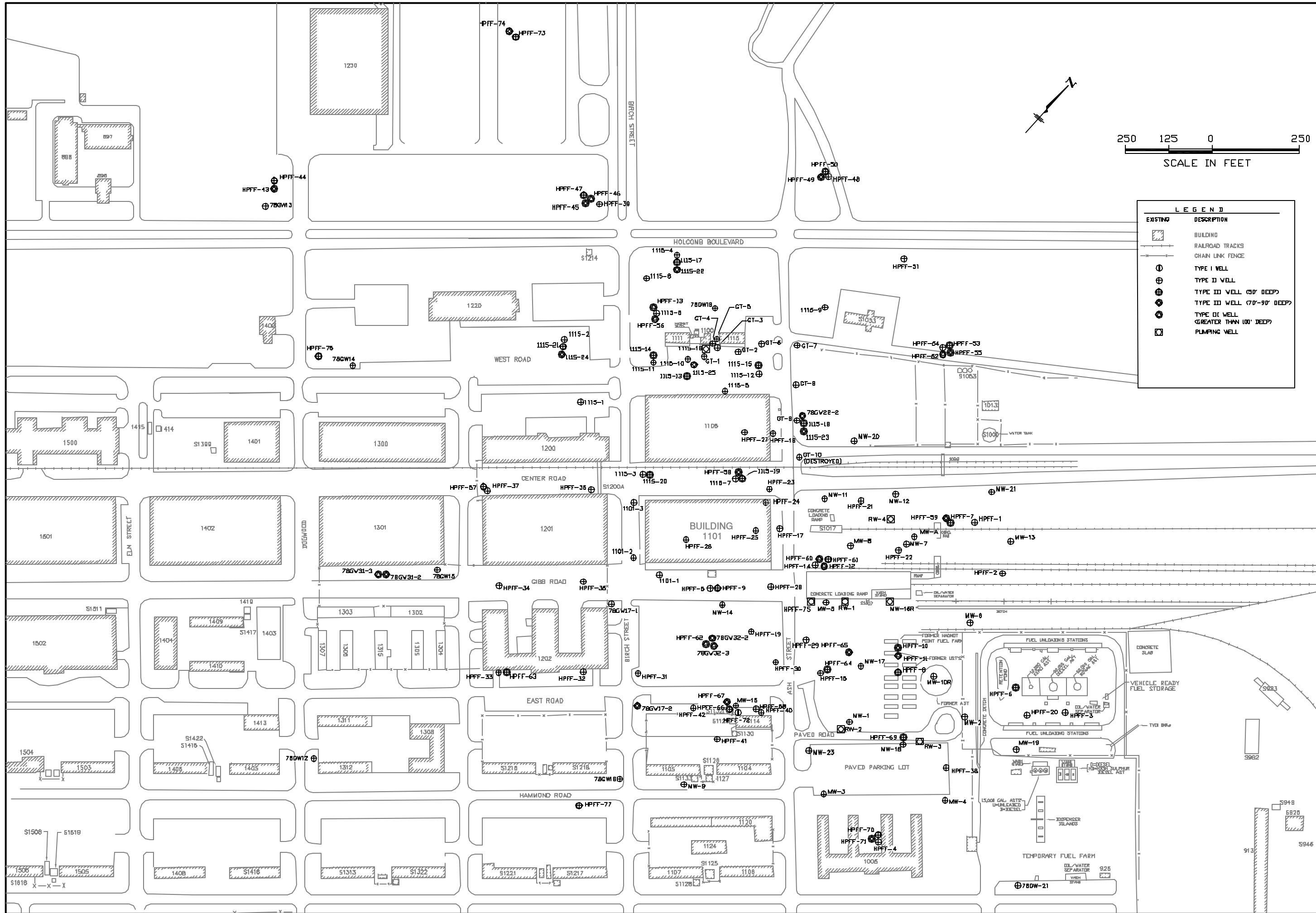
Medium-duty 4 LANE 16 LANE Unimproved dirt

U. S. Route State Route

CAMP LEJEUNE, N. C.

N3437.5—W7715/7.5

1952
PHOTOREVISED 1971
AMS 5553 III NE—SERIES V842



FIGURE

2A

SITE MAP WITH

MONITORING WELL LOCATIONS

PROJECT

REVISED CORRECTIVE ACTION PLAN

HADNOT POINT FUEL FARM

MARINE CORPS BASE

CAMP LEEJUNE, N.C.

TITLE

DATE: JUNE 2003

SCALE: 1"=250'

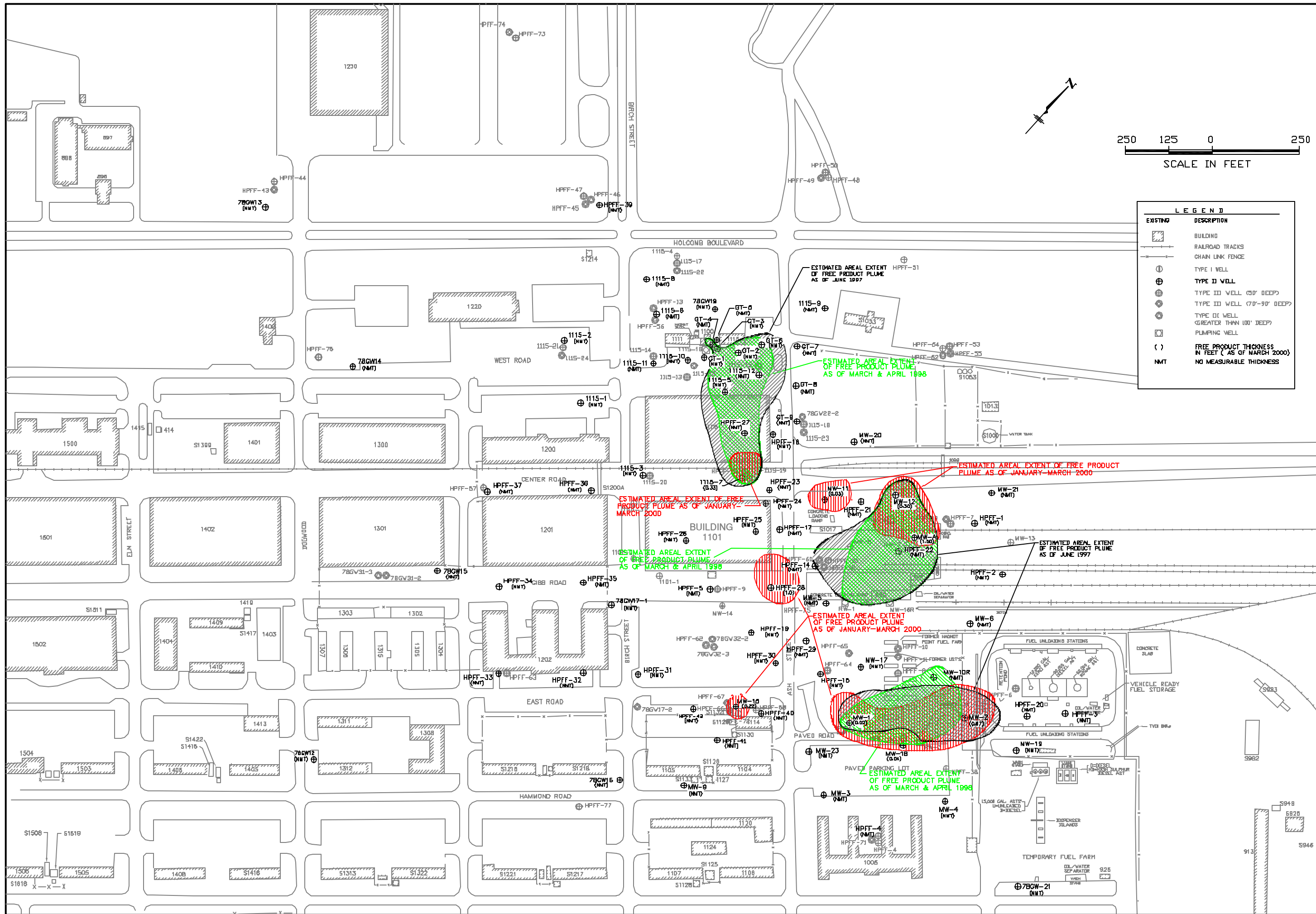
DRAWN BY: HCS

CHECKED BY: MEM

203047-CAP-02A

CALPIN

WILMINGTON, NORTH CAROLINA



FIGURE

4

TITLE

FREE PRODUCT SPATIAL EXTENT
(1997 - 2000)

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=250'

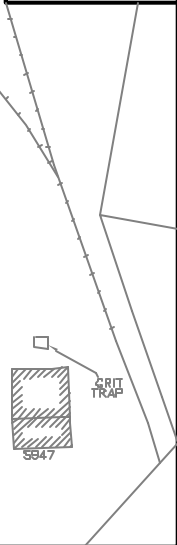
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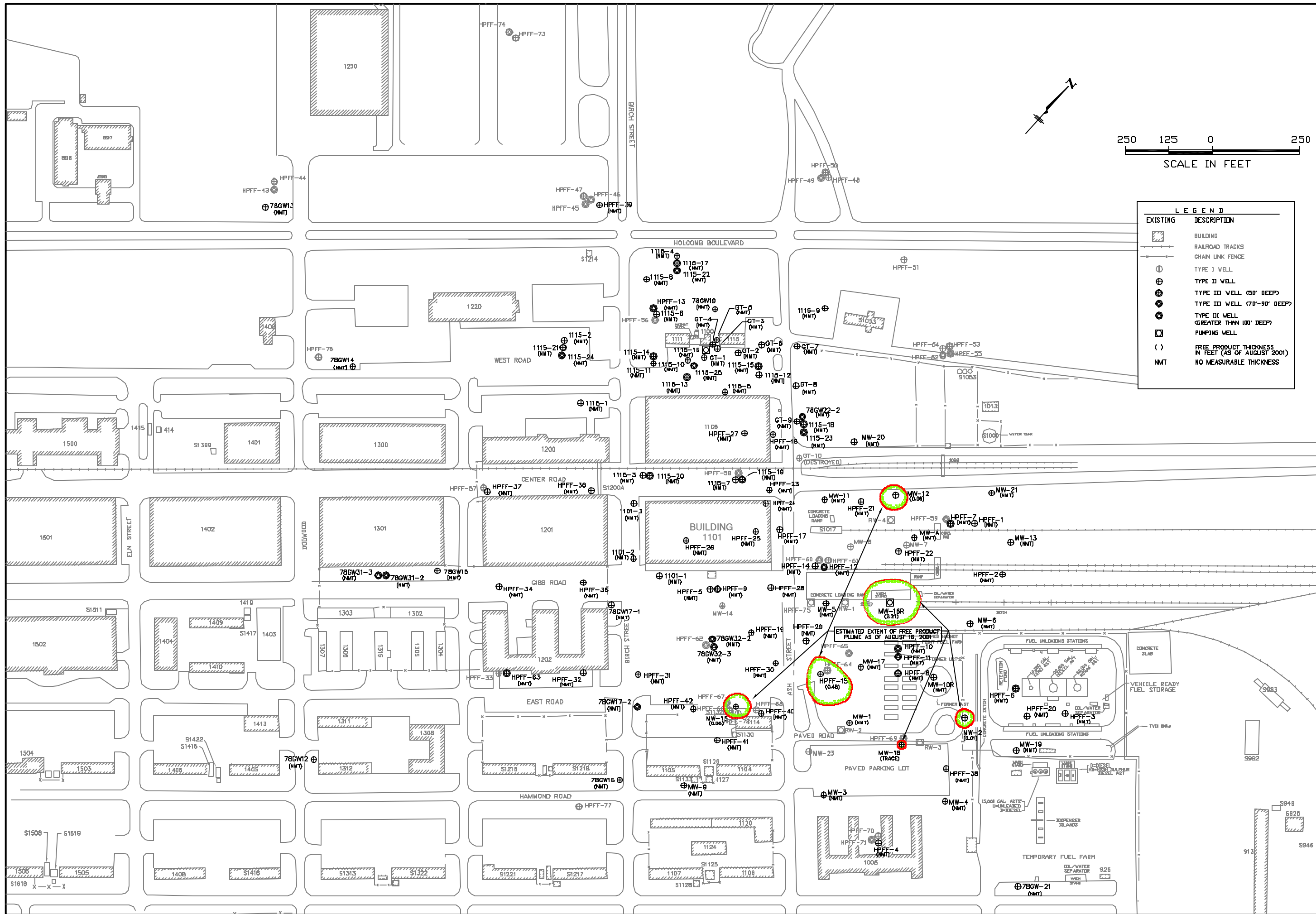
HCS

CHECKED BY

MEM

WILMINGTON, NORTH CAROLINA





FIGURE

5

TITLE

FREE PRODUCT SPATIAL EXTENT
(2001)

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=250'

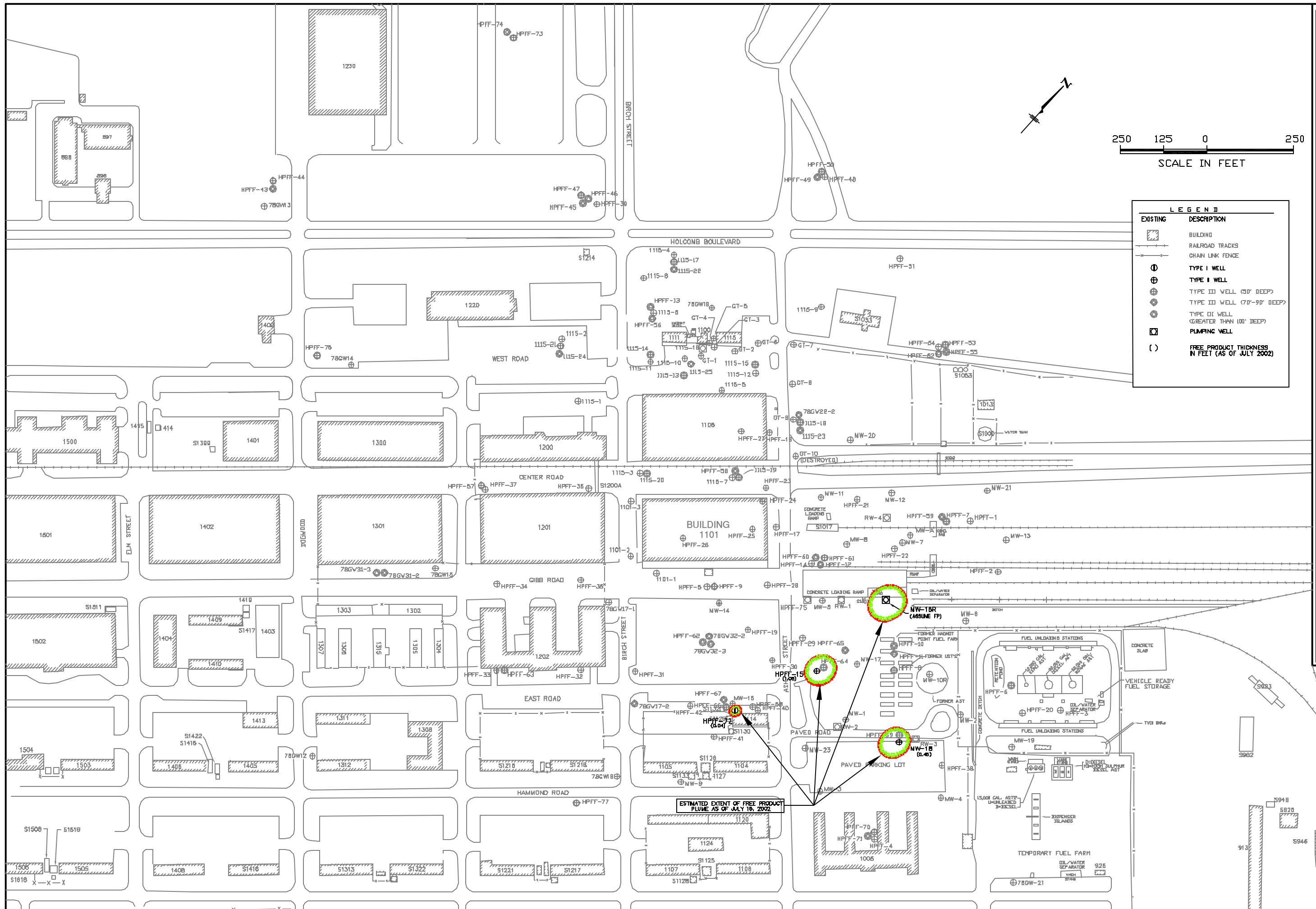
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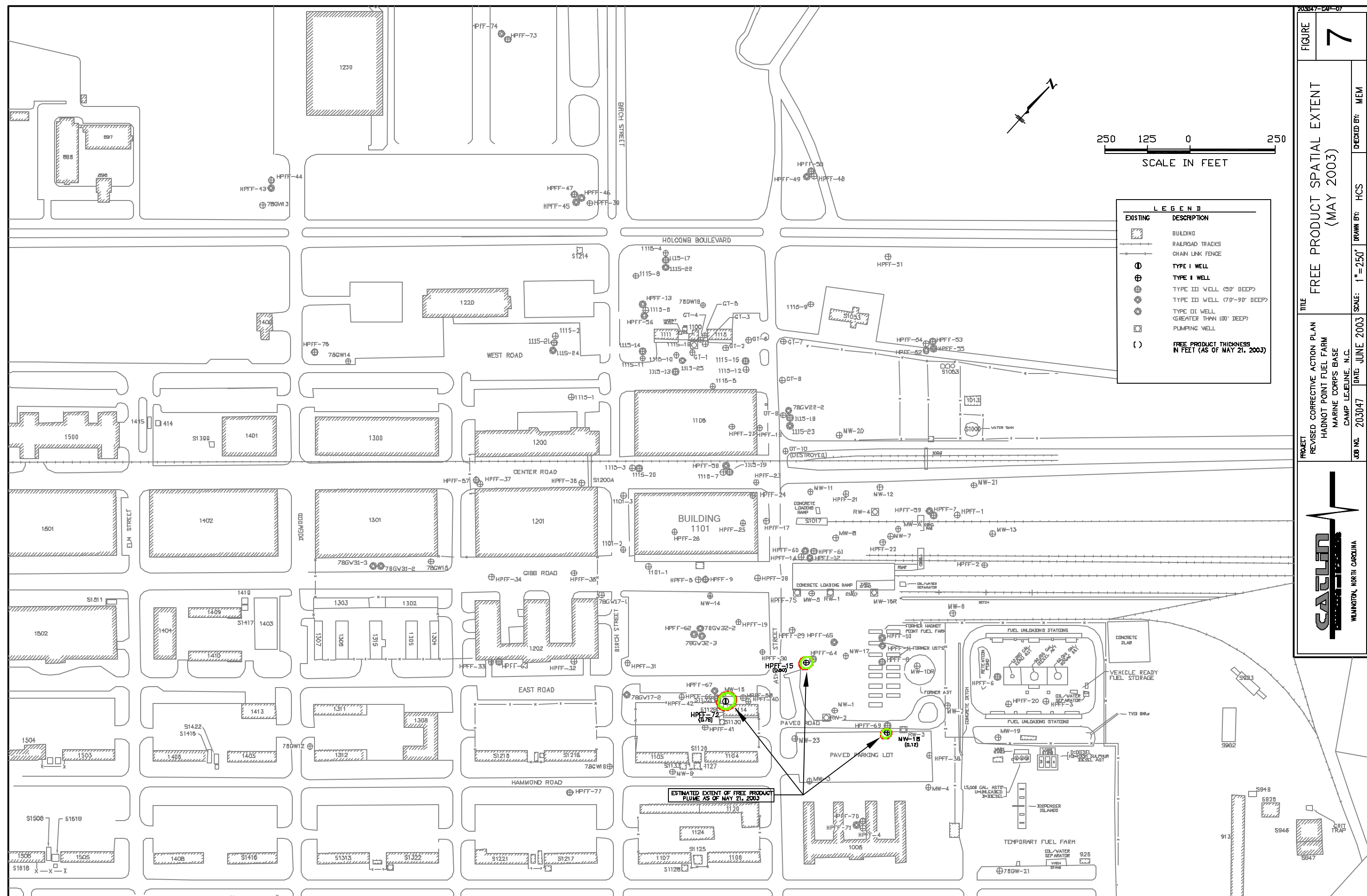
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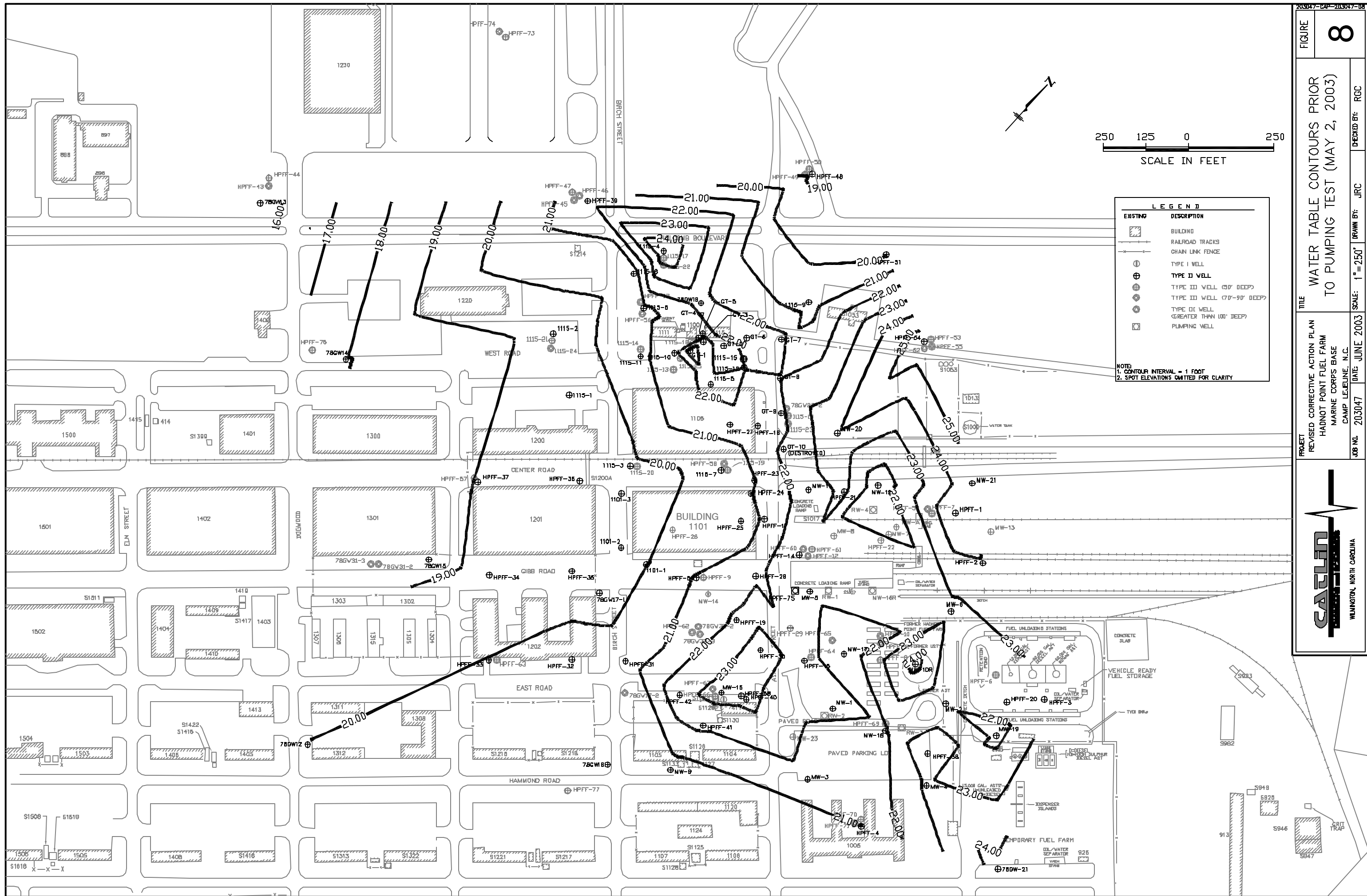
CHECKED BY

MEM









FIGURE

8

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJUNE, N.C.

TITLE

WATER TABLE CONTOURS PRIOR
TO PUMPING TEST (MAY 2, 2003)

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=250'

DRAWN BY

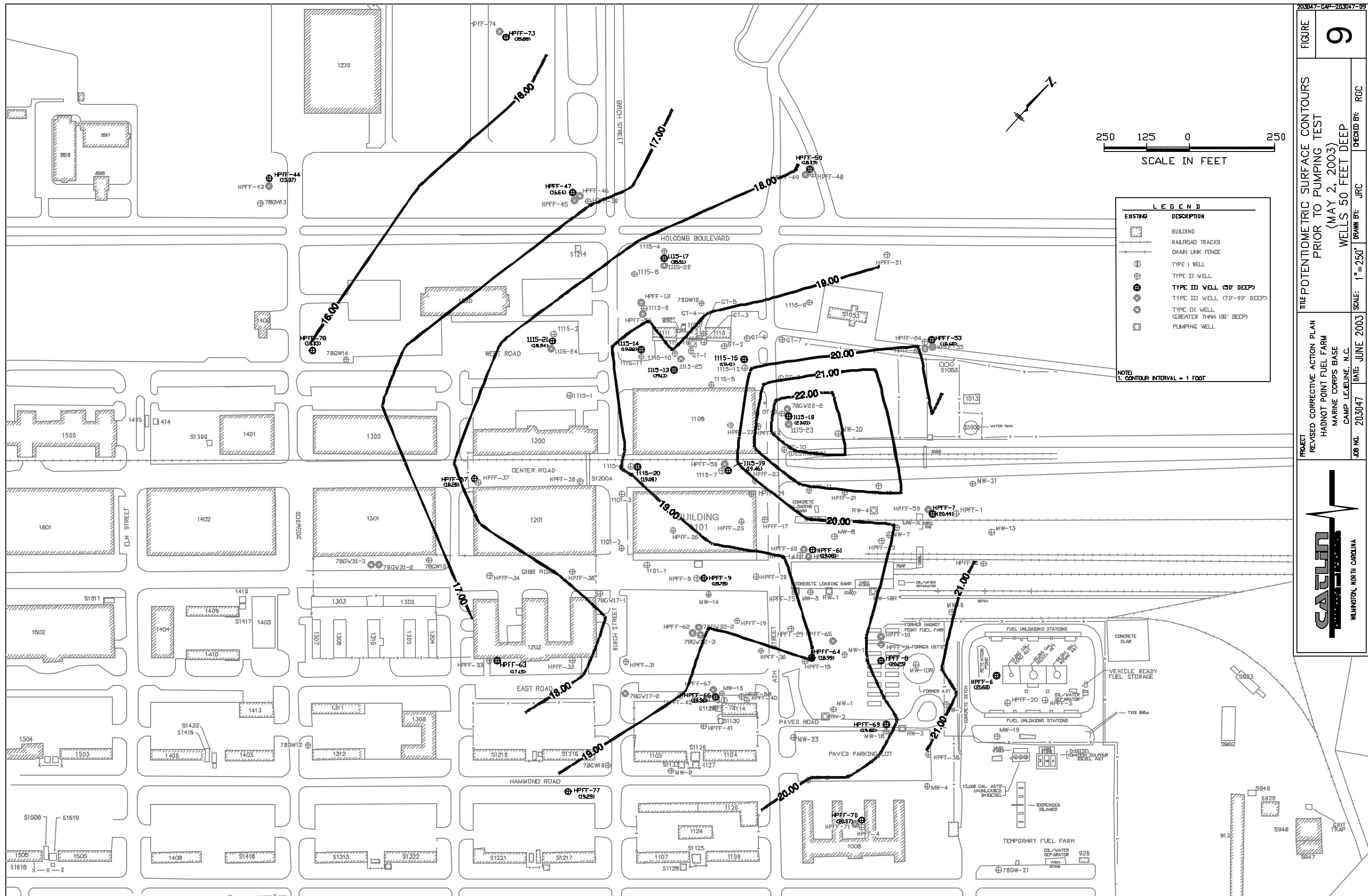
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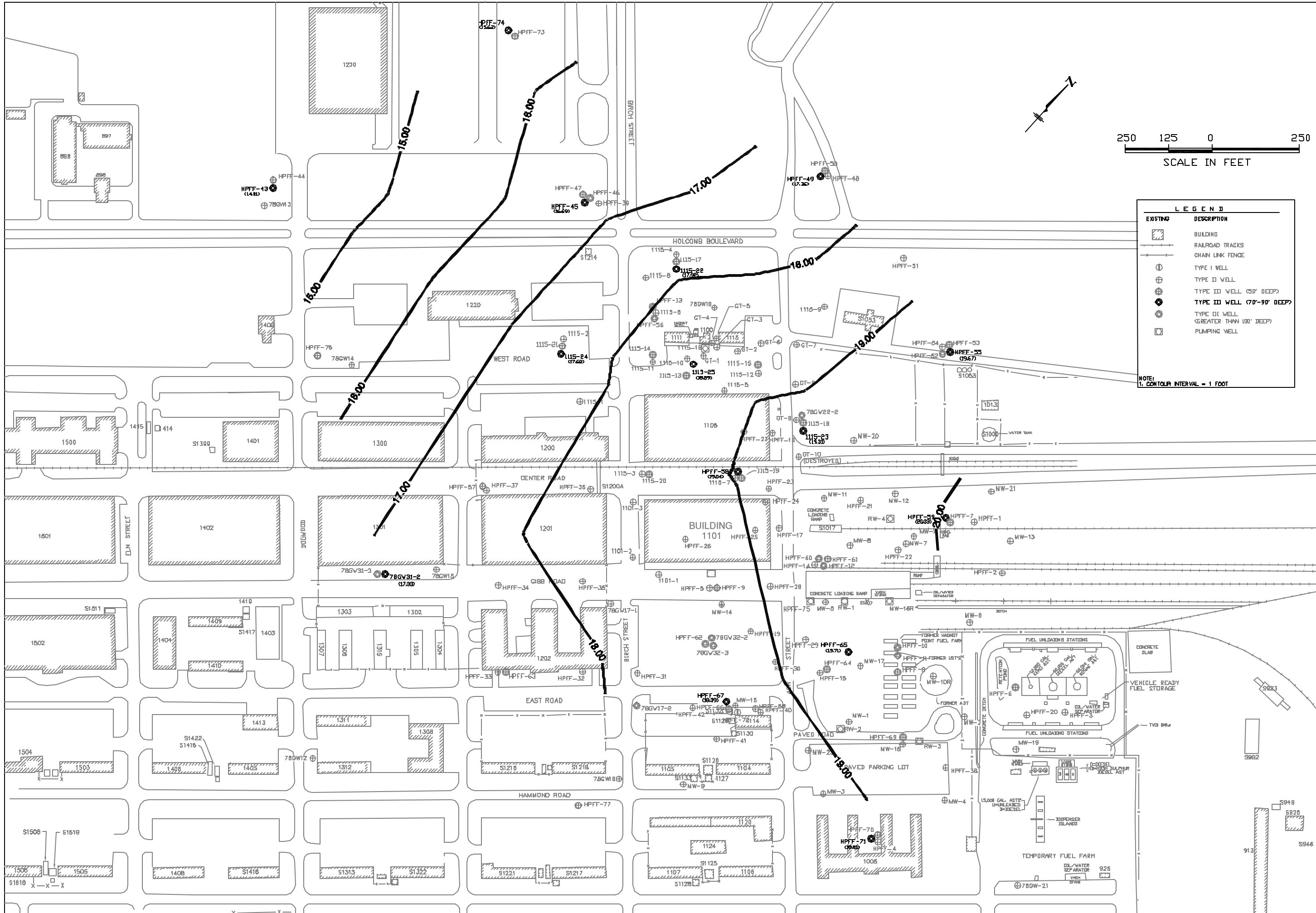
CHECKED BY

RGC

CALPIN

WILMINGTON, NORTH CAROLINA





FIGURE

10

THE POTENTIOMETRIC SURFACE CONTOURS
PRIOR TO PUMPING TEST
(MAY 2, 2003)
WELLS 70-90 FEET DEEP

SCALE: 1"=250'

DRAWN BY: JRC

CHECKED BY: RGC

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

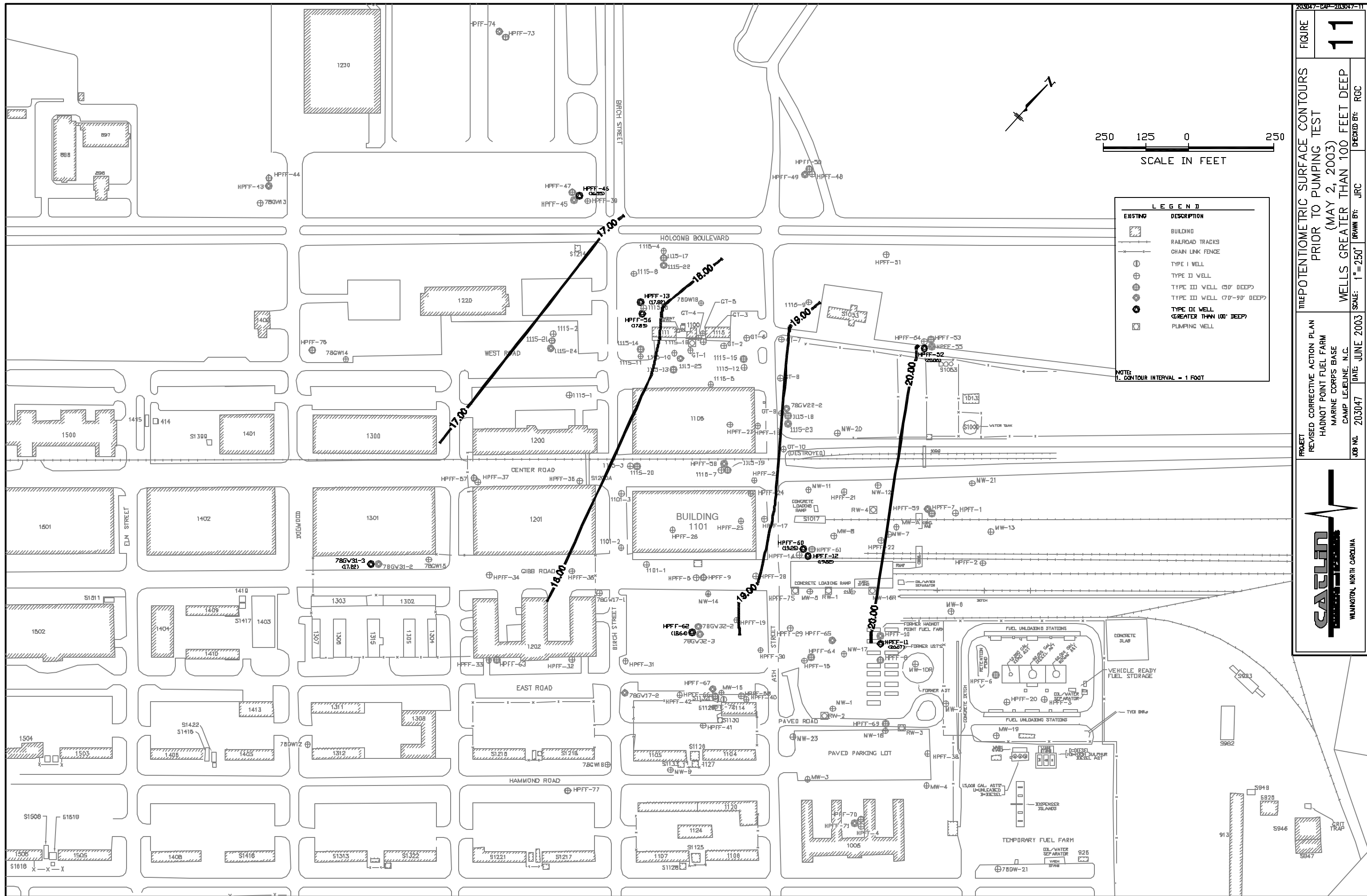
WILMINGTON, NORTH CAROLINA

JOB NO.

203047

DATE

JUNE 2003



PROJECT: REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

DATE: JUNE 2003

JOB NO.: 203047

WILMINGTON, NORTH CAROLINA

CALVIN



FIGURE

12

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE

WATER TABLE CONTOURS AT
CONCLUSION OF PUMPING TEST
(MAY 21, 2003)

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=250'

DRAWN BY

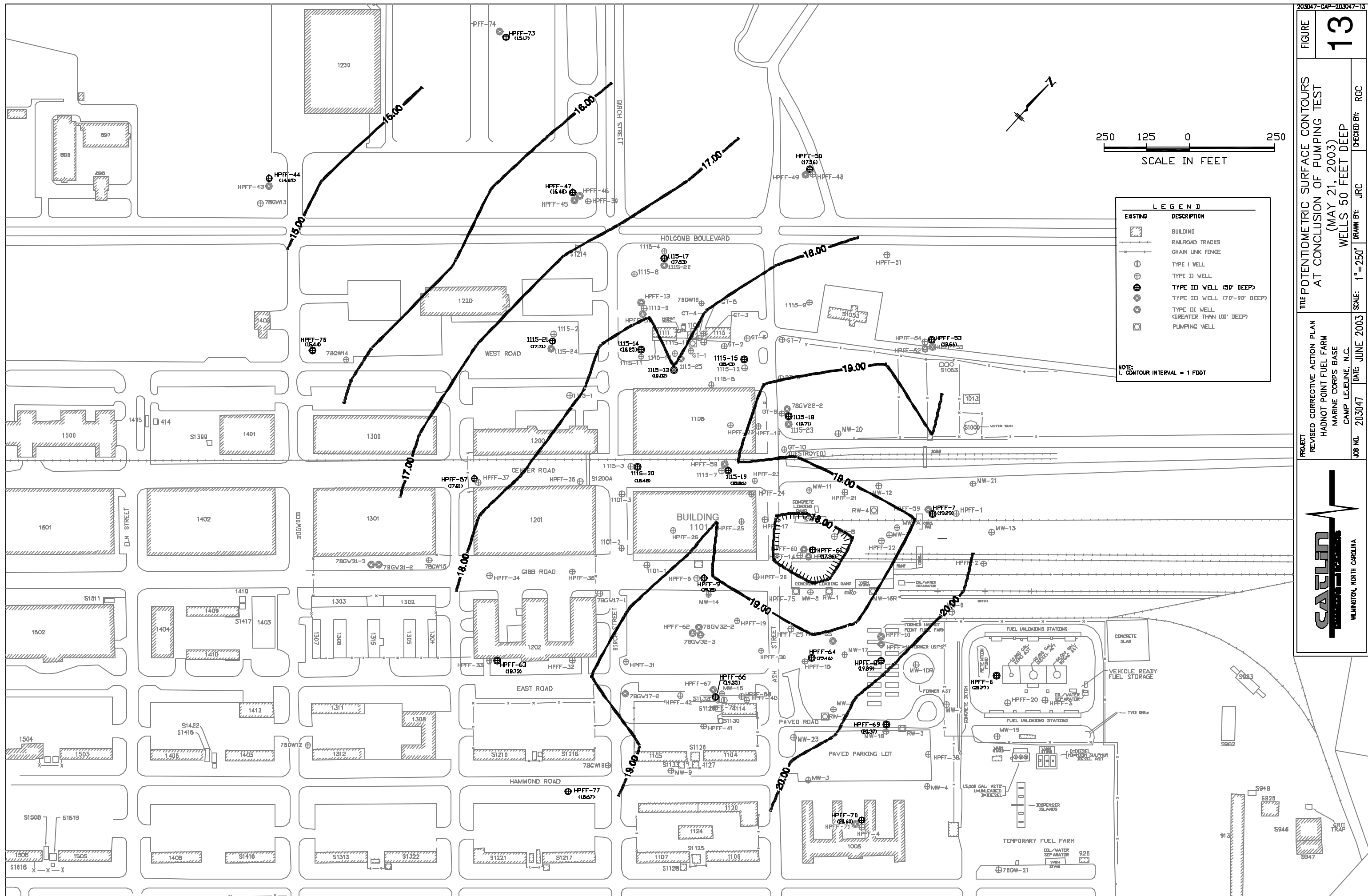
JRC

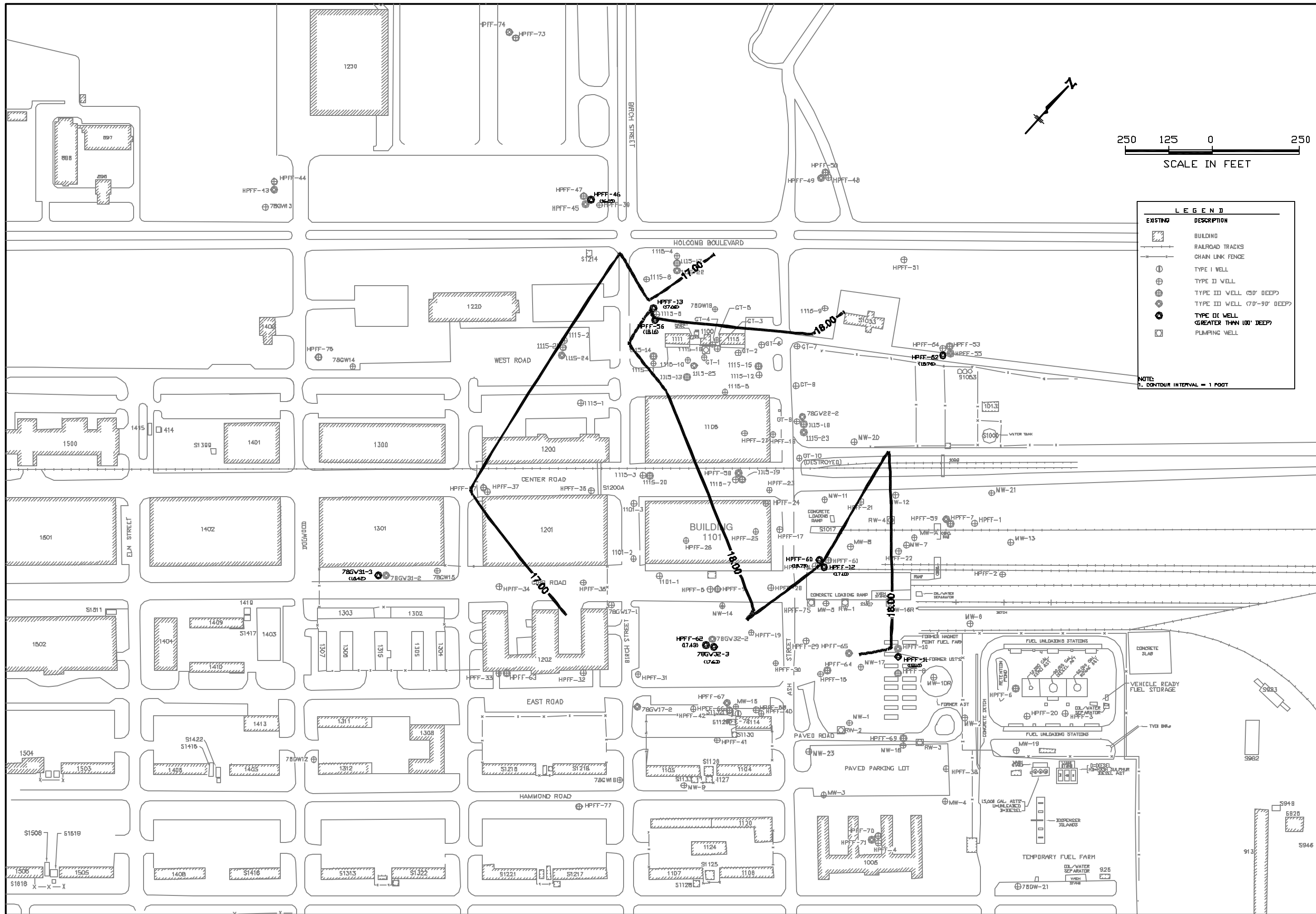
CHECKED BY

MEM



WILMINGTON, NORTH CAROLINA





FIGURE

15

THE POTENTIOMETRIC SURFACE CONTOURS AT CONCLUSION OF PUMPING TEST (MAY 21, 2003) WELLS GREATER THAN 100 FEET DEEP

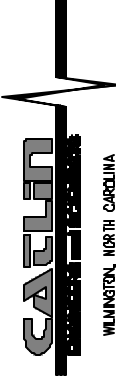
PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

SCALE: 1"=250'

DRAWN BY: JRC

DECKED BY: RGC


WILMINGTON, NORTH CAROLINA

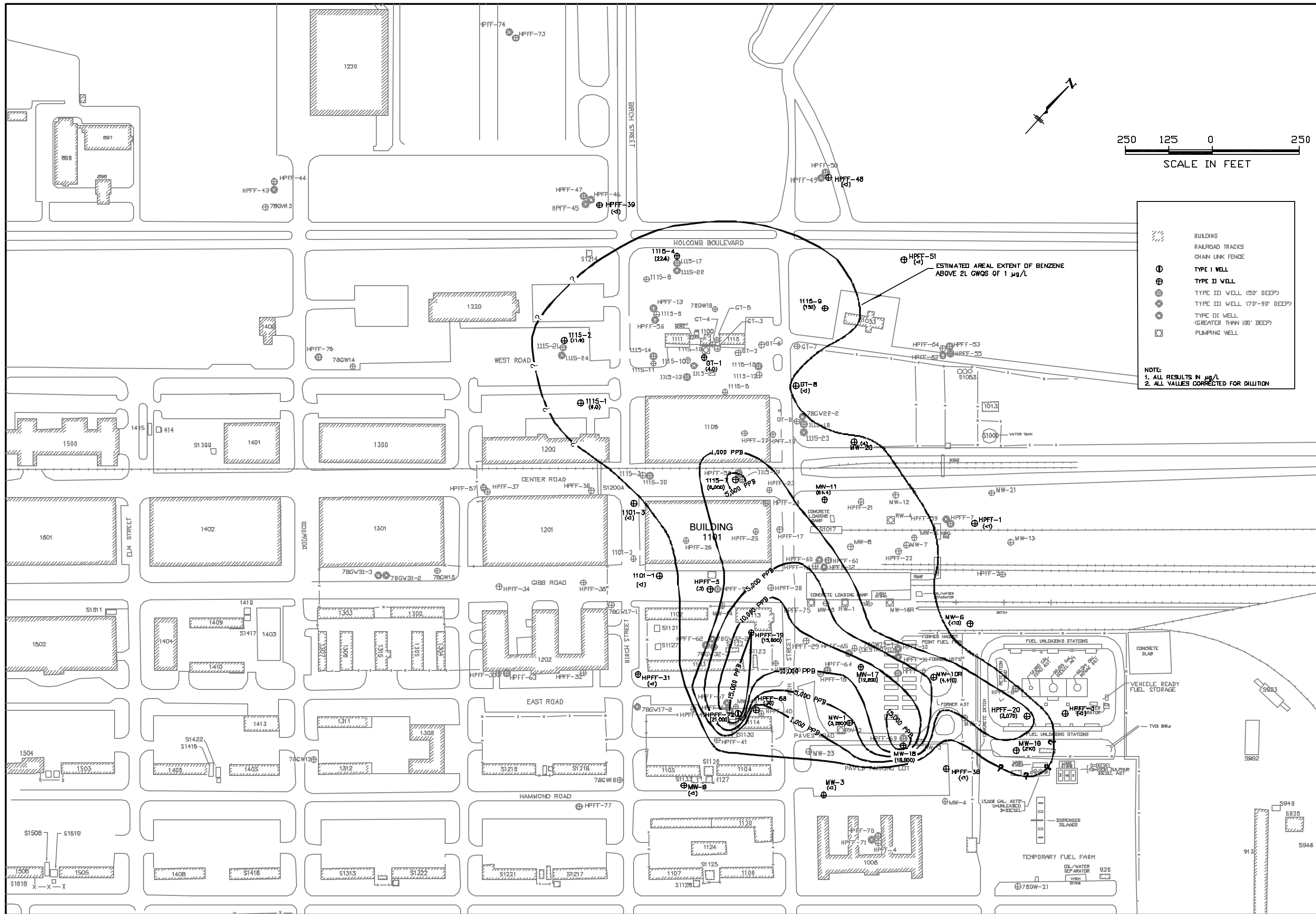
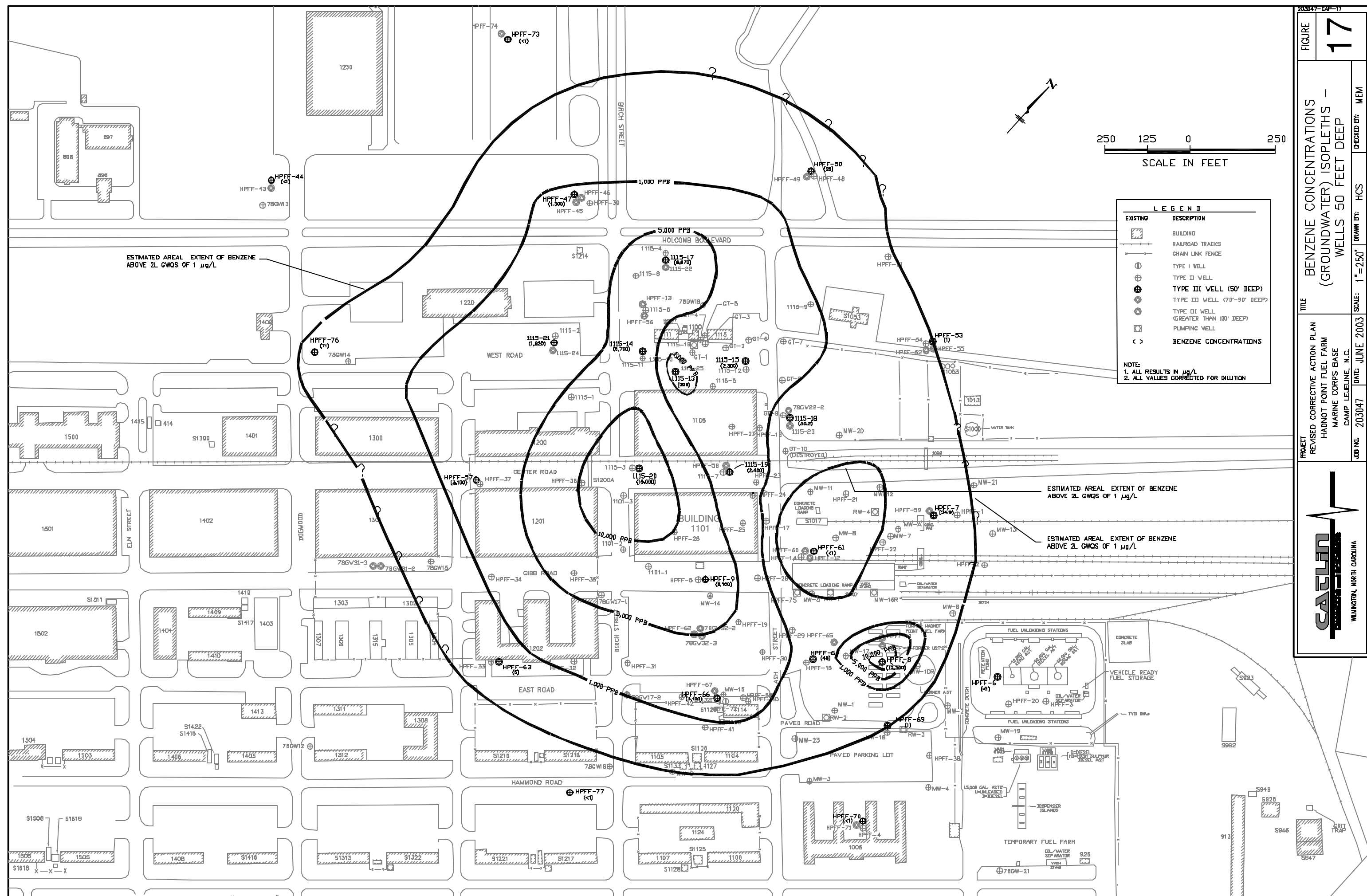
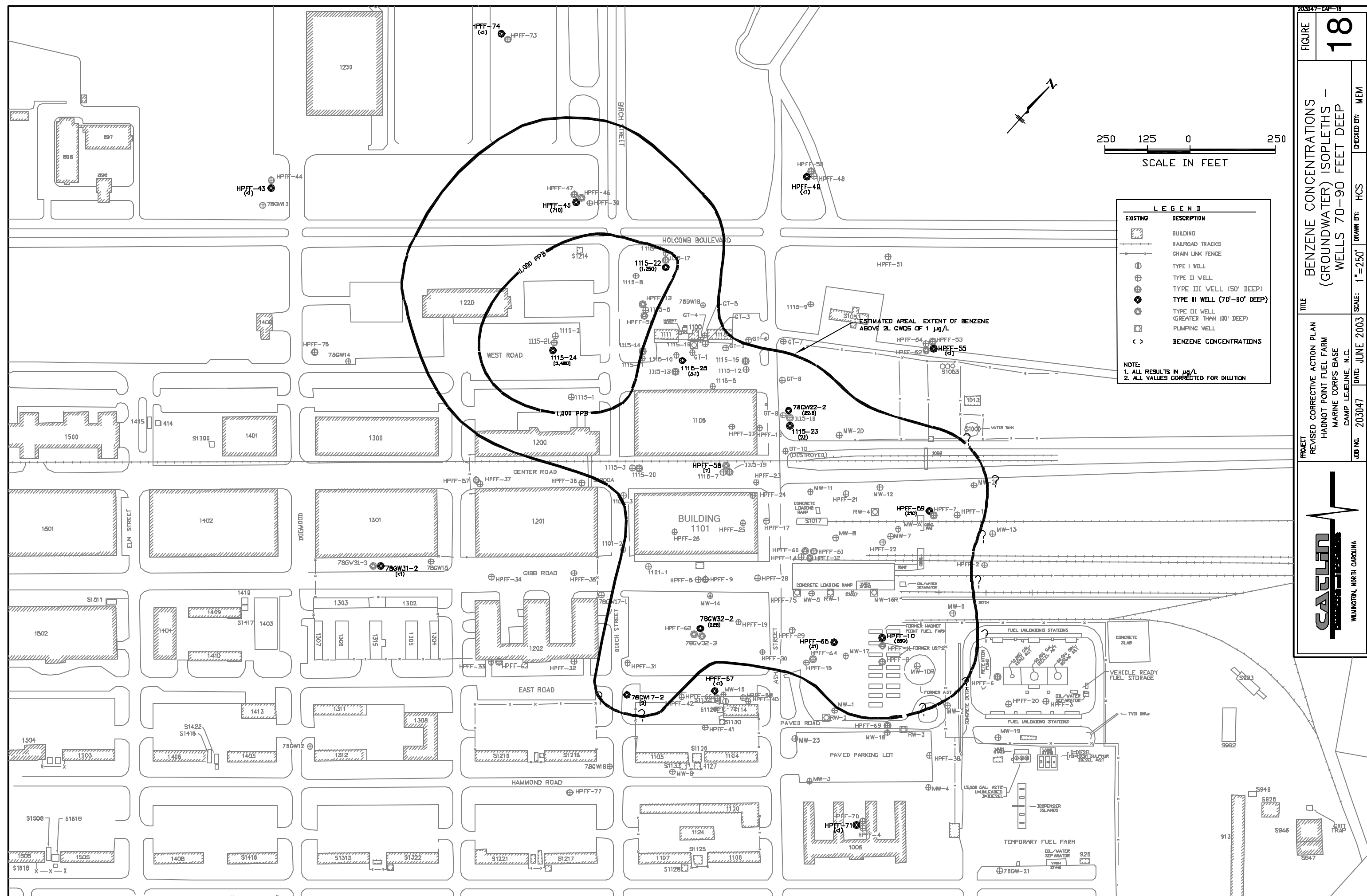
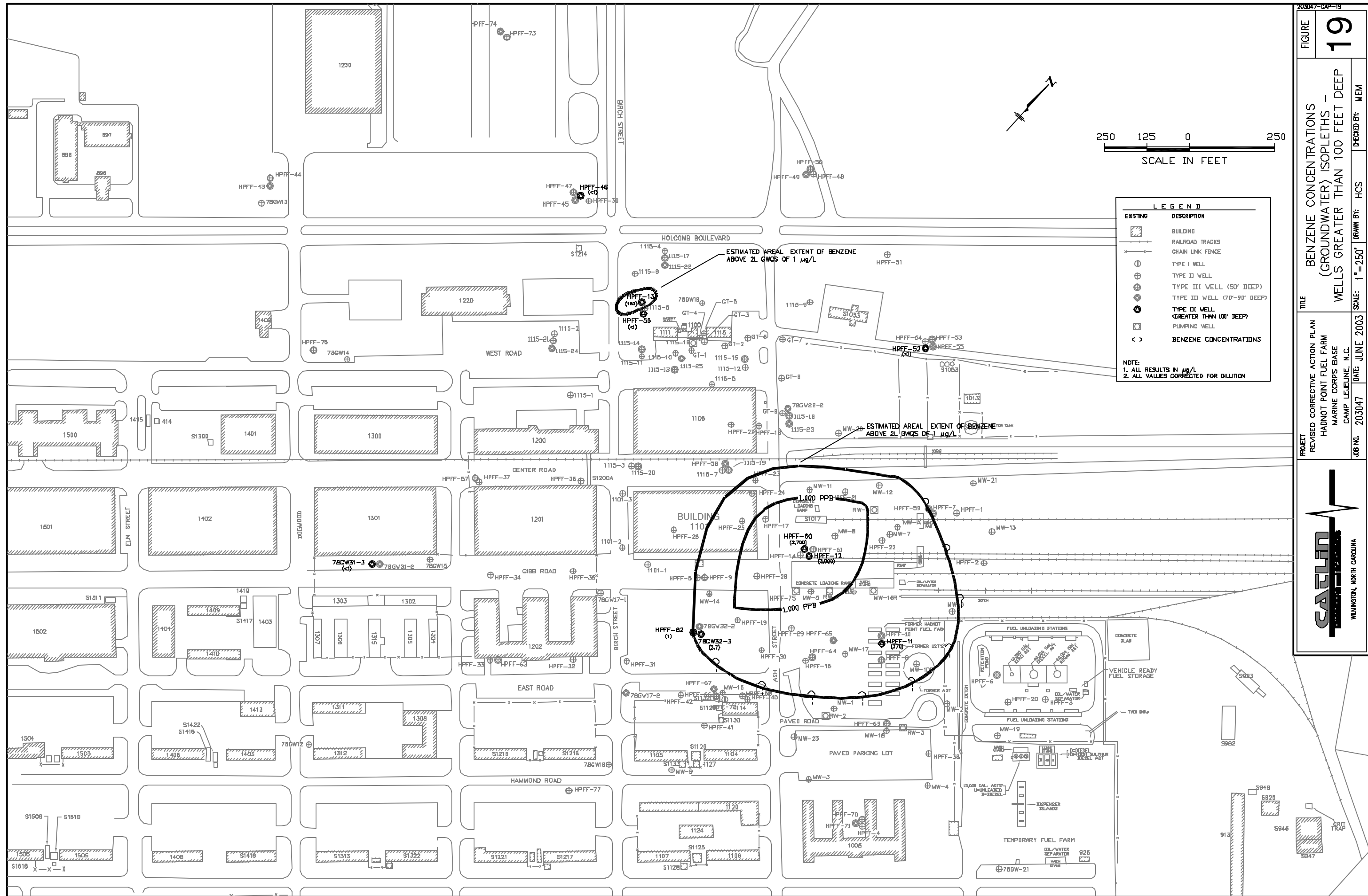
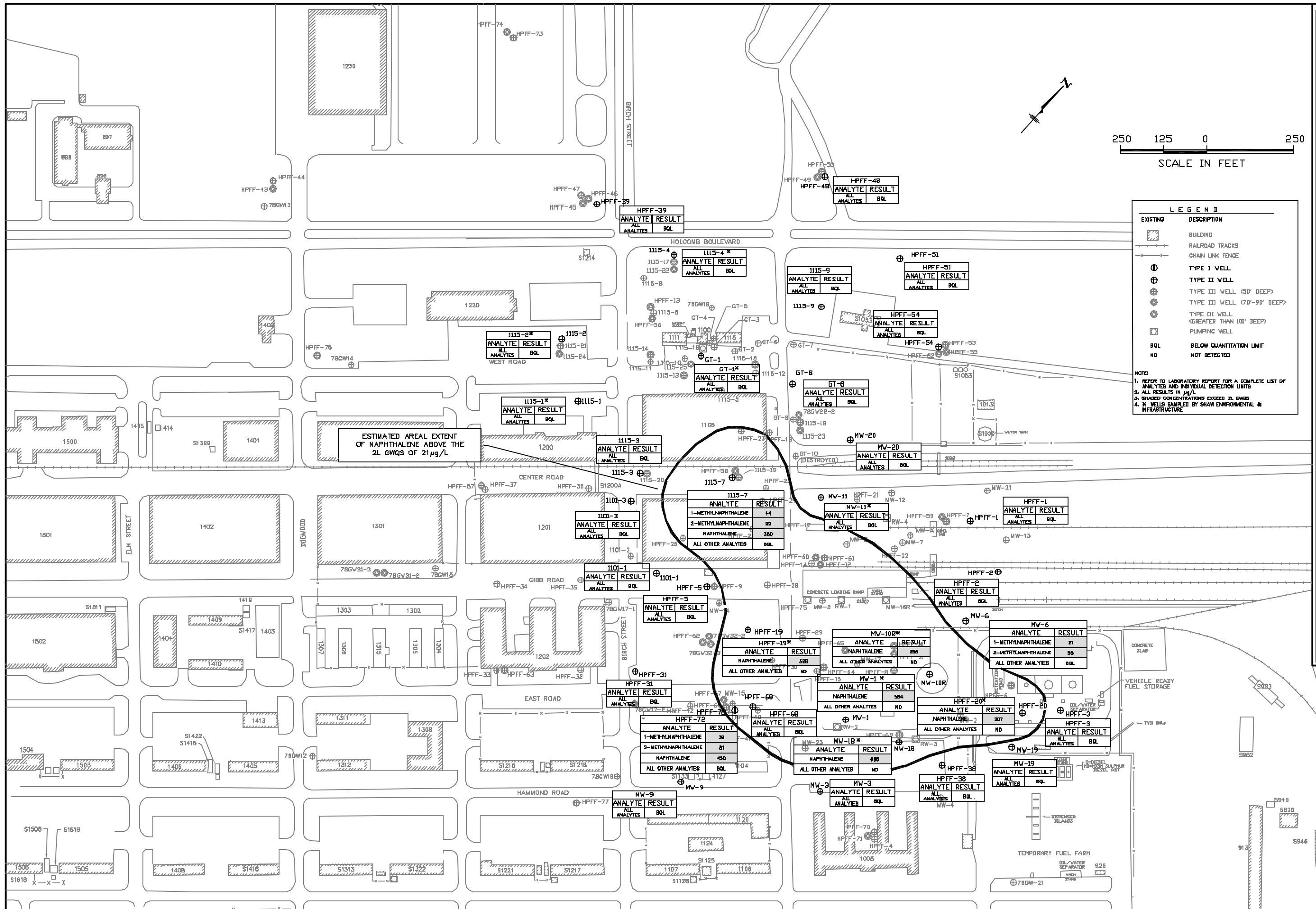


FIGURE	203047-CAP-16	
	16	
TITLE	BENZENE CONCENTRATIONS (GROUNDWATER) ISOPLETHS - TYPE II WELLS ONLY	
	REVISOR: CORRECTIVE ACTION PLAN HADNOT POINT FUEL FARM MARINE CORPS BASE CAMP LEJEUNE, N.C.	
PROJECT	JOB NO. 203047	DATE: JUNE 2003
	SCALE: 1"=250'	DRAWN BY: HCS
		CHECKED BY: MEM
 WILMINGTON, NORTH CAROLINA		









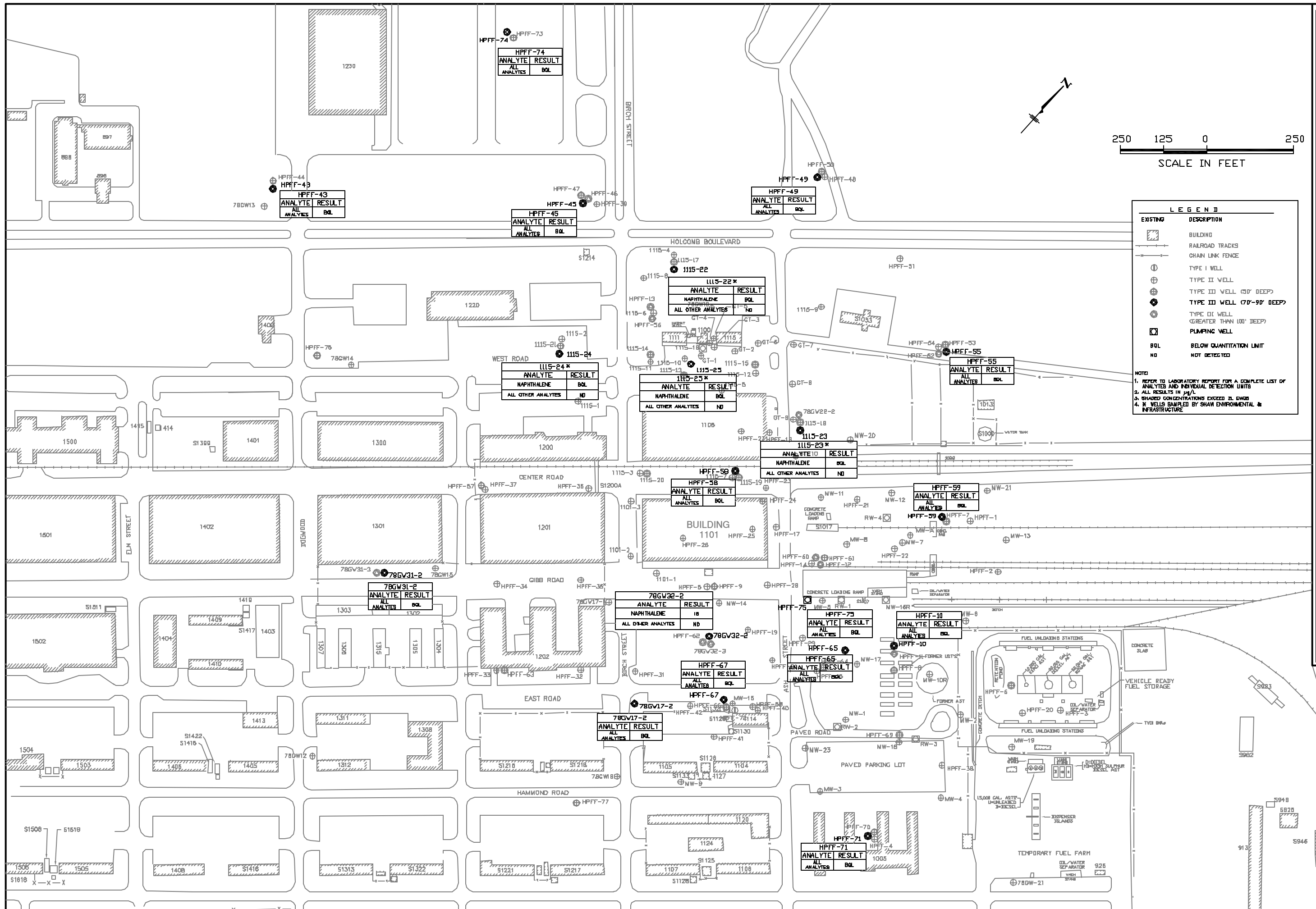
LEGEND

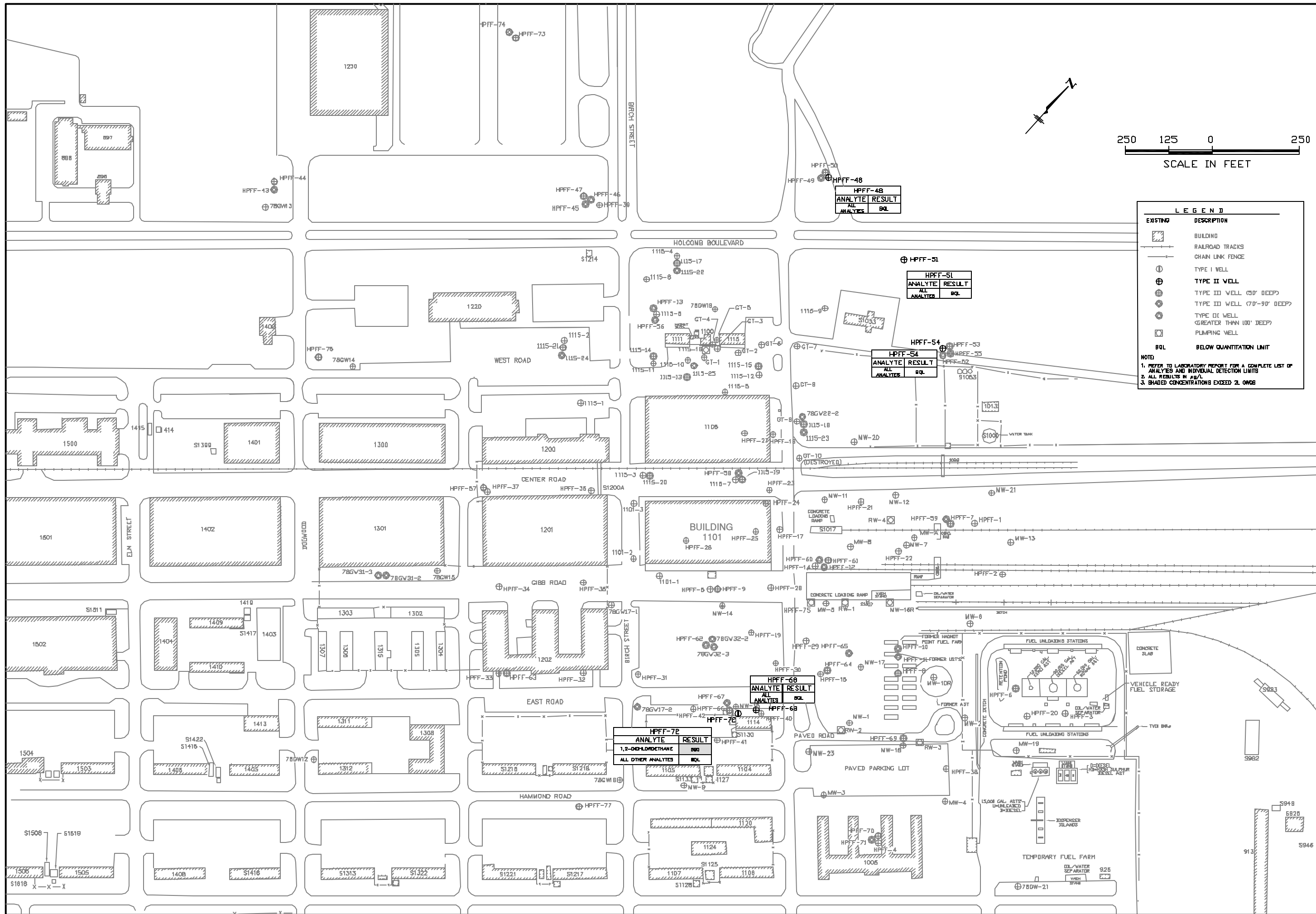
EXISTING	DESCRIPTION
[Symbol]	BUILDING
[Symbol]	RAILROAD TRACKS
[Symbol]	CHAIN LINK FENCE
⊕	TYPE I WELL
⊕	TYPE II WELL
⊕	TYPE III WELL (30' DEEP)
⊕	TYPE III WELL (70'-90' DEEP)
⊕	TYPE IV WELL (GREATER THAN 100' DEEP)
⊕	PUMPING WELL
BOL	BELOW QUANTITATION LIMIT
ND	NOT DETECTED

NOTE:

1. REFER TO LABORATORY REPORT FOR A COMPLETE LIST OF ANALYTES AND INDIVIDUAL DETECTION LIMITS
2. ALL RESULTS IN µg/L
3. SHADED CONCENTRATIONS EXCEED 2L GWQS
4. * WELLS SAMPLED BY SHAW ENVIRONMENTAL & INFRASTRUCTURE

FIGURE	20
TOTAL EPA METHOD 610 CONCENTRATIONS (GROUNDWATER) ISOPLETHS - TYPE II WELLS ONLY	
PROJECT	REVISOR
REVISOR	DATE
DATE	SCALE
SCALE	DRAWN BY
DRAWN BY	HCS
HCS	MEM
WILMINGTON, NORTH CAROLINA	





FIGURE

24

TITLE

TOTAL EPA METHOD 601
CONCENTRATIONS (GROUNDWATER)
— TYPE II WELLS ONLY

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEELUNE, N.C.

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=250'

DRAWN BY

HCS

CHECKED BY

MEM



CALPIN
WILMINGTON, NORTH CAROLINA

FIGURE 24	
TOTAL EPA METHOD 601 CONCENTRATIONS (GROUNDWATER) — TYPE II WELLS ONLY	
PROJECT	REVISED CORRECTIVE ACTION PLAN HADNOT POINT FUEL FARM MARINE CORPS BASE CAMP LEELUNE, N.C.
JOB NO.	203047
DATE	JUNE 2003
SCALE	1"=250'
DRAWN BY	HCS
CHECKED BY	MEM
 CALPIN WILMINGTON, NORTH CAROLINA	

HPFF-74	
ANALYTE	RESULT
CHLOROFORM	1.1
ALL OTHER ANALYTES	BQL

HPFF-45	
ANALYTE	RESULT
DB-1,2-DICHLOROETHENE	40
TRICHLOROETHENE	110
ALL OTHER ANALYTES	BQL

HPFF-49	
ANALYTE	RESULT
DB-1,2-DICHLOROETHENE	130
ALL OTHER ANALYTES	BQL

HPFF-55	
ANALYTE	RESULT
CHLOROFORM	13
ALL OTHER ANALYTES	BQL

HPFF-58	
ANALYTE	RESULT
1,2-DICHLOROETHANE	1
ALL OTHER ANALYTES	BQL

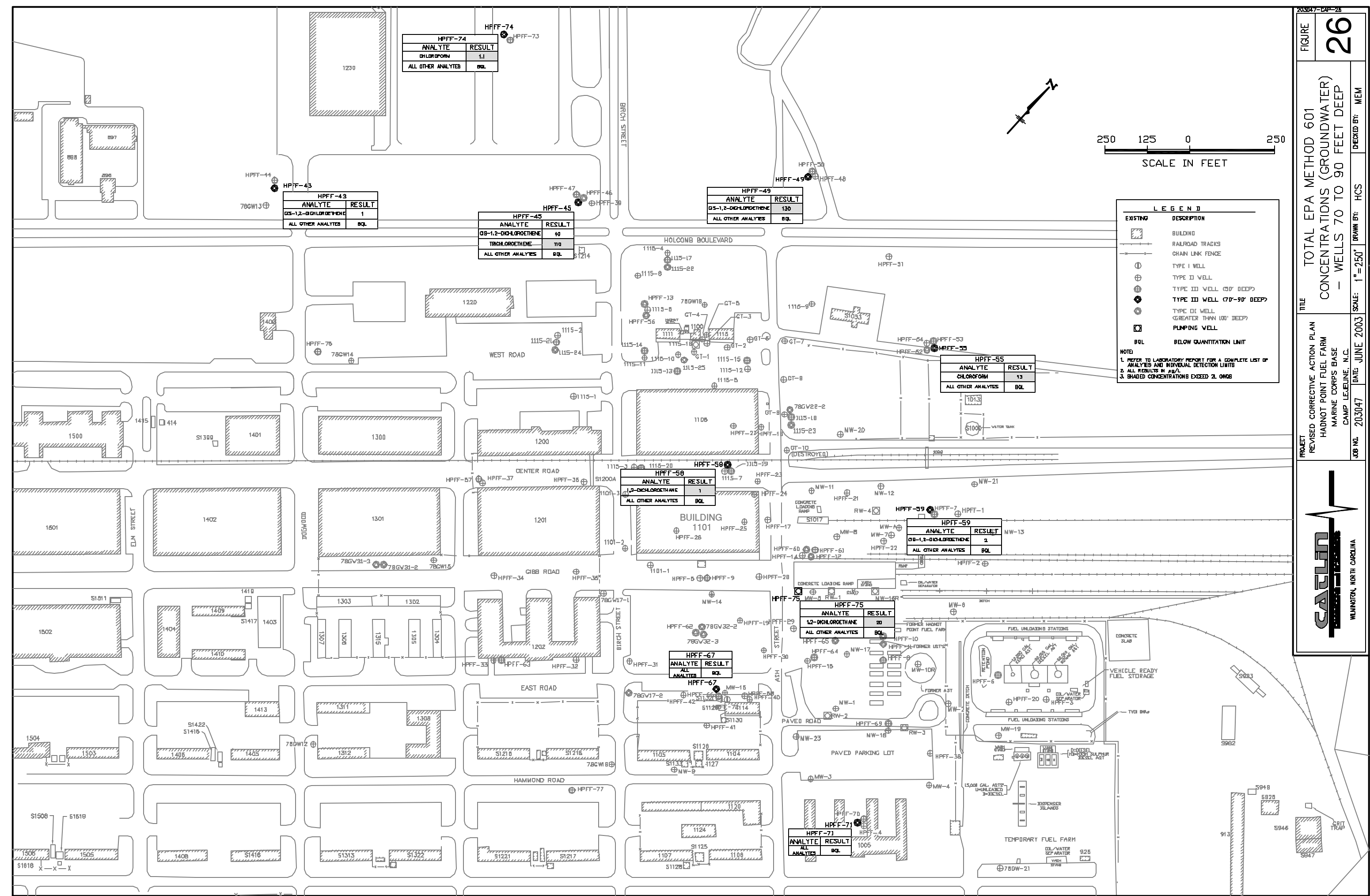
HPFF-59	
ANALYTE	RESULT
DB-1,2-DICHLOROETHENE	1
ALL OTHER ANALYTES	BQL

HPFF-67	
ANALYTE	RESULT
ALL ANALYTES	BQL

HPFF-75	
ANALYTE	RESULT
1,2-DICHLOROETHANE	20
ALL OTHER ANALYTES	BQL

HPFF-71	
ANALYTE	RESULT
ALL ANALYTES	BQL

LEGEND	
EXISTING	DESCRIPTION
	BUILDING
	RAILROAD TRACKS
	CHAIN LINK FENCE
	TYPE I WELL
	TYPE II WELL
	TYPE III WELL (30' DEEP)
	TYPE III WELL (70'-90' DEEP)
	TYPE III WELL (GREATER THAN 100' DEEP)
	PUMPING WELL
	BELOW QUANTITATION LIMIT
NOTE:	
1. REFER TO LABORATORY REPORT FOR A COMPLETE LIST OF ANALYTES AND INDIVIDUAL DETECTION LIMITS	
2. ALL RESULTS IN µg/L	
3. SHADED CONCENTRATIONS EXCEED 2L OMOL	



FIGURE

26

TOTAL EPA METHOD 601

CONCENTRATIONS (GROUNDWATER)

WELLS 70 TO 90 FEET DEEP

PROJECT

REVISED CORRECTIVE ACTION PLAN

HADNOT POINT FUEL FARM

MARINE CORPS BASE

CAMP LEVINE, N.C.

DATE

JUNE 2003

SCALE

1"=250'

DRAWN BY

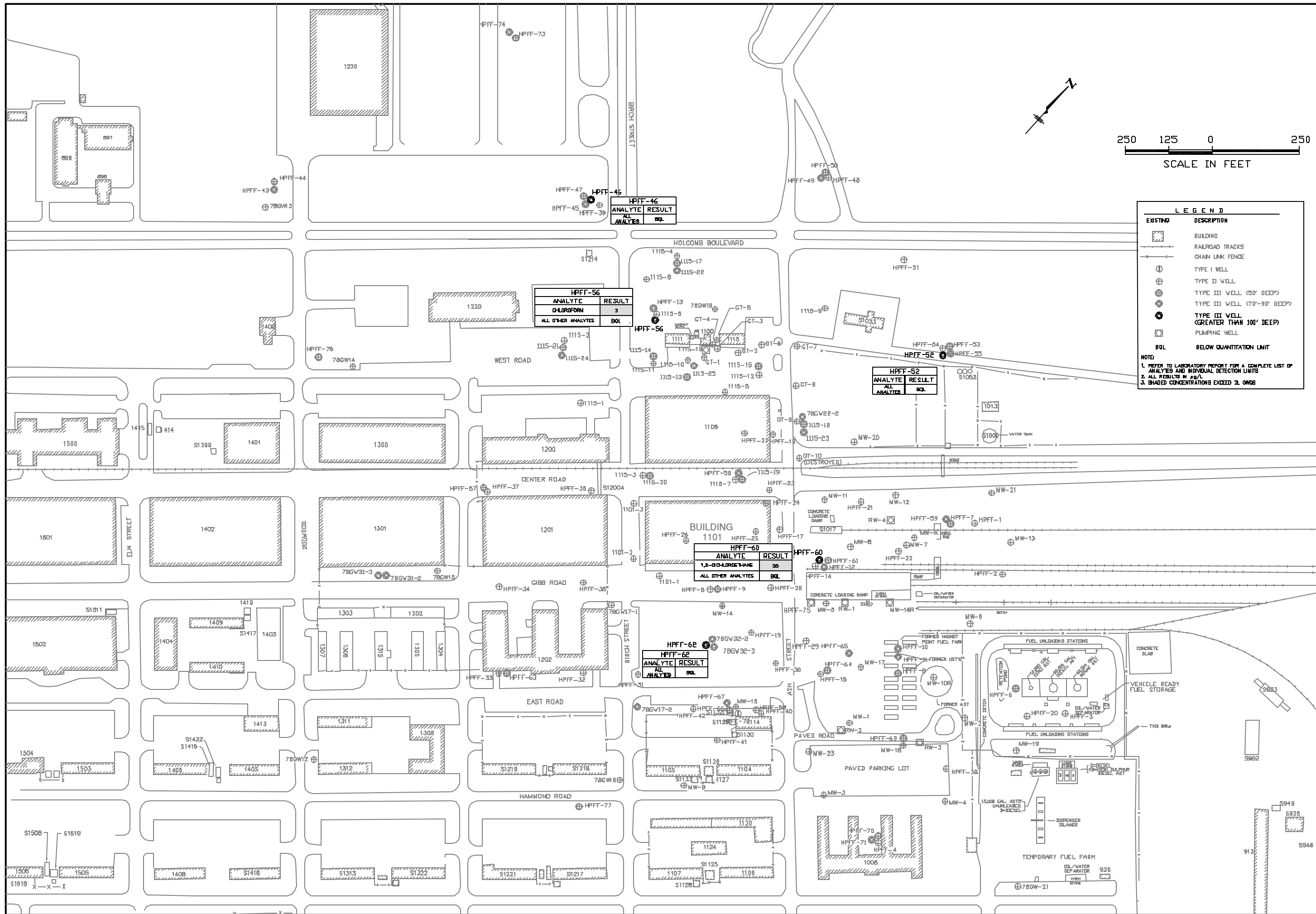
HCS

CHECKED BY

MEM

CALVIN

WILMINGTON, NORTH CAROLINA



FIGURE

27

TITLE

TOTAL EPA METHOD 601
CONCENTRATIONS (GROUNDWATER) -
WELLS GREATER THAN 100 FEET DEEP

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEELUNE, N.C.

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=250'

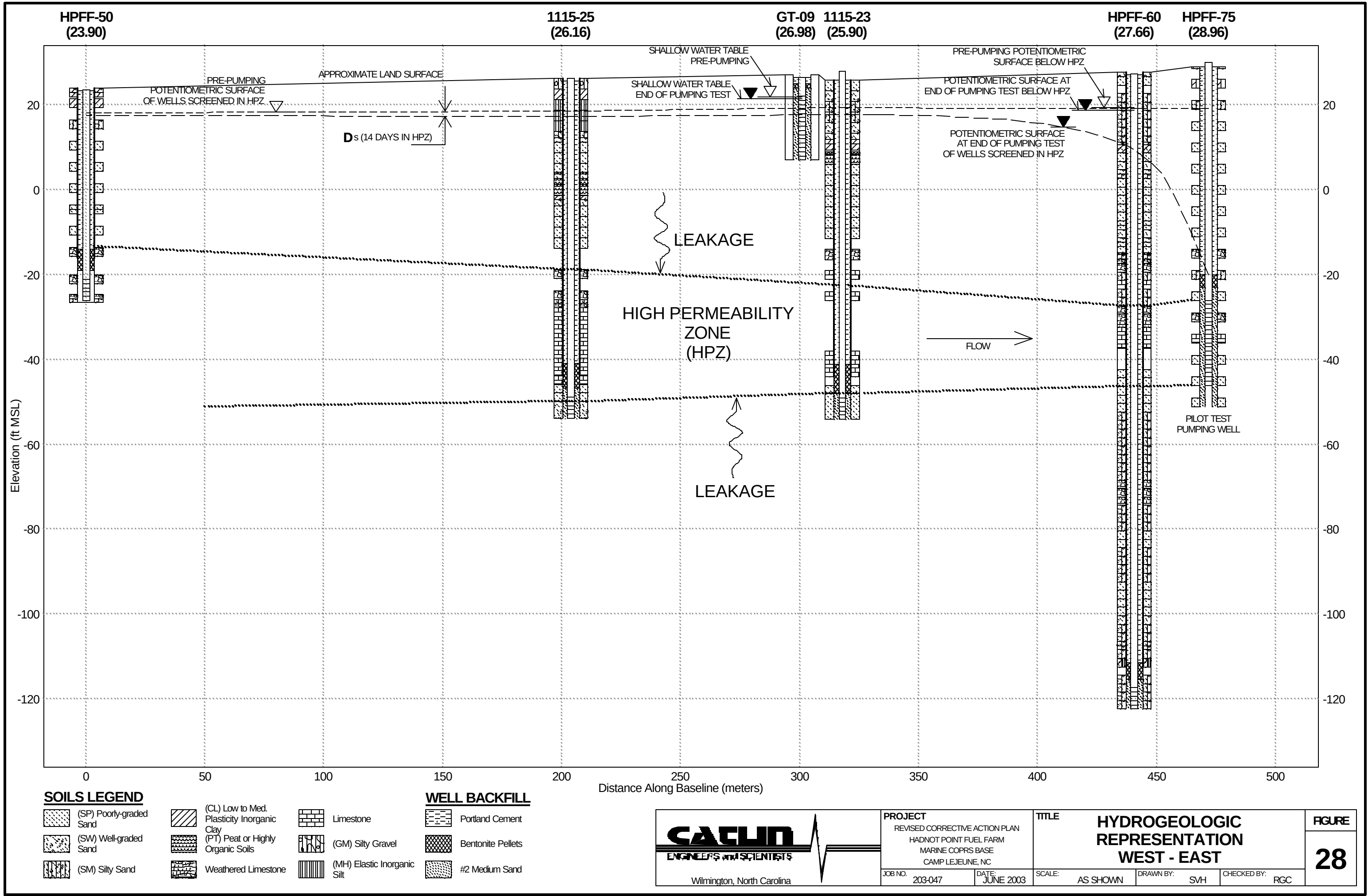
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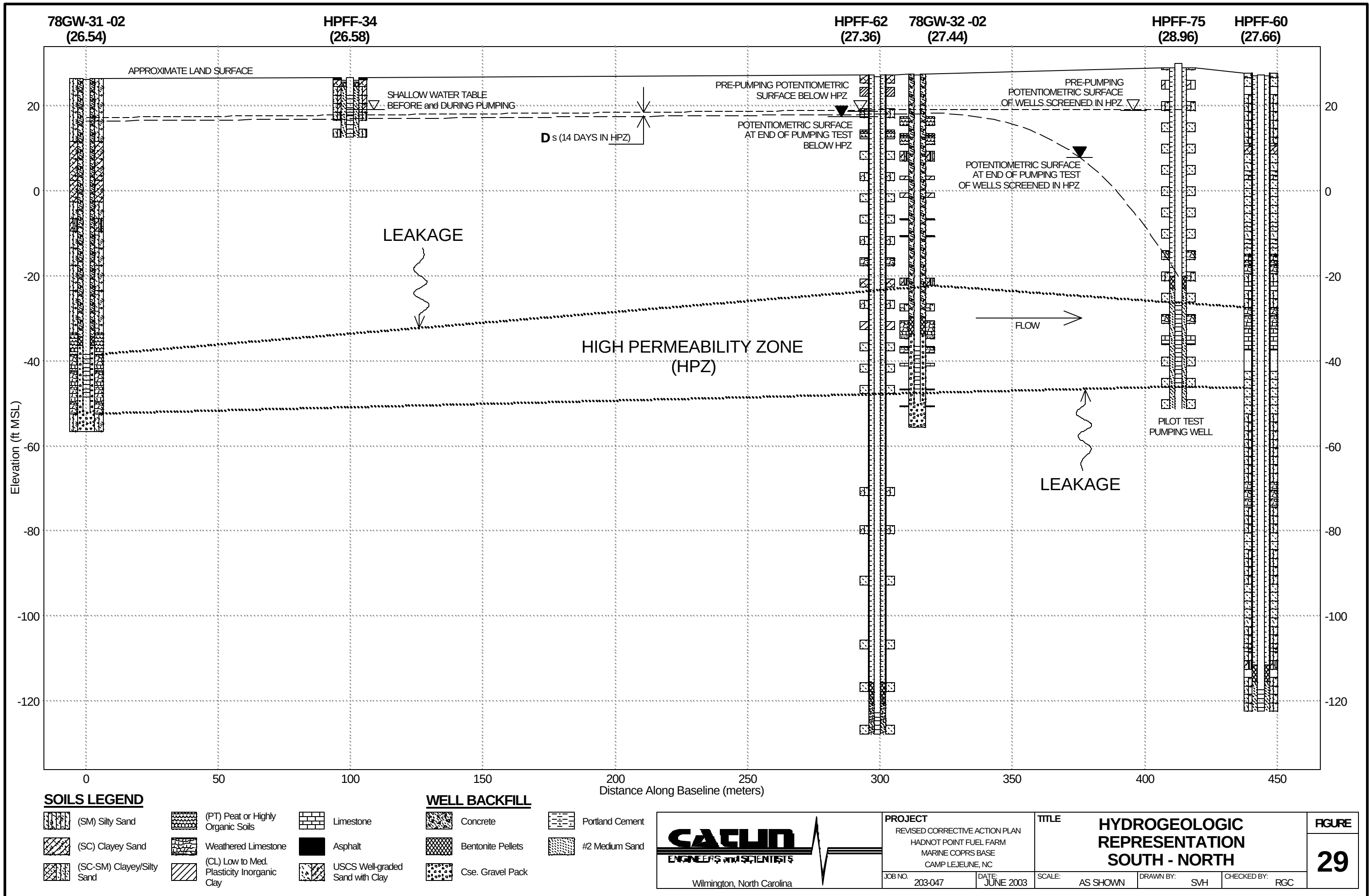
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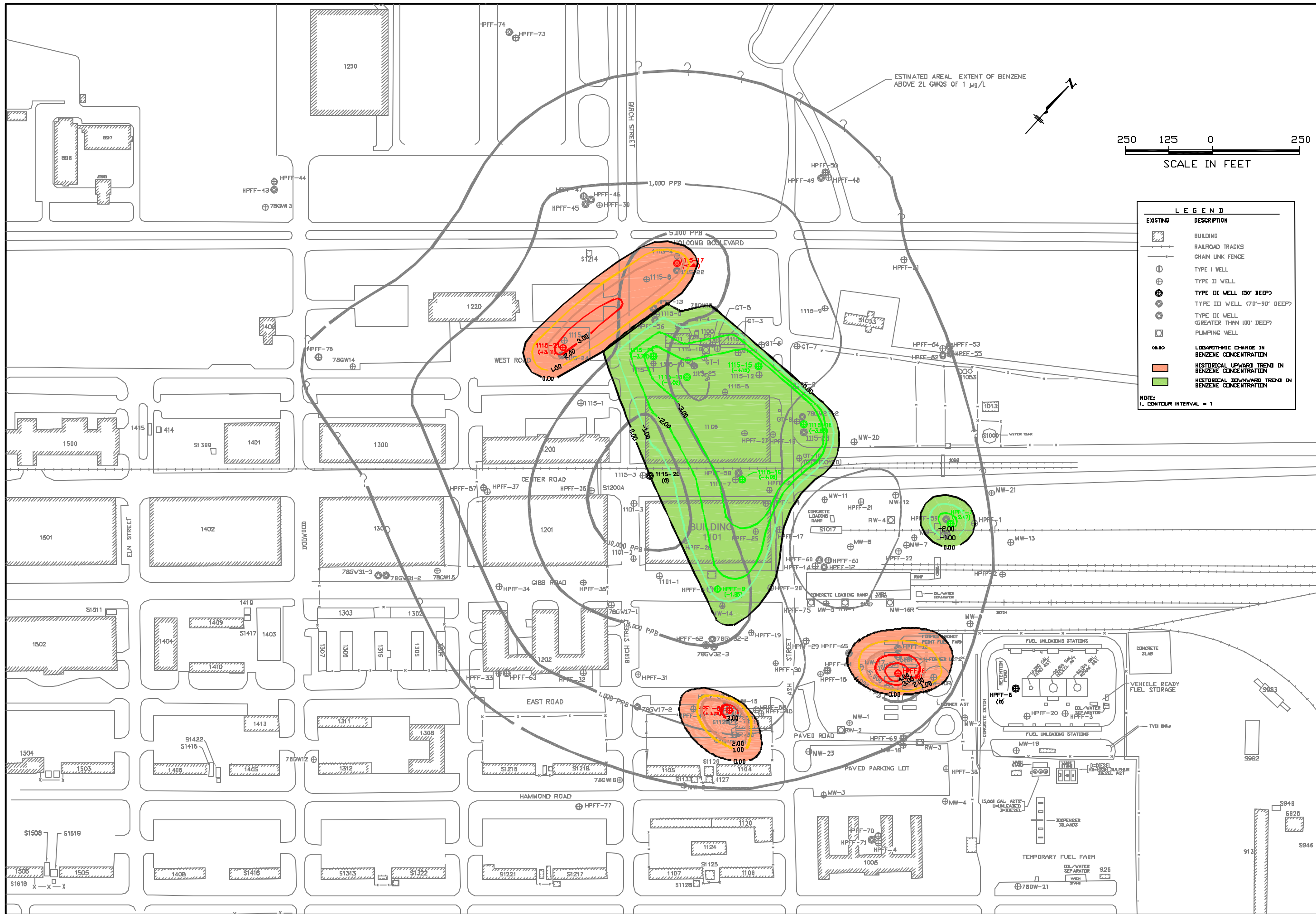
CHECKED BY

MEM

WILMINGTON, NORTH CAROLINA







FIGURE

31

HISTORICAL BENZENE TRENDS -
WELLS 50 FEET DEEP

REVISOR: JUNE 2003

DATE: JUNE 2003

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

WILMINGTON, NORTH CAROLINA

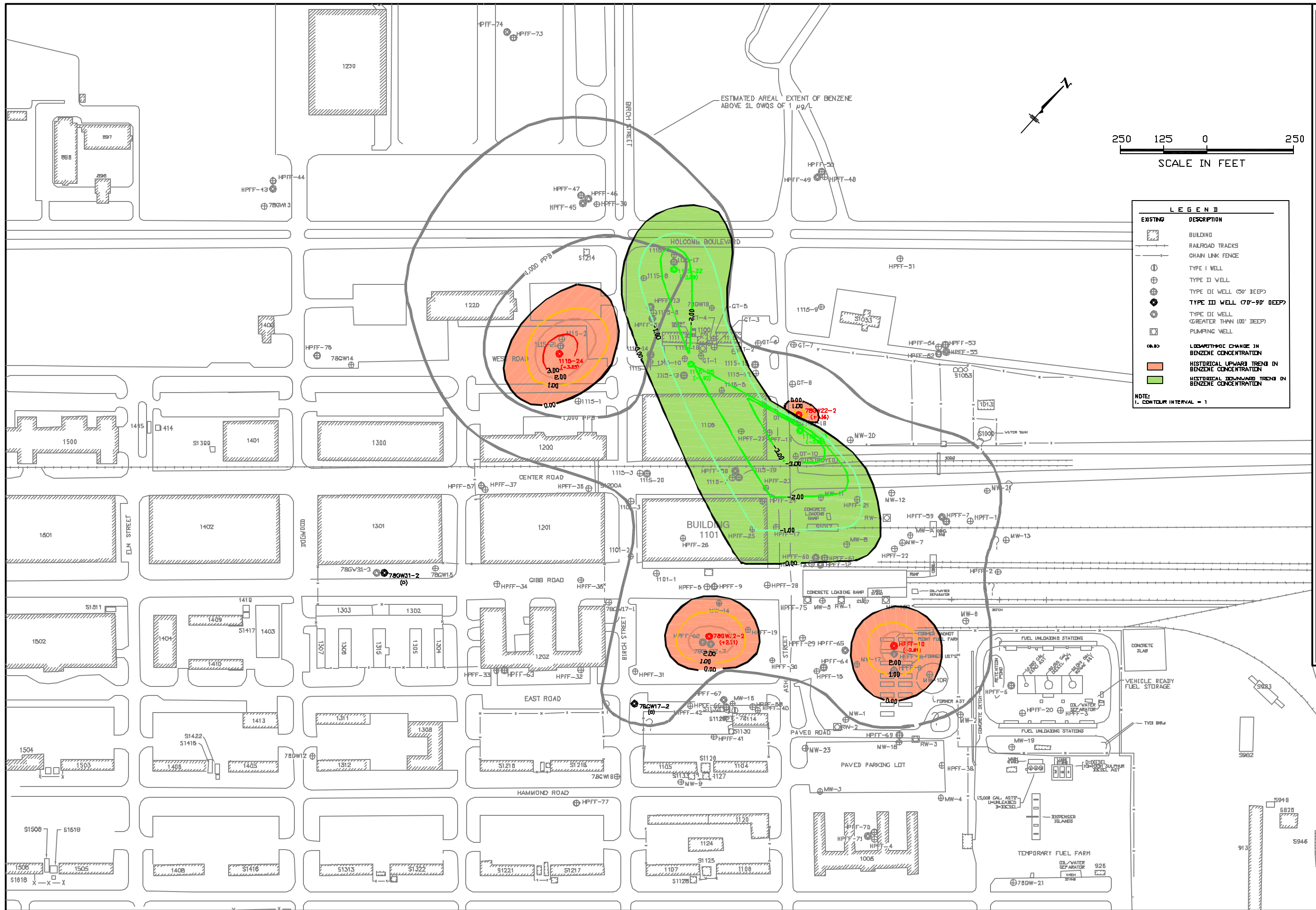
WJW

SCALE: 1"=250'

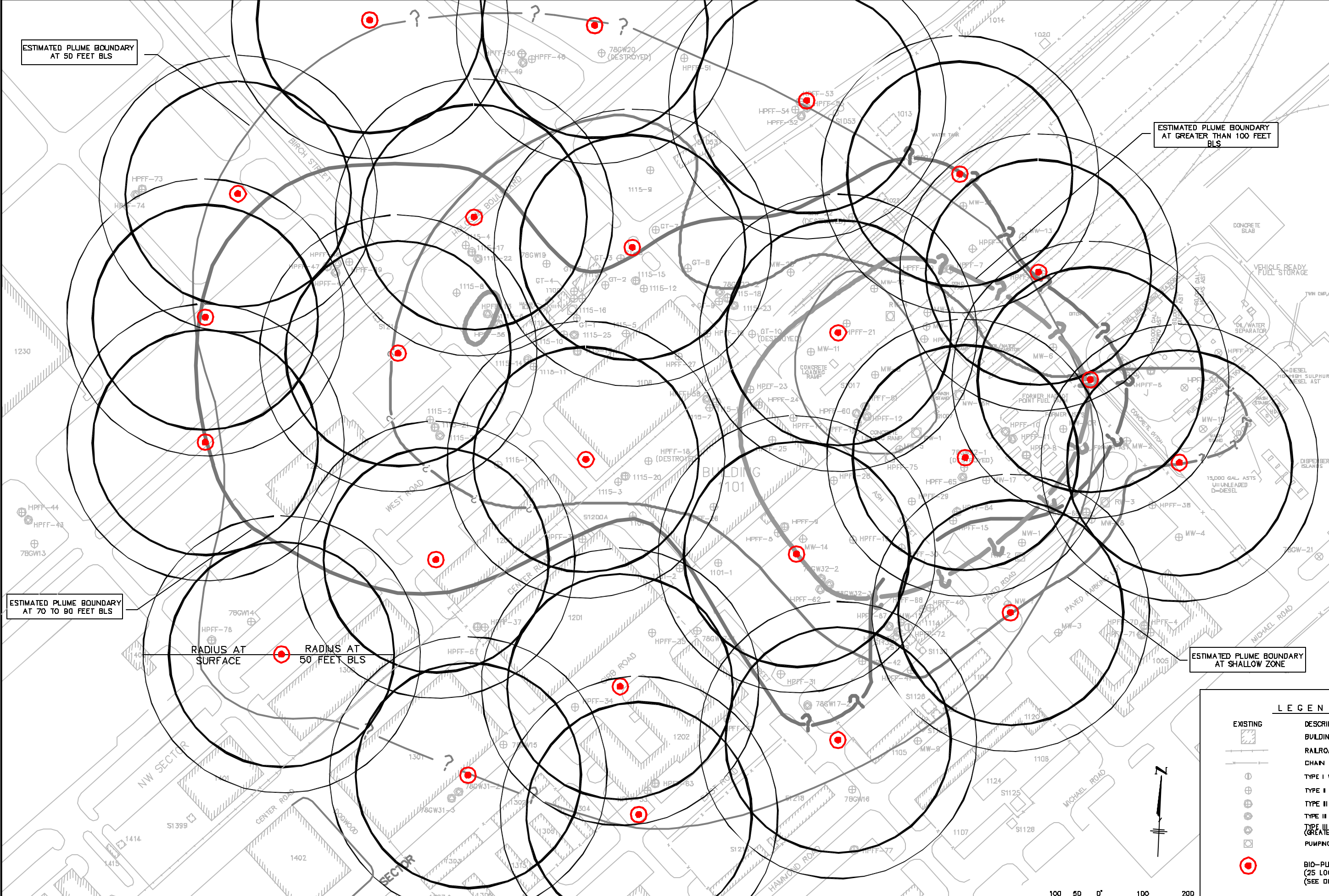
DRAWN BY: HCS

CHECKED BY: WJW









ESTIMATED PLUME BOUNDARY
AT 50 FEET BLS

ESTIMATED PLUME BOUNDARY
AT GREATER THAN 100 FEET
BLS

ESTIMATED PLUME BOUNDARY
AT 70 TO 90 FEET BLS

RADIUS AT
SURFACE

RADIUS AT
50 FEET BLS

ESTIMATED PLUME BOUNDARY
AT SHALLOW ZONE

LEGEND

- | EXISTING | DESCRIPTION |
|----------|---|
| | BUILDING |
| | RAILROAD TRACKS |
| | CHAIN LINK FENCE |
| | TYPE I WELL |
| | TYPE II WELL |
| | TYPE II WELL (50' DEEP) |
| | TYPE II WELL (70'-90' DEEP) |
| | TYPE II WELL (GREATER THAN 100' DEEP) |
| | PUMPING WELL |
| | BIC-PULSE SPARGE WELL
(25 LOCATIONS)
(SEE DETAIL FIGURE 38) |

NOTE:
1. BIC-PULSE SPARGE WELL RADIUS OF INFLUENCE SHALL BE CONFIRMED THROUGH PILOT
TESTING PRIOR TO DESIGN

FIGURE

34

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE

PROPOSED REMEDIATION SYSTEM
LAYOUT

JOB NO.

203047

DATE

JUNE 2003

SCALE

1"=200'

DRAWN BY

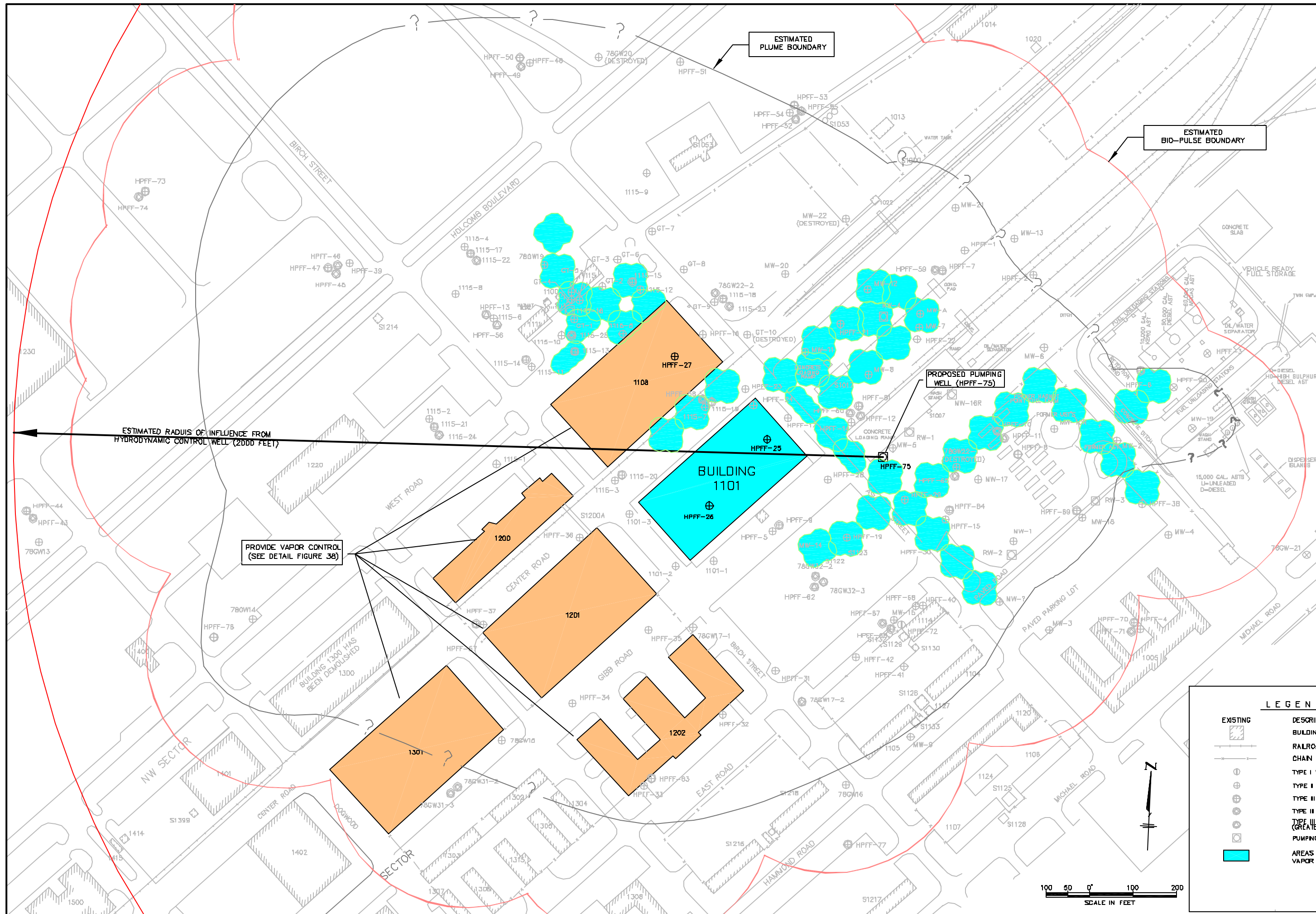
HCS

CHECKED BY

WJW

WILMINGTON, NORTH CAROLINA

100 50 0' 100 200
SCALE IN FEET



FIGURE

35

PROPOSED LAYOUT OF
HYDRODYNAMIC AND VAPOR
CONTROL SYSTEMS

203047-DAP-35

PROJECT

REVISED CORRECTIVE ACTION PLAN
HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJUNE, N.C.

DATE

JUNE 2003

SCALE

1"=100'

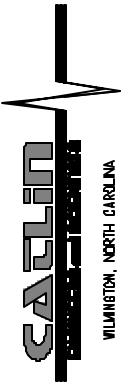
CHECKED BY:

WJW

DRAWN BY:

HCS

203047



CAGLIN
WILMINGTON, NORTH CAROLINA

LEGEND	
EXISTING	DESCRIPTION
	BUILDING
	RAILROAD TRACKS
	CHAIN LINK FENCE
	TYPE I WELL
	TYPE II WELL
	TYPE II WELL (50' DEEP)
	TYPE II WELL (70'-90' DEEP)
	TYPE III WELL (GREATER THAN 100' DEEP)
	PUMPING WELL
	AREAS PROTECTED BY VAPOR CONTROL SYSTEM



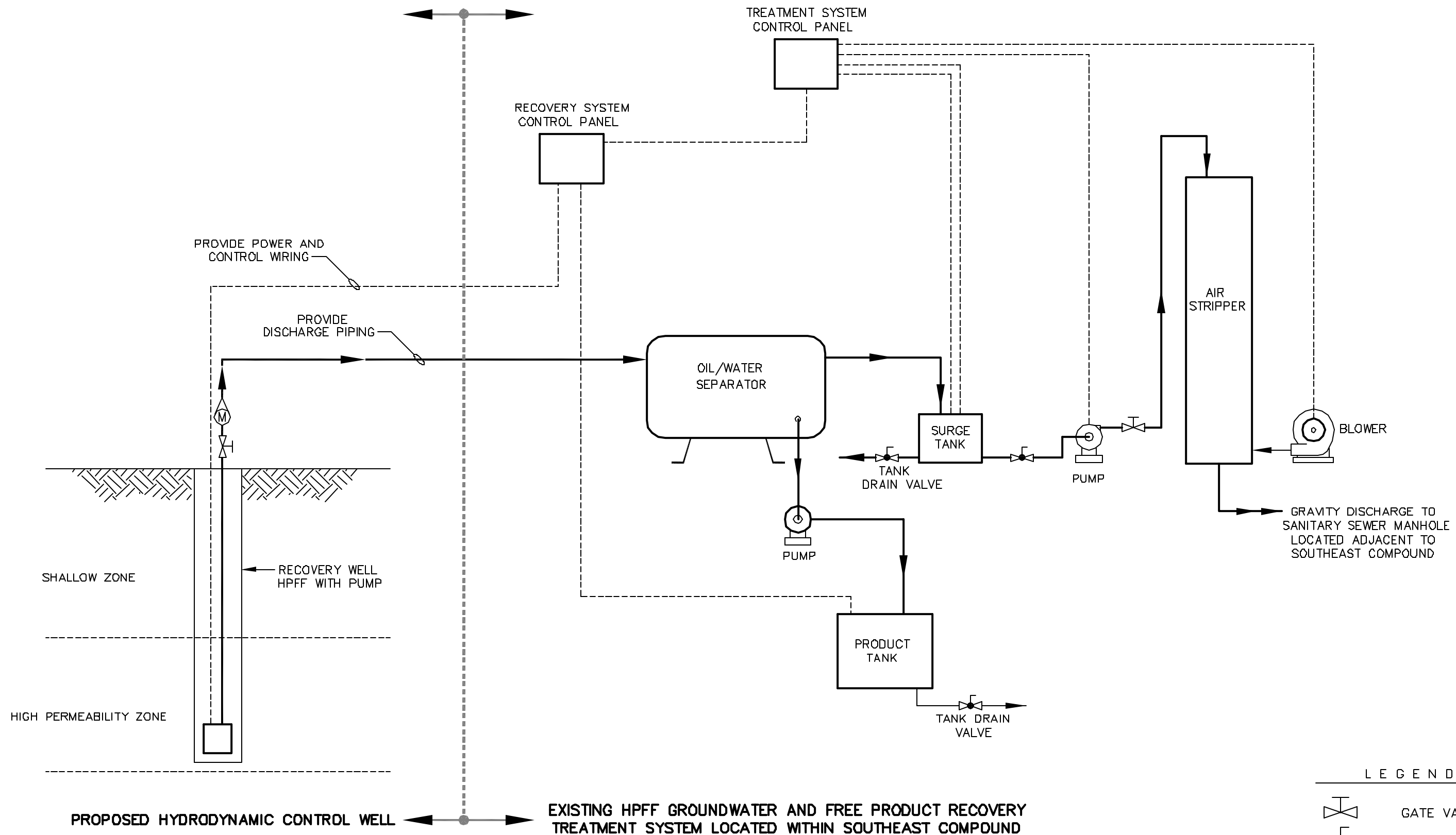
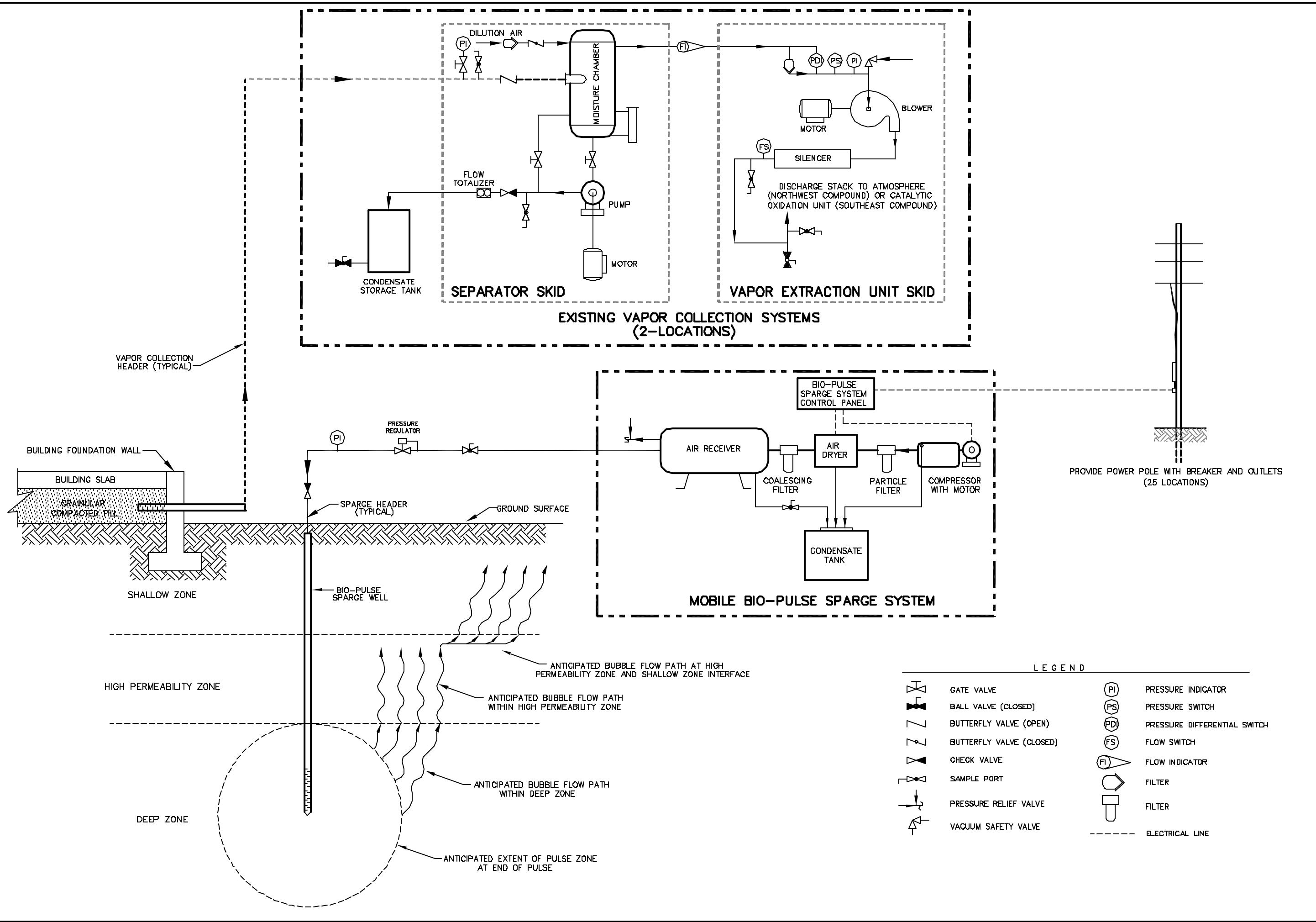


FIGURE		36	
TITLE		GROUNDWATER RECOVERY/TREATMENT SYSTEM SCHEMATIC	
PROJECT	REVISED CORRECTIVE ACTION PLAN HADNOT POINT FUEL FARM MARINE CORPS BASE CAMP LEELENE, N.C.	DATE	JUNE 2003
JOB NO.	203047	SCALE	NO SCALE
DRAWN BY: WJW		CHECKED BY: WJW	

WILMINGTON, NORTH CAROLINA



FIGURE

37

PULSE SPARGING SYSTEM SCHEMATIC

PROJECT

REVISED CORRECTIVE ACTION PLAN

HADNOT POINT FUEL FARM

MARINE CORPS BASE

CAMP LEELINE, N.C.

JOB NO.

203047

DATE

JUNE 2003

SCALE

NO SCALE

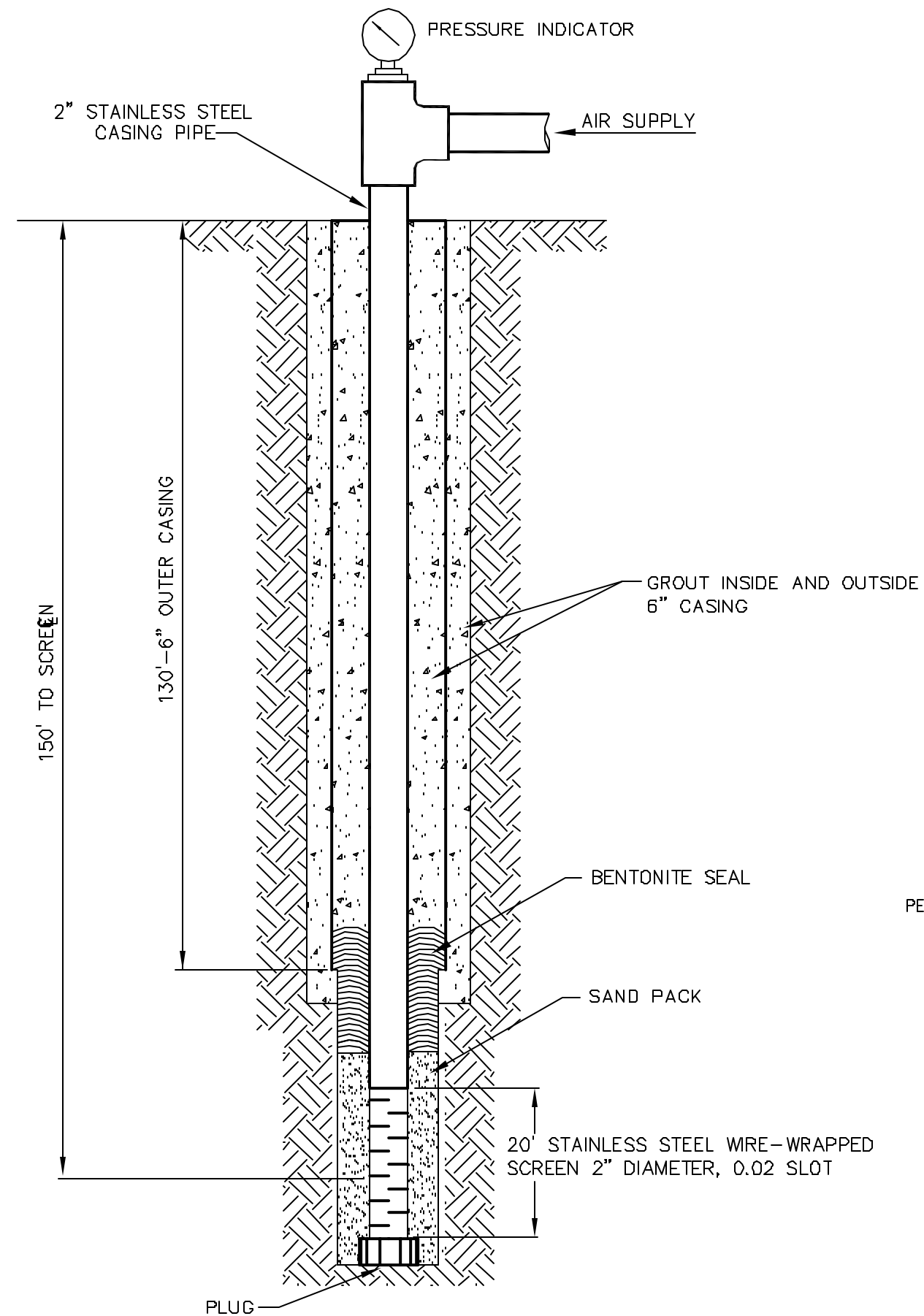
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WHW

CHECKED BY:

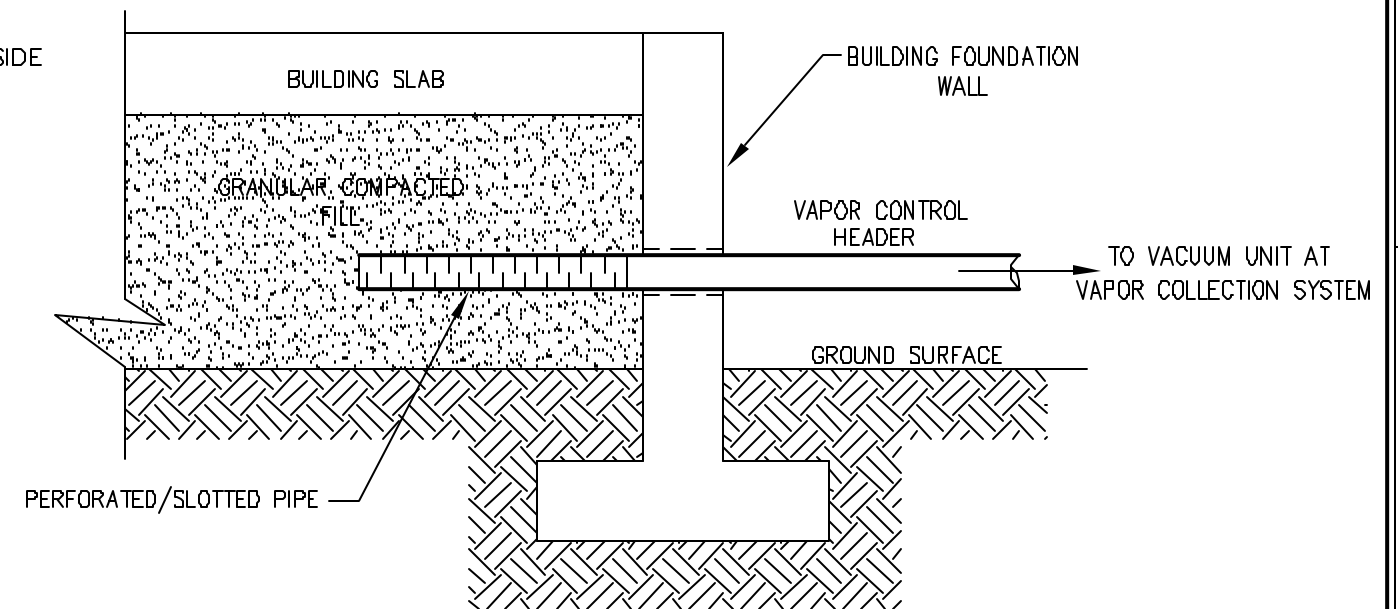
WJW

WILMINGTON, NORTH CAROLINA



BIO-PULSE SPARGE WELL DETAIL

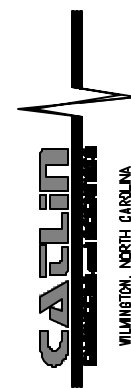
NOT TO SCALE



VAPOR CONTROL SYSTEM DETAIL

NOT TO SCALE

20047-04P-28	FIGURE	38
PROJECT	TITLE	REMEDATION SYSTEM DETAILS
REVISED CORRECTIVE ACTION PLAN	SCALE	NTS
HADNOT POINT FUEL FARM	DATE	JUNE 2003
MARINE CORPS BASE	DRAWN BY	HCS
CAMP LEJUNE, N.C.	CHECKED BY	WJW
JOB NO. 203047	DATE	JUNE 2003



APPENDICES

APPENDIX A
HYDROGEOLOGIC ANALYSIS

CONTENTS:

- **HYDROGEOLOGIC CALCULATIONS**
- **FIELD TIME/DRAWDOWN CURVE FOR
OBSERVATION WELL 78GW32-02**
- **WELL GAUGING TABLES**
- **WELL LOGS FOR WELLS USED FOR EMPIRICAL
DATA**
- **TIME/DRAWDOWN PLOTS FOR OTHER WELLS**

JOB: Hadnot PointCOMPUTED BY: R. Catlin DATE: 5/21/03DESCRIPTION: HYDRO-CALCSCHECKED BY: J.C/W.W

PUMPING WELL - HPFF-75- SCREENED AT 55' - 75' BLS

Q = 30 GPM CONSTANT

OBSERVATION WELL - 78GW32-02 SCREENED 64' - 75' BLS

300' FROM PUMPING WELL TO OBSERVATION WELL

ASSUME: LEAKY ARTESIAN, FULLY PENETRATING, NO H₂O RELEASE FROM STORAGE IN AQUITARD, CONSTANT Q, ISOTROPIC, HOMOGENIOUS, INFINITE AERIAL EXTENT.

FIND T AND S: FROM HANTUSH TYPE CURVE/T, S FIELD DATA PLOT

$$u = 0.1$$

$$w(u, r/B) = 0.1$$

$$s = 0.053'$$

$$t = 1.5 \text{ DAYS}$$

$$r = 300'$$

$$Q = 30 \text{ GPM} = 5775 \text{ ft}^3/\text{day}$$

$$r/B = 0.5$$

$$T = \frac{Q}{4\pi s} w(u, \frac{r}{B}) = \frac{5775}{4\pi(0.053)} (0.1) = 867 \frac{\text{ft}^2}{\text{day}}$$

$$S = \frac{u4Tt}{r^2} = \frac{(0.1)(4)(867)(1.5)}{300^2} = 0.0058$$

JOB: Hadnot PointCOMPUTED BY: R. Catlin DATE: 5/21/03DESCRIPTION: HYDRO-CALCSCHECKED BY: J.C/W.W

PREDICT RADIUS OF INFLUENCE FOR PUMPING WELL HPFF-75

$$T = 867 \text{ ft}^2/\text{day}$$

$$S = 0.0058$$

FIND RADIUS AT $t = 14$ days FOR 0.5' DRAWDOWN AND Q AT 5775 ft^3/day

$$T = \frac{Q}{4\pi s} w(u, \frac{r}{B}) \text{ solve for } w(u, r/B)$$

$$\frac{(867)(4\pi 0.5)}{5775} = 0.94$$

FROM HANTUSH LEAKY AQUIFER TYPE CURVE

$$\frac{r}{B} = 0.5, \text{ FOR } w(u, r/B) = 0.94 \rightarrow \frac{1}{u} = 4.5$$

$$\frac{1}{u} = 4.5 \rightarrow u = 0.222$$

$$S = \frac{u4Tt}{r^2} \rightarrow 0.0058 = \frac{(0.222)(4)(867)(14)}{r^2}$$

$$r = \sqrt{1858369} \rightarrow r = 1363'$$

PREDICTION OF 0.5' DRAWDOWN AT 1363' RADIUS

JOB: Hadnot PointCOMPUTED BY: R. Catlin DATE: 5/21/03DESCRIPTION: HYDRO-CALCSCHECKED BY: J.C/W.W

CHECK DRAWDOWN PREDICTION AGAINST ACTUAL 14-DAY TEST (NOTE Q WAS TEMPORARORLY INTERRUPTED FOR SEVERAL BRIEF PERIODS DUE TO EQUIPMENT PROBLEMS).

VERY FEW OBSERVATION WELLS ARE SCREENED AT THE PUMPING WELL INTERVAL OF 55' - 75' BLS BUT 3 WELLS ARE CLOSE ENOUGH HYDROGEOLOGICALLY TO PROVIDE EMPIRICAL DATA.

WELL #	ORIENTATION	SCREENED INTERVAL	DISTANCE FROM PUMPING WELL	14 DAY DRAWDOWN
1115-25	WEST	75' - 80'	780'	1.25'
789WW31-2	N.W.	65' - 75'	1230'	0.96'
HPFF-50	S.W.	45' - 50'	1260'	0.53'

CONCLUSION: EMPIRICAL DATA GENERALLY SUPPORTS PREDICTIVE MODEL.

JOB: Hadnot PointCOMPUTED BY: R. Catlin DATE: 5/21/03DESCRIPTION: HYDRO-CALCSCHECKED BY: J.C/W.W

USE AQUIFER MODEL TO PREDICT DRAWDOWN AT FARTHEST PLUME BOUNDARY
AFTER 30 DAYS.

$$T = 867 \text{ ft}^2/\text{day}$$

$$\text{USE } Q = 5772 \text{ ft}^3/\text{day}$$

$$S = 0.0058$$

$$\text{SET } r \text{ at } 2000'$$

$$S = \frac{u4Tt}{r^2} \text{ solve for } u$$

$$\frac{(0.0058)(2000^2)}{(4)(867)(30)} = 0.223 = u \rightarrow \frac{1}{u} = 4.48$$

FROM HANDTUSH LEAKY ARTESIAN AQUIFER

$$r/B \sim 0.5 \text{ FOR } \frac{1}{u} = 4.48, w(u, r/B) = 0.96$$

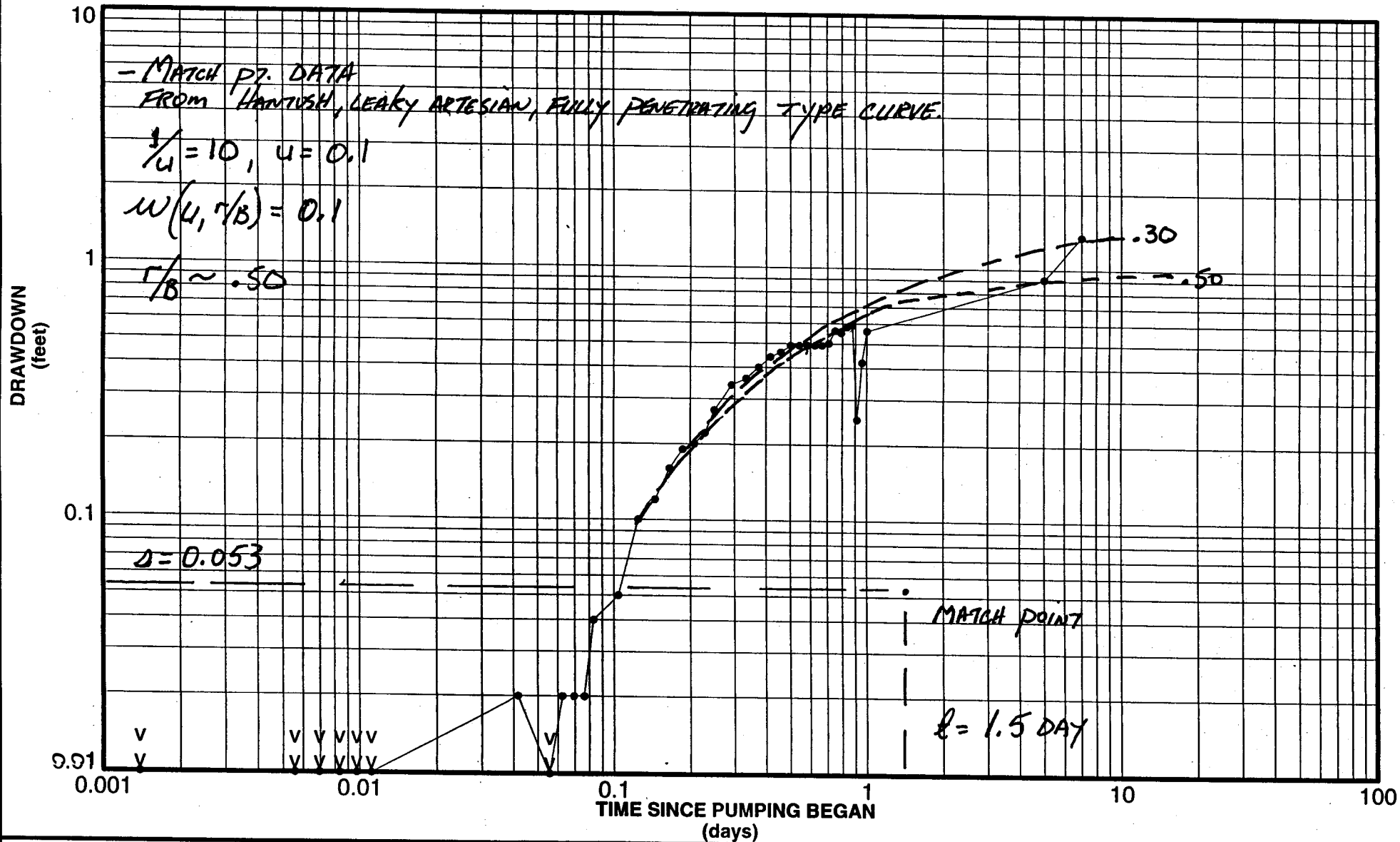
$$T = \frac{Q}{4\pi s} w(u, r/B) \text{ solve for } s$$

$$s = \frac{(Q)w(u, r/B)}{T4\pi} = \frac{(5775)(0.96)}{(867)(4)(\pi)} = 0.51'$$

CONCLUSION: WITH EXISTING TEST WELL AT 30 GPM FOR 30 DAYS
WE EXPECT APPROXIMATELY 0.5 FEET DRAWDOWN AT 2000 FEET.

SCRN. TOP.: 64
SCRN. BOT.: 74

300' FROM PUMPING WELL



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES
Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 202-126

78GW-32 -02

PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF Pumping Test

CITY: MCB, Camp Lejeune

PREPARED FOR: Camp Lejeune

TABLE

WATER LEVEL GAUGING DATA

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	05/02/03		05/09/03		05/21/03		NET Depth to Water CHANGE (Δ s)
	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	
1101-01	7.18				7.37		0.19
1101-02	7.56				7.52		-0.04
1101-03	7.16				7.40		0.24
1115-01	7.01				7.60		0.59
1115-02	6.73				7.54		0.81
1115-03	6.41				6.71		0.30
1115-04	2.52				5.14		2.62
1115-05	4.05				4.37		0.32
1115-06	7.41				8.26		0.85
1115-07	6.08	0.01	5.70		6.87		0.79
1115-08	7.38				8.25		0.87
1115-09	7.97				9.20		1.23
1115-10	4.40				4.98		0.58
1115-11	7.10				7.75		0.65
1115-12	4.15				4.64		0.49
1115-13	6.79				7.88		1.09
1115-14	8.74				9.71		0.97
1115-15	6.52				7.50		0.98
1115-17	7.68				8.66		0.98
1115-18	7.90				4.60		-3.30
1115-19	6.65		6.45		7.25		0.60
1115-20	7.16				7.76		0.60
1115-21	7.35				8.18		0.83
1115-22	9.56				10.72		1.16
1115-23	8.59				10.15		1.56
1115-24	8.56				9.59		1.03
1115-25	7.57				8.82		1.25
78GW-12	10.08				10.52		0.44
78GW-13	10.19				10.87		0.68
78GW-14	6.55				7.15		0.60
78GW-15	7.61				7.67		0.06
78GW-16					11.24		
78GW-17 -01	10.35				10.35		0.00
78GW-17 -02			12.19		13.27		1.08
78GW-19	6.92				7.85		0.93
78GW-21	9.45				9.57		0.12
78GW-22 -02	7.16				7.57		0.41
78GW-31 -02	8.92				9.72		0.80
78GW-31 -03	8.76				9.56		0.80

TABLE
WATER LEVEL GAUGING DATA

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	05/02/03		05/09/03		05/21/03		NET Depth to Water CHANGE (Δs)
	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	
78GW-32 -02	8.15		8.69		9.05		0.90
78GW-32 -03	8.71		9.33		9.48		0.77
GT-01	3.31				3.66		0.35
GT-02	4.35				4.90		0.55
GT-03	3.98				4.71		0.73
GT-04	4.97				5.40		0.43
GT-05	4.81				5.43		0.62
GT-06	3.89				4.49		0.60
GT-07	3.99				5.40		1.41
GT-08	5.00				5.46		0.46
GT-09	4.64				5.09		0.45
HPFF-01	3.61				4.25		0.64
HPFF-02	5.56				6.28		0.72
HPFF-03	8.62				9.05		0.43
HPFF-04	10.03				9.00		-1.03
HPFF-05	6.26				6.34		0.08
HPFF-06	9.25				10.16		0.91
HPFF-07	7.84				8.99		1.15
HPFF-08	14.65				15.01		0.36
HPFF-09	8.35				7.98		-0.37
HPFF-10					14.19		
HPFF-11	12.21				14.18		1.97
HPFF-12	7.60		9.15		10.02		2.42
HPFF-13	8.50				9.24		0.74
HPFF-14	4.25		5.11		5.87		1.62
HPFF-15	5.31	0.06	5.66	0.24	5.90	0.50	0.59
HPFF-16	6.27				6.58		0.31
HPFF-17	6.43				6.86		0.43
HPFF-19	4.29				5.11		0.82
HPFF-20	6.43				6.72		0.29
HPFF-21	4.07				4.27		0.20
HPFF-23	5.48				5.90		0.42
HPFF-24	10.44				10.87		0.43
HPFF-25	11.09	0.01			11.72	0.01	0.63
HPFF-28	5.73	0.01			5.88	0.01	0.15
HPFF-30	3.26				4.00		0.74
HPFF-31	8.05				8.05		0.00
HPFF-32	9.23				9.43		0.20
HPFF-33					9.84		

TABLE
WATER LEVEL GAUGING DATA

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	05/02/03		05/09/03		05/21/03		NET Depth to Water CHANGE (Δ s)
	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	
HPFF-34	7.42				7.50		0.08
HPFF-35	7.27				7.31		0.04
HPFF-36	7.24				7.50		0.26
HPFF-37	6.97				7.12		0.15
HPFF-38	6.32				6.32		0.00
HPFF-39	3.26				3.69		0.43
HPFF-40	4.65				5.30		0.65
HPFF-41					7.51		
HPFF-42	5.05				5.58		0.53
HPFF-43	9.00				8.70		-0.30
HPFF-44	7.63				8.31		0.68
HPFF-45	8.11				8.29		0.18
HPFF-46	7.98				8.48		0.50
HPFF-47	8.35				8.51		0.16
HPFF-48	5.00				6.19		1.19
HPFF-49	6.04				6.21		0.17
HPFF-50	5.42				5.95		0.53
HPFF-51	7.79				9.05		1.26
HPFF-52	8.30				9.60		1.30
HPFF-53	8.03				9.05		1.02
HPFF-54	1.69				3.77		2.08
HPFF-55	7.83				8.89		1.06
HPFF-56	10.08				9.77		-0.31
HPFF-57	7.77				8.24		0.47
HPFF-58	7.30		8.26		9.18		1.88
HPFF-59	7.91				9.41		1.50
HPFF-60	7.94		7.00		8.40		0.46
HPFF-61	8.26		9.31		9.98		1.72
HPFF-62	8.22		9.04		9.43		1.21
HPFF-63	12.58				11.00		-1.58
HPFF-64	8.59		7.00		8.12		-0.47
HPFF-65	10.08				12.61		2.53
HPFF-66	8.11				8.06		-0.05
HPFF-67	9.01				9.53		0.52
HPFF-68	5.22				5.93		0.71
HPFF-69	10.05				9.50		-0.55
HPFF-70	10.39				10.16		-0.23
HPFF-71	11.93				11.84		-0.09
HPFF-72	8.01				8.70	0.76	0.69

TABLE

WATER LEVEL GAUGING DATA

HADNOT POINT FUEL FARM
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

WELL ID	05/02/03		05/09/03		05/21/03		NET Depth to Water CHANGE (Δ s)
	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	Depth to Water	Free Product Thickness	
HPFF-73	9.59				10.10		0.51
HPFF-74	9.76				10.54		0.78
HPFF-75					50.09		
HPFF-76	7.52				8.11		0.59
HPFF-77	10.15				10.77		0.62
MW-01					8.52	0.01	
MW-02	9.78				10.20	0.01	0.42
MW-03	7.61				7.06		-0.55
MW-04	8.05				8.69		0.64
MW-05	4.55				4.67		0.12
MW-06	7.44				8.10		0.66
MW-09	8.85				9.37		0.52
MW-10R	9.65				12.04	0.01	2.39
MW-11	6.20				6.36		0.16
MW-12	7.37	0.01			8.20	0.01	0.83
MW-15	7.05	0.01			7.50	0.01	0.45
MW-17	10.05				9.94		-0.11
MW-18	10.08				10.58	0.12	0.50
MW-19	10.42				10.37		-0.05
MW-20	7.31				7.78		0.47
MW-21	1.97				2.63		0.66
MW-A	5.58	0.01			6.12	0.01	0.54

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 3

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Paul Feinberg	WELL ID: 78GW-32 -02
NORTHING: 3,839,062.2		EASTING: 286,265.2	GREW: ESE
SYSTEM: UTM NAD83 (m)		BORING LOCATION: Rds. 1113, & 1103 between Gibb & East	T.O.C. ELEV.: 27.20
DRILL MACHINE:	METHOD: MR	0 HOUR DTW:	BORING DEPTH: 83.0
START DATE: 12/18/90	FINISH DATE: 12/20/90	24 HOUR DTW:	WELL DEPTH: 77.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in					0.0	LAND SURFACE	27.4	0.0
									10.0		17.4	
							SC/SM		12.0	Brown/gray, CLAYEY/SILTY SAND w/4" thick PEAT seams.	15.4	
									14.0		13.4	
							PT		14.6	PEAT w/some wood chips.	12.8	
							SC/SM		16.4	Brown/gray, CLAYEY/SILTY SAND w/4" thick PEAT seams.	11.0	
									18.0		9.4	
							SC/SM		20.4	Gray, SILTY/CLAYEY SAND. HCO from 18' to 18'7".	7.0	
									24.0		3.4	
							CL		24.8	Gray, SILTY, fine to med. SANDY CLAY.	2.6	
									28.0		-0.6	
							CL		29.0	S.A.A.	-1.6	

Concrete

Bentonite Pellets

Coarse Gravel Pack

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

WELL LOG

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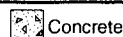
Wilmington, North Carolina

SHEET 2 OF 3

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Paul Feinberg WELL ID: 78GW-32 -02
NORTHING: 3,839,062.2 EASTING: 286,265.2 CREW: ESE
SYSTEM: UTM NAD83 (m) BORING LOCATION: Rds. 3, & 1103 between Gibb & East T.O.C. ELEV.: 27.20
DRILL MACHINE: METHOD: MR 0 HOUR DTW: BORING DEPTH: 83.0
START DATE: 12/18/90 FINISH DATE: 12/20/90 24 HOUR DTW: WELL DEPTH: 77.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
									34.9	PT Light brown, WOOD CHIPS	-6.6	4" Sch. 40 PVC
									38.9	PT Orange/brown, WOOD CHIPS	-10.6	
									48.0		-20.6	
							SC/SM		49.5	Gray, SILTY/CLAYEY SAND. Some shell fragments.	-22.1	
									54.0		-26.6	
							SM		55.7	Gray, SILTY, fine to med. SAND. Little clay, some shell fragments, trace organic matter.	-28.3	
									58.0		-30.6	
							SC			Gray, SILTY, CLAYEY SAND. Some LIMESTONE fragments.		57.0
												61.0

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03



Concrete



Bentonite Pellets



Coarse Gravel Pack

WELL LOG

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ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 1 OF 3

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Steven Hudson WELL ID: 1115-25
NORTHING: 3,839,246.9 EASTING: 286,094.3 CREW: LAW
SYSTEM: UTM NAD83 (m) BORING LOCATION: NW SECTOR In parking lot @ Bld 1111 & 1115 along West St. T.O.C. ELEV.: 26.16
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: BORING DEPTH: 80.0
START DATE: 06/30/95 FINISH DATE: 07/05/95 24 HOUR DTW: 9.6 WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in									
									0.0	LAND SURFACE	26.2	0.0
0.0	G	R	A	B	80		GM		2.5	Light orange to brown, GRAVEL with CLAYEY SILT and minor v.f. to cse. sand. Poorly sorted. Dry. Weak HCO.	23.7	
2.5	2	2	2	2	4.0		CL		5.0	Buff orange to light gray, v.f. to fine grained SANDY CLAY w/med. fine grained sand lenses. Poorly sorted. Damp. No HCO.	21.2	
5.0	2	2	2	2	400		MH		7.5	Light greenish gray to tan, SANDY SILT. Poorly sorted w/minor clay. Cohesive and elastic. Wet. Strong HCO.	18.7	
7.5	1	2	1	1	300		MH		10.0	S.A.A. Wet. Strong HCO.	16.2	
10.0	1	1	1	1	250		MH		12.5	S.A.A. Wet. Possible HCO.	13.7	
12.5	1	1	6	12	1000+		SM		14.0	Gray, SILTY, v.f. to fine grained SAND. Loose. Wet. Slight HCO.	12.2	
15.0							SW/SP		15.0	Gray, med. grained SAND. Mod. poor sorting. Wet. Strong HCO.	11.2	
	2	3	6	5	1000+		SP		17.5	Gray, med. grained SAND. Mod. well sorted. High permeability. Wet. Strong HCO.	8.7	
17.5	5	5	6	8	1000+		SP		20.0	S.A.A. Wet. Strong HCO.	6.2	
20.0	2	3	3	4	1000+		SP		22.0	S.A.A. Wet. Strong HCO.	4.2	
22.5							PT		22.5	Dark brown, SILTY PEAT. Dense w/many root frags. Dry. No HCO.	3.7	
	4	4	5	4	1000+		SP		23.5	Medium grained SAND. Mod. sorted. Damp. Possible HCO.	2.7	
25.0							PT		25.0	Dark brown PEAT. Many root fragments. Dry. No HCO.	1.2	
	HP	HP	HP	HP	1000+		PT		27.5	Dark brown, SILTY PEAT. Dense w/many root frags. Dry. No HCO.	-1.3	
27.5							OH		28.5	Dark gray, SILTY CLAY. Cohesive and plastic. Wet. HCO.	-2.3	
	8	14	16	44	1000+		SW		30.0	Dark to light gray, med. fine to med. grained SAND. Mod. sorted w/mod. permeability. Wet.	-3.8	

CATLIN BORING LOG 203-047-HPFF CAP GEL CATLIN GDI 06/13/03

Portland Cement Bentonite Pellets #2 Medium Sand

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 2 OF 3

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Steven Hudson WELL ID: 1115-25
NORTHING: 3,839,246.9 EASTING: 286,094.3 CREW: LAW
SYSTEM: UTM NAD83 (m) BORING LOCATION: NW SECTOR, In parking lot @ Bldg 1111 & 1115 along West St. T.O.C. ELEV.: 26.16
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: BORING DEPTH: 80.0
START DATE: 06/30/95 FINISH DATE: 07/05/95 24 HOUR DTW: 9.6 WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK			WELL DETAIL
	6in	6in	6in	6in					DEPTH	DESCRIPTION	ELEVATION	
30.0									HCO.			2" Sch. 40 PVC
	22	22	24	25	1000+		SP		Light gray, med. grained SAND. Mod. well to well sorted w/mod. high to high permeability. Wet. HCO.			
32.5									32.5		-6.3	
	16	18	12	24	1000+		SP		S.A.A. Wet.			
35.0									35.0		-8.8	
	10	10	10	8	790		SP		S.A.A., med. to med. cse. grained. Wet. Strong HCO.			
37.5									37.5		-11.3	
	4	4	4	6	1000+		SP		S.A.A. Wet. Strong HCO.			
40.0									40.0		-13.8	
45.0									45.0		-18.8	
	WRWR	5	8	1000+		SW			Dark gray, fine to med. grained SAND. Mod. poor sorting w/minor calcareous fragments increasing w/depth. Mod. to low permeability. Saturated. Strong HCO.			
47.0									47.0		-20.8	
50.0									50.0		-23.8	
	4	4	7	10	1000+		SW		S.A.A. Saturated. Strong HCO.			
52.0									52.0		-25.8	
	G	R	A	B	NM		SP/SC		Gray/brown, mod. sorted SAND w/minor clay. Sandy clay lenses throughout. Possible HCO.			
53.0									53.0		-26.8	
	G	R	A	B	NM				Light gray brown, very sandy LIMESTONE. Sandy clay interbedded. Poorly indurated. Mild HCO.			
54.0									54.0		-27.8	
	G	R	A	B	NM				Tan/gray, FOSSILIFEROUS SANDY LIMESTONE. Thin sandy clay lenses. Mod. to mod. well indurated. Strong HCO.			
58.0									58.0		-31.8	
									Well indurated FOSSILIFEROUS LIMESTONE. 6" thick sandy clay layers throughout.			

CATLIN BORING LOG 203-047-HPFF CAP.GPI.CATLIN.GDT 06/13/03

Portland Cement Bentonite Pellets #2 Medium Sand

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS
Wilmington, North Carolina

SHEET 3 OF 3

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Steven Hudson WELL ID: 1115-25
DRILLER:
NORTHING: 3,839,246.9 EASTING: 286,094.3 CREW: LAW
SYSTEM: UTM NAD83 (m) BORING LOCATION: NW SECTOR In parking lot @ Bldg 1111 & 1115 along West St. T.O.C. ELEV.: 26.16
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: BORING DEPTH: 80.0
START DATE: 06/30/95 FINISH DATE: 07/05/95 24 HOUR DTW: 9.6 WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
	G	R	A	B	NM							
70.0									70.0	Well indurated FOSSILIFEROUS LIMESTONE. 6" thick sandy clay layers throughout. (continued)	-43.8	70.0
72.0	G	R	A	B	NM				72.0	Light gray/brown, very SANDY FOSSILIFEROUS LIMESTONE. Well indurated w/minor clay lenses.	-45.8	
74.0	37	35	47	50/5	NM		SP		74.0	Light blue/gray, fine to med. grained SAND. Well sorted w/minor shell fragments and cse. sands. Wet. No HCO.	-47.8	73.0
76.0	G	R	A	B	NM		SP		76.0	S.A.A. Wet. No HCO.	-49.8	75.0
80.0	G	R	A	B	NM		SW		80.0	Light gray, SAND w/minor clay stringers and shell fragments. Mod. to poorly sorted.	-53.8	80.0
										Boring Terminated at Elevation -53.8 ft		

2" Slot 0.10 Sch. 40
PVC

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

Portland Cement Bentonite Pellets #2 Medium Sand

WELL LOG

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Wilmington, North Carolina

SHEET 1 OF 2

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Charles Ray WELL ID: HPFF-50
NORTHING: 3,839,430.7 EASTING: 286,180.1 CREW: Chris Jolly
SYSTEM: UTM NAD83 (m) BORING LOCATION: 10188MB NW CORNER - North of corner of
HOLCOMB Blvd & Ash St. on N side of
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: BORING DEPTH: 50.5
START DATE: 09/21/01 FINISH DATE: 10/09/01 24 HOUR DTW: WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in									
									0.0	LAND SURFACE	23.9	0.0
0.0	4	5	5	6	100	HPFF-50 0-2'	SC		1.0	Brown, tan, SILTY, v.f. to fine CLAYEY SAND.	22.9	-0.4
2.0							CL		2.0	Brown, SILTY, v.f. to fine, SANDY CLAY.	21.9	
2.5									2.5	Moist. No HCO.	21.4	
4.5	2	3	3	3	720	HPFF-50 2.5-4.5'	CL		4.5	Gray, brown, S.A.A. Moist. No HCO.	19.4	
7.5									7.5		16.4	
9.5	4	4	4	3	270		SM		9.5	Gray, SILTY, v.f. to fine SAND. Sat. No HCO.	14.4	
12.5									12.5		11.4	
14.5	13	17	15	15	1000+		SP		14.5	Gray, brown, well sorted, v.f. to fine SAND. Sat. High HCO.	9.4	
17.5									17.5		6.4	
19.5	7	7	8	9	1000+		SP		19.5	Gray, S.A.A.	4.4	
22.5									22.5		1.4	
24.5	5	7	6	7	120		SP		24.5	S.A.A. Slight HCO.	-0.6	
27.5									27.5		-3.6	
29.5	5	12	14	13	80		SP		28.5	Gray, green, v.f. to med. SAND.	-4.6	
							SP		29.5	Orange, well sorted v.f. to med. SAND. Sat. High HCO.	-5.6	

2" Sch. 40 PVC

6" Sch. 40 PVC

 Portland Cement  Bentonite Pellets

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 2

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Charles Ray	WELL ID: HPFF-50
NORTHING: 3,839,430.7		EASTING: 286,180.1	CREW: Chris Jolly
SYSTEM: UTM NAD83 (m)		BORING LOCATION: H10108B	T.O.C. ELEV.: 23.51
DRILL MACHINE: Diedrich D-50		METHOD: HSA/MR	0 HOUR DTW:
START DATE: 09/21/01		FINISH DATE: 10/09/01	24 HOUR DTW:
			BORING DEPTH: 50.5
			WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION		ELEVATION	WELL DETAIL
	6in	6in	6in	6in					DEPTH	DESCRIPTION		
32.5									32.5		-8.6	
	7	17	16	17	66		SP			Gray, green, well sorted, v.f. to med. SAND. Sat. No HCO.	-10.6	
34.5									34.5			
37.5									37.5		-13.6	
	14	30	30	36	16		SW			Green, v.f. to fine SAND w/SHELL and LIMESTONE fragments. Sat. No HCO.	-15.6	
39.5									39.5			
44.0									44.0		-20.1	
	8	13	16	19	2.4		SP			Olive green, well sorted, v.f. to med. SAND w/trace cse. shell fragments. Sat.	-22.1	
46.0									46.0			
48.5									48.5		-24.6	
	16	18	15	20	4.5				49.5	Weathered SANDY LIMESTONE w/silty, v.f. to med. sand.	-25.6	
50.5							SM		50.5	Olive green, SILTY, v.f. to med. SAND w/trace limestone fragments. Sat.	-26.6	
										Boring Terminated at Elevation -26.6 ft		

 Portland Cement  Bentonite Pellets

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDI 06/13/03

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 3

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Paul Feinberg	WELL ID:
		DRILLER: Env. Mon. & Testing	78GW-31 -02
NORTHING: 3,838,929.5	EASTING: 286,001.1	CREW: ESE	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: Bld. 1301 along Glob Rd. CENTRAL SECTOR - SE of center of		T.O.C. ELEV.: 26.25
DRILL MACHINE:	METHOD: MR	0 HOUR DTW:	BORING DEPTH: 83.0
START DATE: 12/12/90	FINISH DATE: 12/17/90	24 HOUR DTW:	WELL DEPTH: 78.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
									0.0	LAND SURFACE	26.5	0.0
							SM			Brown grading to gray tan, SILTY, fine to medium SAND w/trace to little pebbles.		-0.3
									15.0		11.5	
							SC			Gray tan, CLAYEY, fine to coarse SAND w/trace pebbles. Cohesive.		
									24.0		2.5	
							SC			Gray tan, CLAYEY, fine to medium SAND. Cohesive.		
									29.0		-2.5	
							SM			Gray tan, SILTY, fine to medium SAND.		

 Concrete

 Bentonite Pellets

 Coarse Gravel Pack

CATLIN BORING LOG 203-047-HPFF CAP GEL CATLIN.GDI 06/13/03

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 3

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Paul Feinberg WELL ID: 78GW-31 -02
DRILLER: Env. Mon. & Testing
NORTHING: 3,838,929.5 EASTING: 286,001.1 CREW: ESE
SYSTEM: UTM NAD83 (m) BORING LOCATION: Bld. 1301 along Glob Rd. T.O.C. ELEV.: 26.25
DRILL MACHINE: METHOD: MR 0 HOUR DTW: BORING DEPTH: 83.0
START DATE: 12/12/90 FINISH DATE: 12/17/90 24 HOUR DTW: WELL DEPTH: 78.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
							SM		33.0	Gray tan, SILTY, fine to medium SAND. (continued)	-6.5	4" Sch. 40 PVC
							SC/ SM		36.0	Gray tan, CLAYEY/SILTY SAND w/some pebbles.	-9.5	
							SM		40.0	Gray tan, SILTY, fine to medium SAND w/some pebbles.	-13.5	
							SM		44.0	Gray tan, SILTY, fine to medium SAND. Little clay, somewhat cohesive.	-17.5	
							SM		50.0	Gray tan, SILTY, fine to medium SAND w/trace pebbles.	-23.5	
							SM		60.0	Dark gray, SILTY, fine SAND.	-33.5	
							PT			Dark gray, PEAT.		
												60.7

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDI 06/13/03



Concrete



Bentonite Pellets



Coarse Gravel Pack

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 3 OF 3

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Paul Feinberg	WELL ID: 78GW-31 -02
NORTHING: 3,838,929.5		EASTING: 286,001.1	CREW: ESE
SYSTEM: UTM NAD83 (m)	BORING LOCATION: Bld. 1301 along Gibb Rd. CENTRAL SECTOR - SE of center of		T.O.C. ELEV.: 26.25
DRILL MACHINE:	METHOD: MR	0 HOUR DTW:	BORING DEPTH: 83.0
START DATE: 12/12/90	FINISH DATE: 12/17/90	24 HOUR DTW:	WELL DEPTH: 78.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION		ELEVATION	WELL DETAIL	
	6in	6in	6in	6in									
							PT		Dark gray, PEAT. (continued)		65.0		62.9
											-38.5	65.0	
							SM		Med. gray, SILTY, fine to medium SAND w/little shell and organics.		69.0		
											-42.5		
							SM		Med. gray, SILTY, fine to medium SAND w/shell and limestone fragments.		79.0		
											-52.5		
							SM		Med. gray, SILTY, fine to medium SAND w/trace shell fragments.		83.0		
											-56.5		83.0
									Boring Terminated at Elevation -56.5 ft Lithology from 78GW-31-03 Adapted from logs generated by ESE, Inc.				

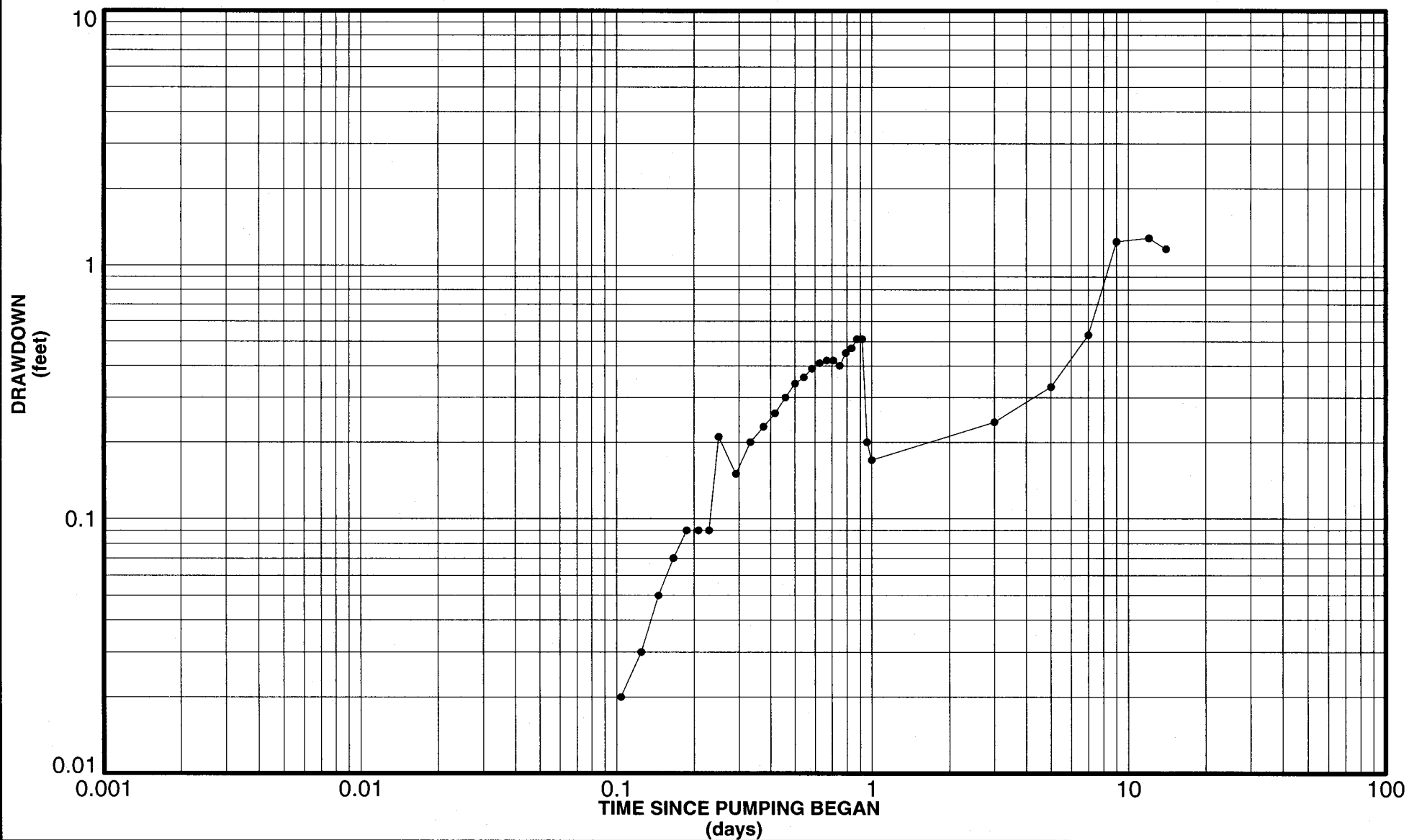
Concrete

Bentonite Pellets

Coarse Gravel Pack

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

SCRN. TOP.: 75
SCRN. BOT.: 80



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-58

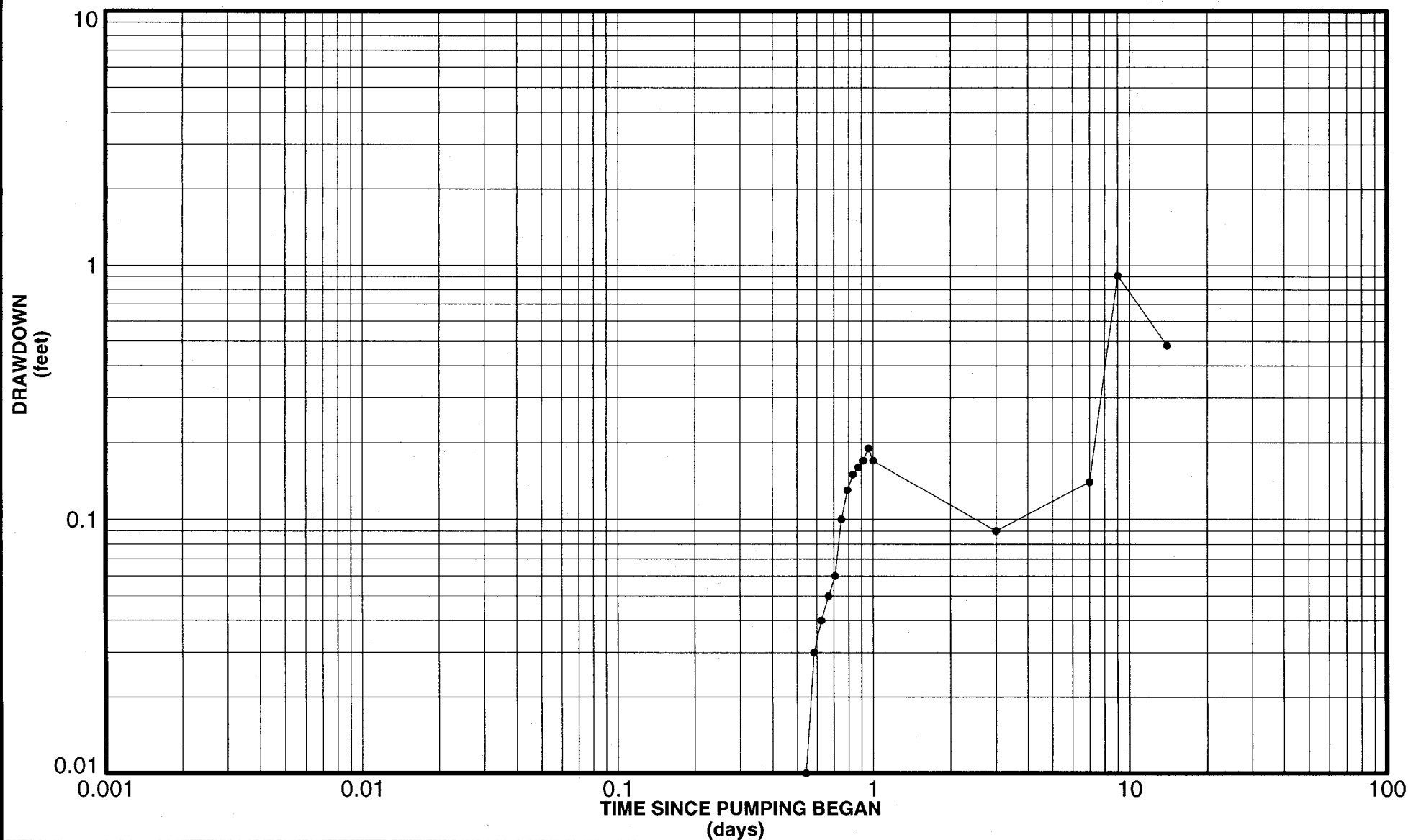
PUMPING TEST DATA
Aug-2003

PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

SCRN. TOP.: 150
SCRN. BOT.: 155



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-62

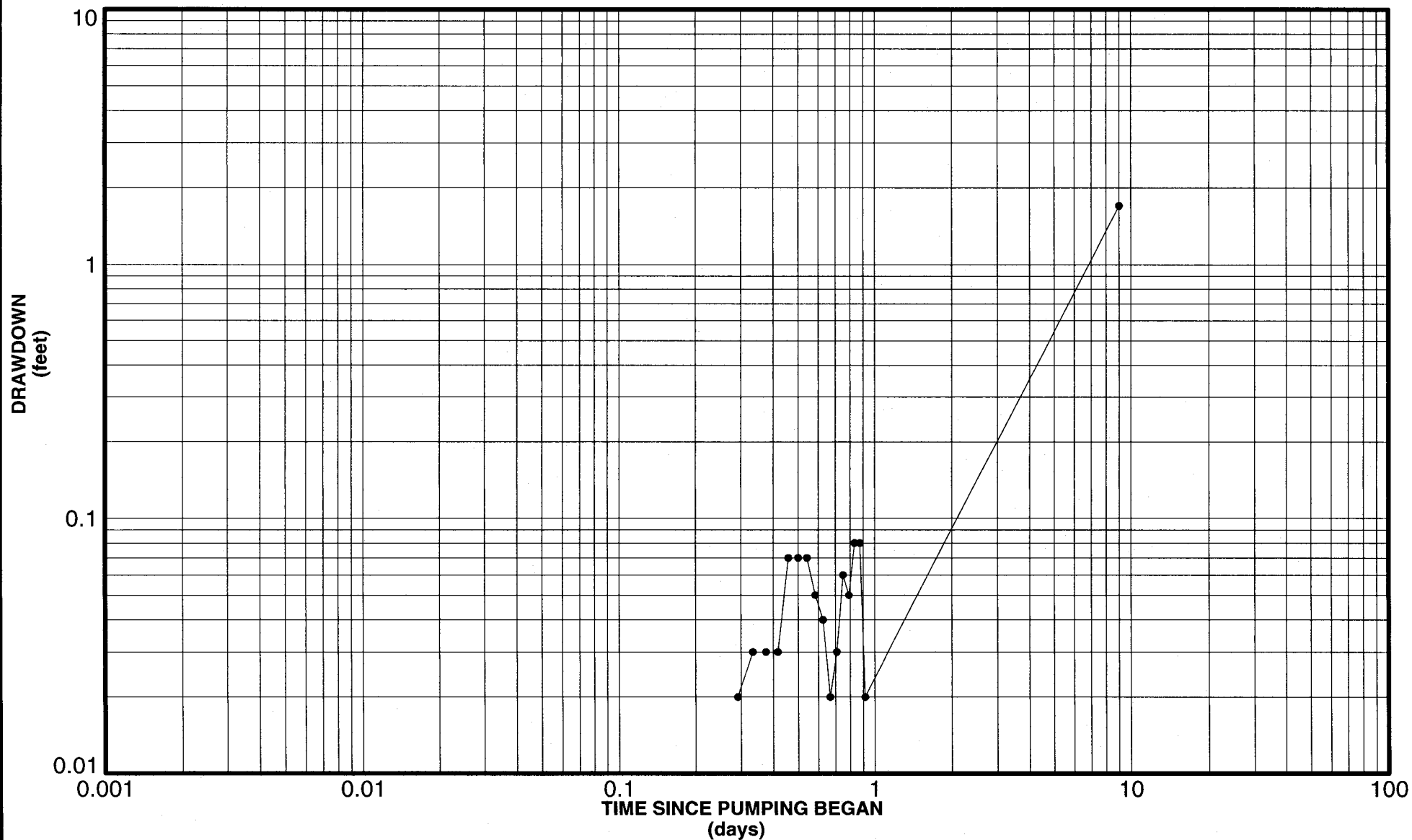
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May-2003

PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

SCRN. TOP.: 45
SCRN. BOT.: 50



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES
Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-64

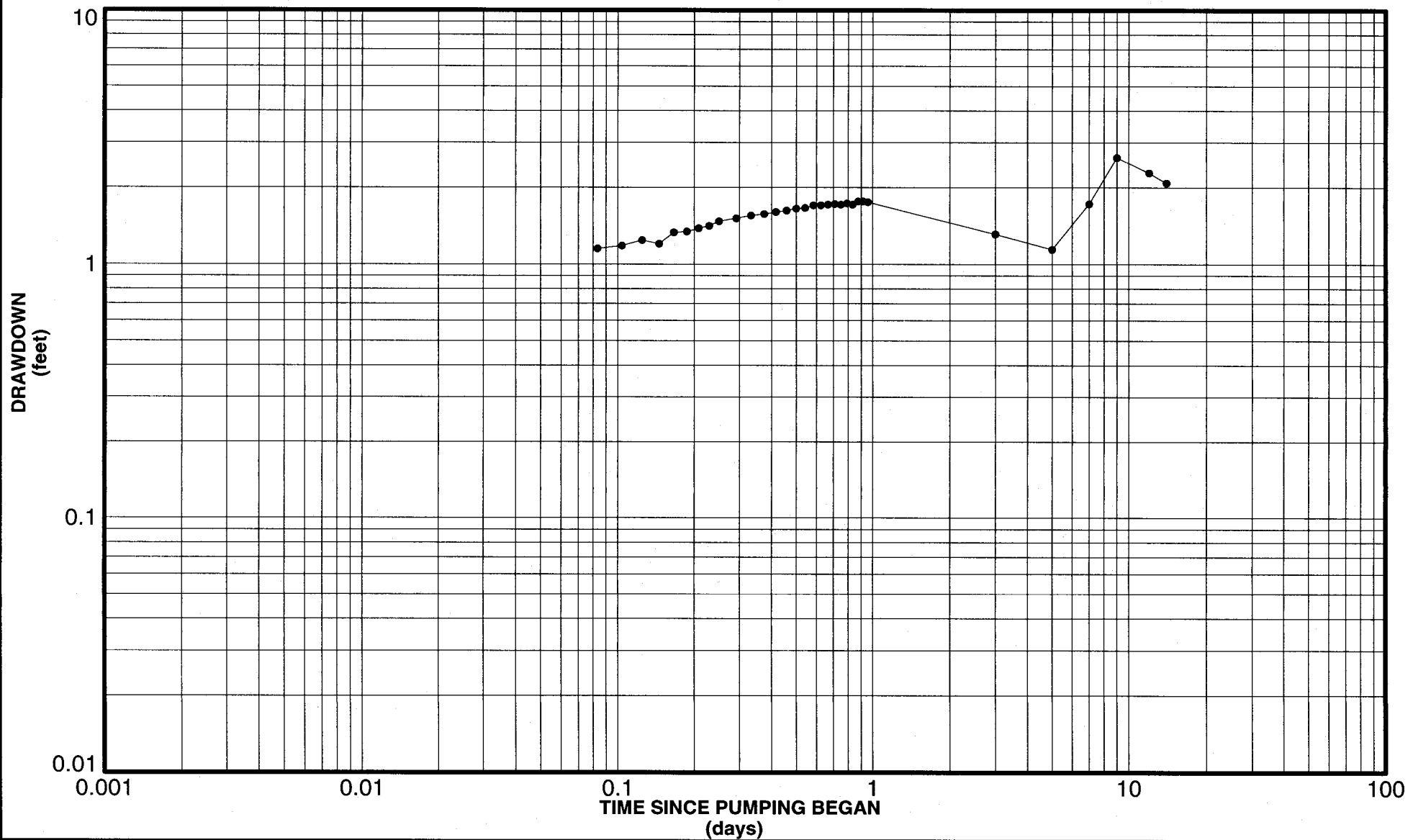
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

SCRN. TOP.: 75
SCRN. BOT.: 80



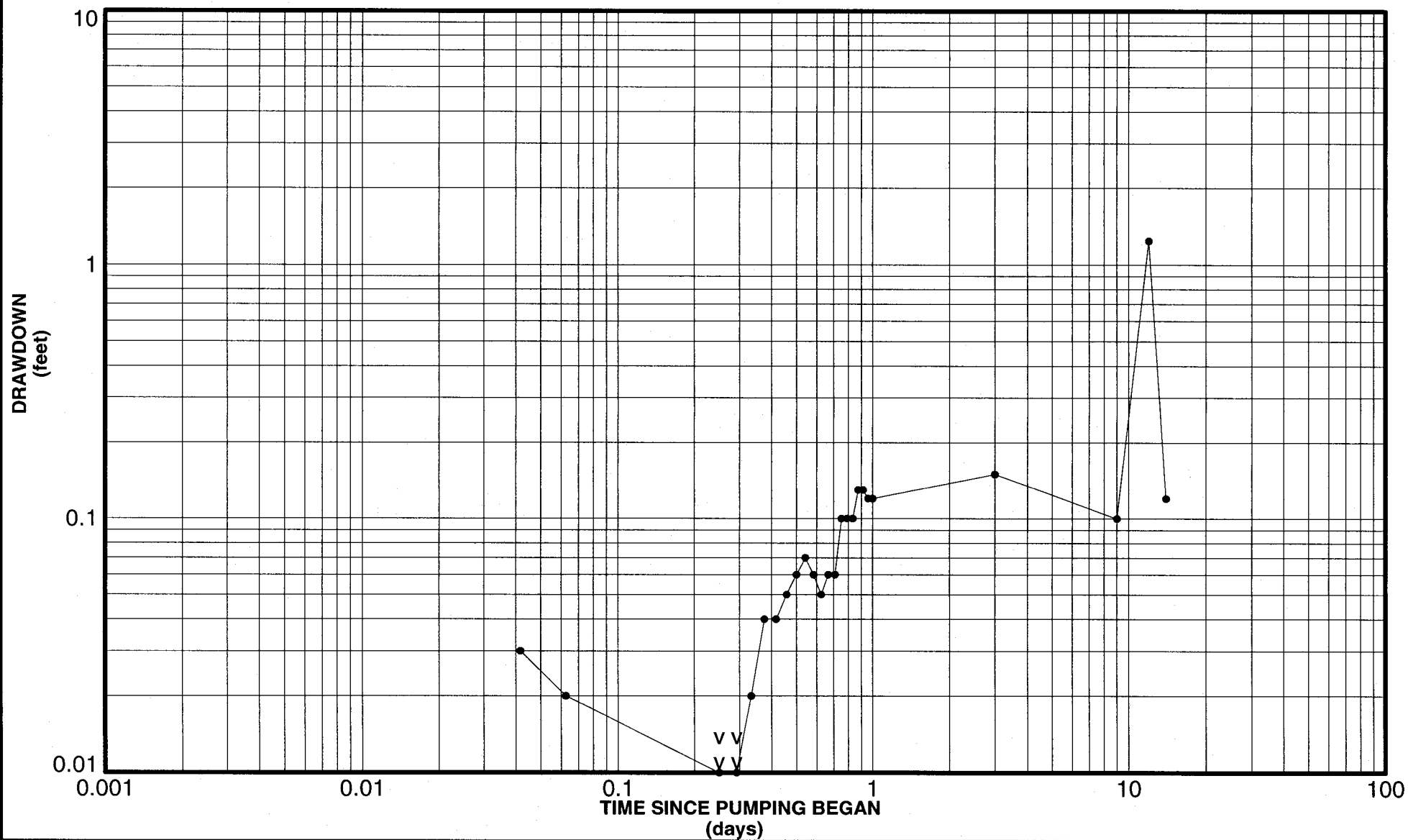
CATLIN
ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES
Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-65
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP
CITY: MCB, CAMP LEJEUNE
PREPARED FOR: Camp Lejeune

SCRN. TOP.: 5
SCRN. BOT.: 15



CATLIN

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GEOTECHNICAL LABORATORIES
Wilmington, North Carolina

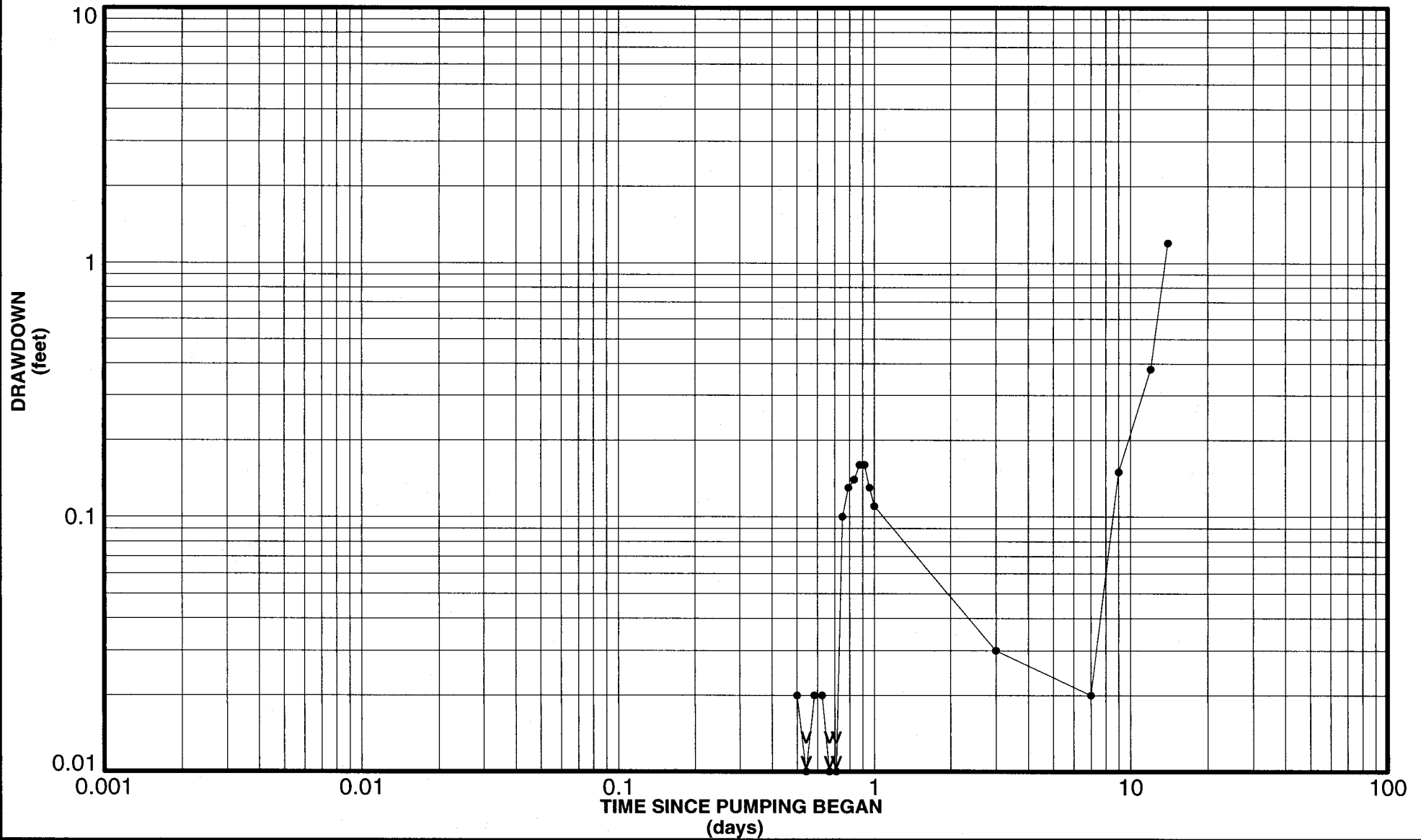
CATLIN NAME:
CATLIN NUM.: 203-047

MW-05

PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP
CITY: MCB, CAMP LEJEUNE
PREPARED FOR: Camp Lejeune

SCRN. TOP.: 5
SCRN. BOT.: 20



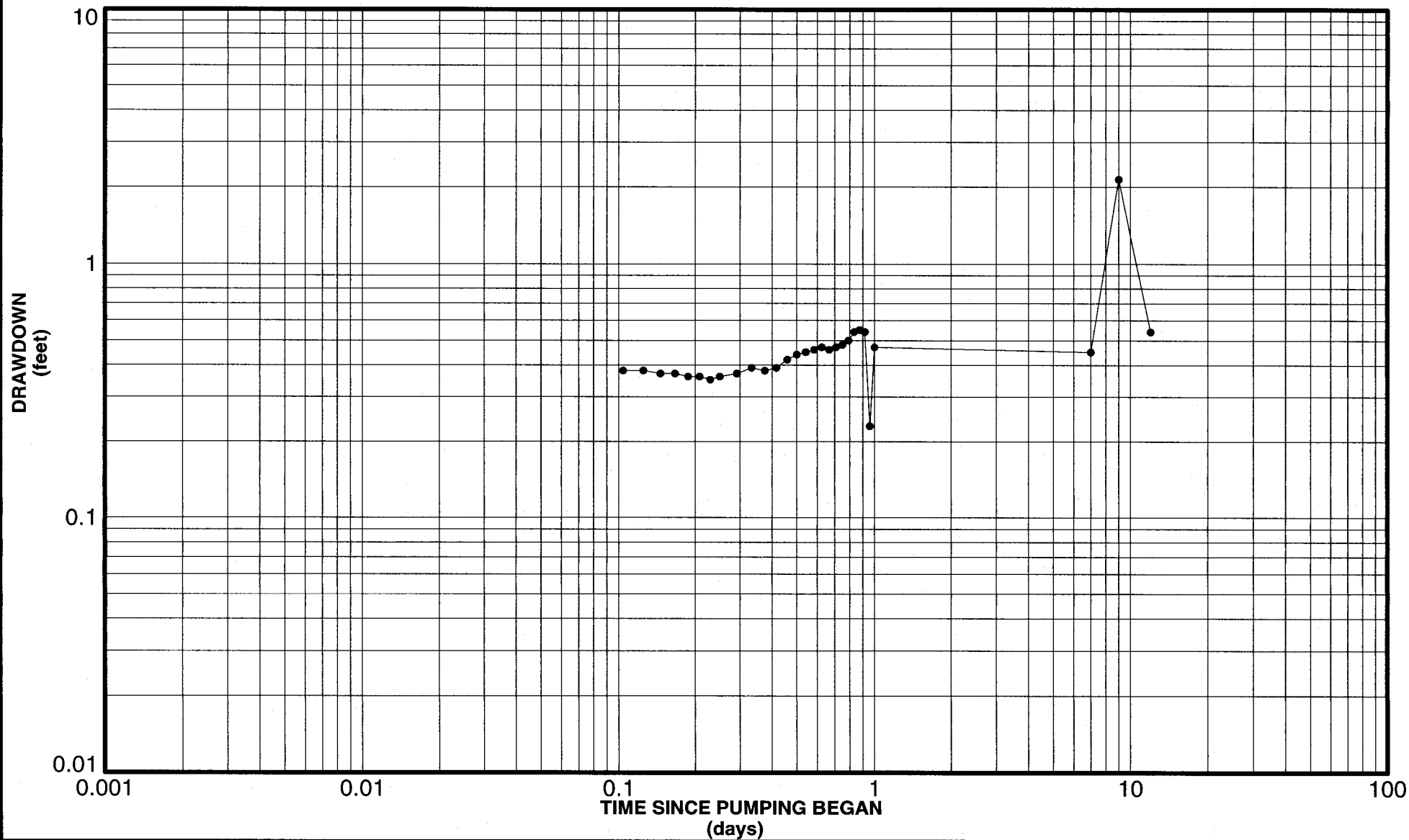
CATLIN
ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES
Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

1115-07
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP
CITY: MCB, CAMP LEJEUNE
PREPARED FOR: Camp Lejeune

SCRN. TOP.: 45
SCRN. BOT.: 50



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

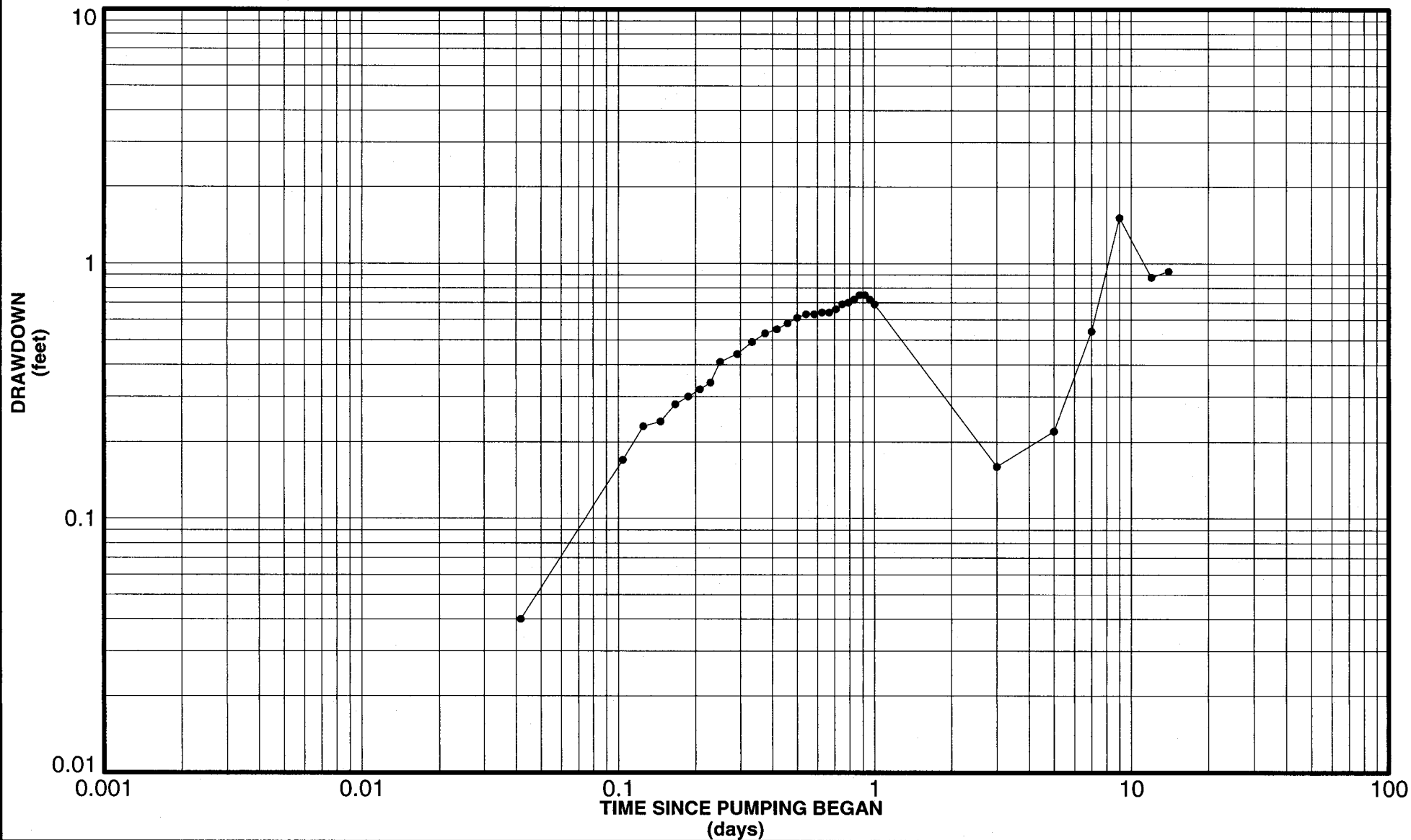
Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

1115-19
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP
CITY: MCB, CAMP LEJEUNE
PREPARED FOR: Camp Lejeune

SCRN. TOP.: 140
SCRN. BOT.: 150



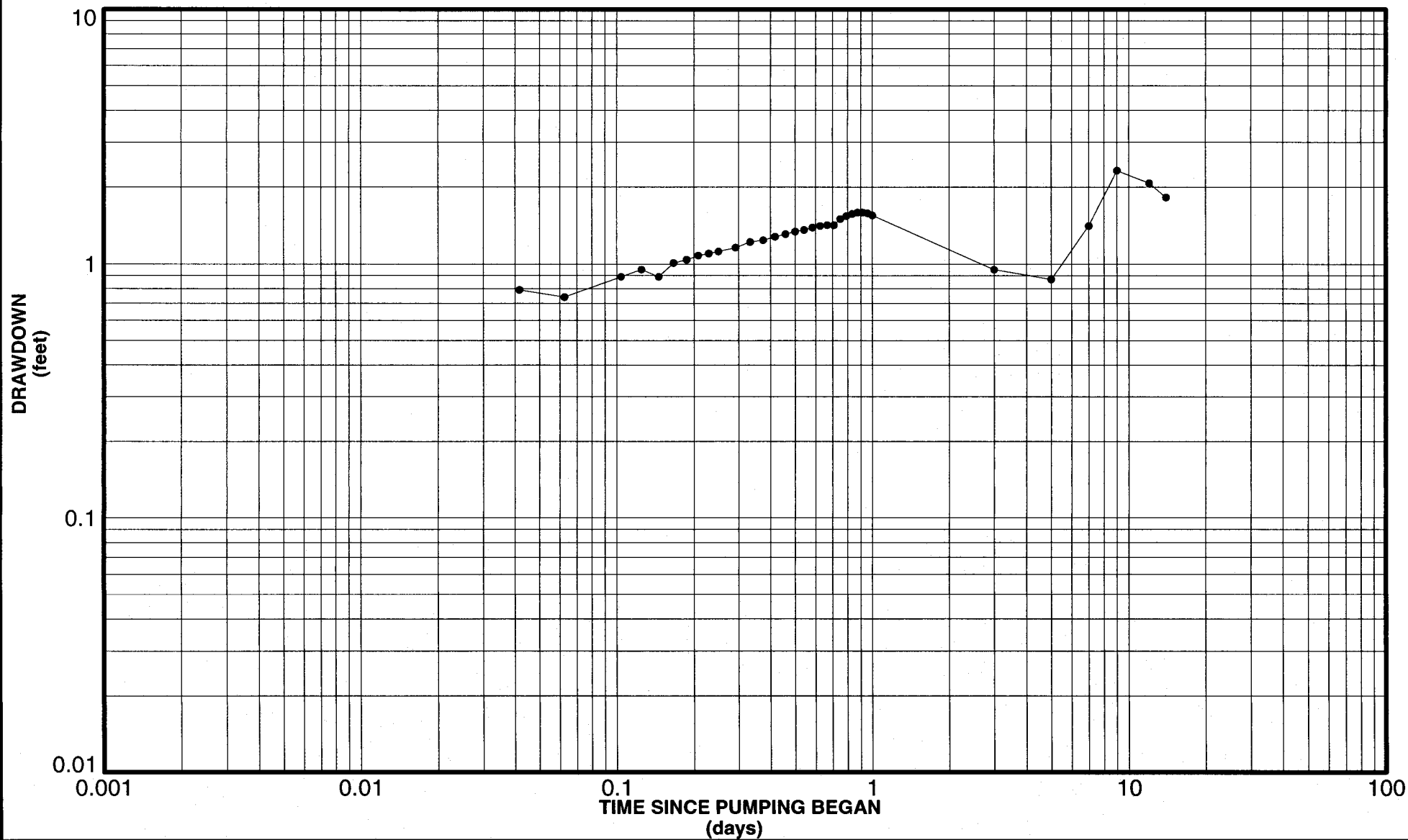
CATLIN
ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES
Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

78GW-32 -03
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP
CITY: MCB, CAMP LEJEUNE
PREPARED FOR: Camp Lejeune

SCRN. TOP.: 105
SCRN. BOT.: 110



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-12

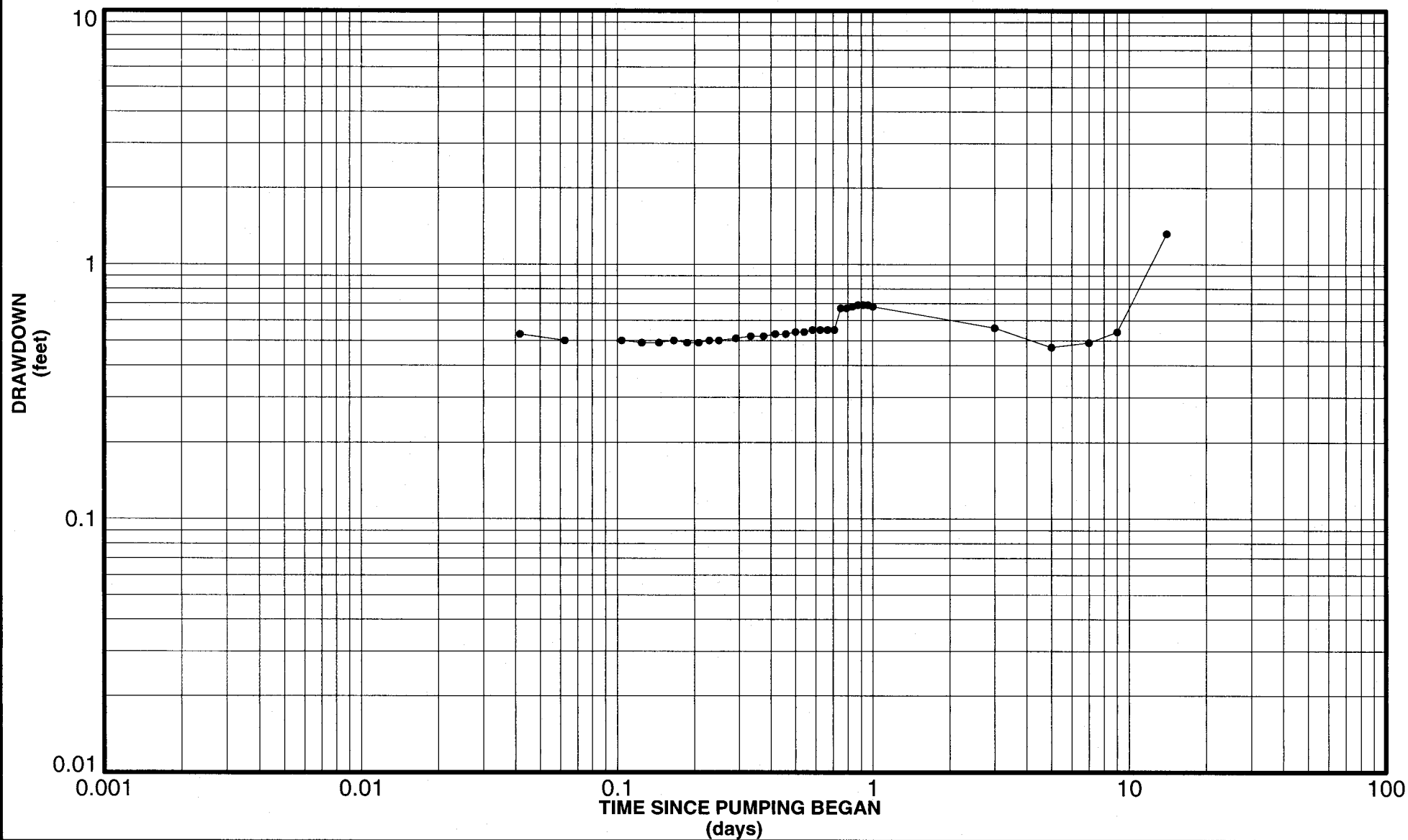
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

SCRN. TOP.: 5
SCRN. BOT.: 15



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-14

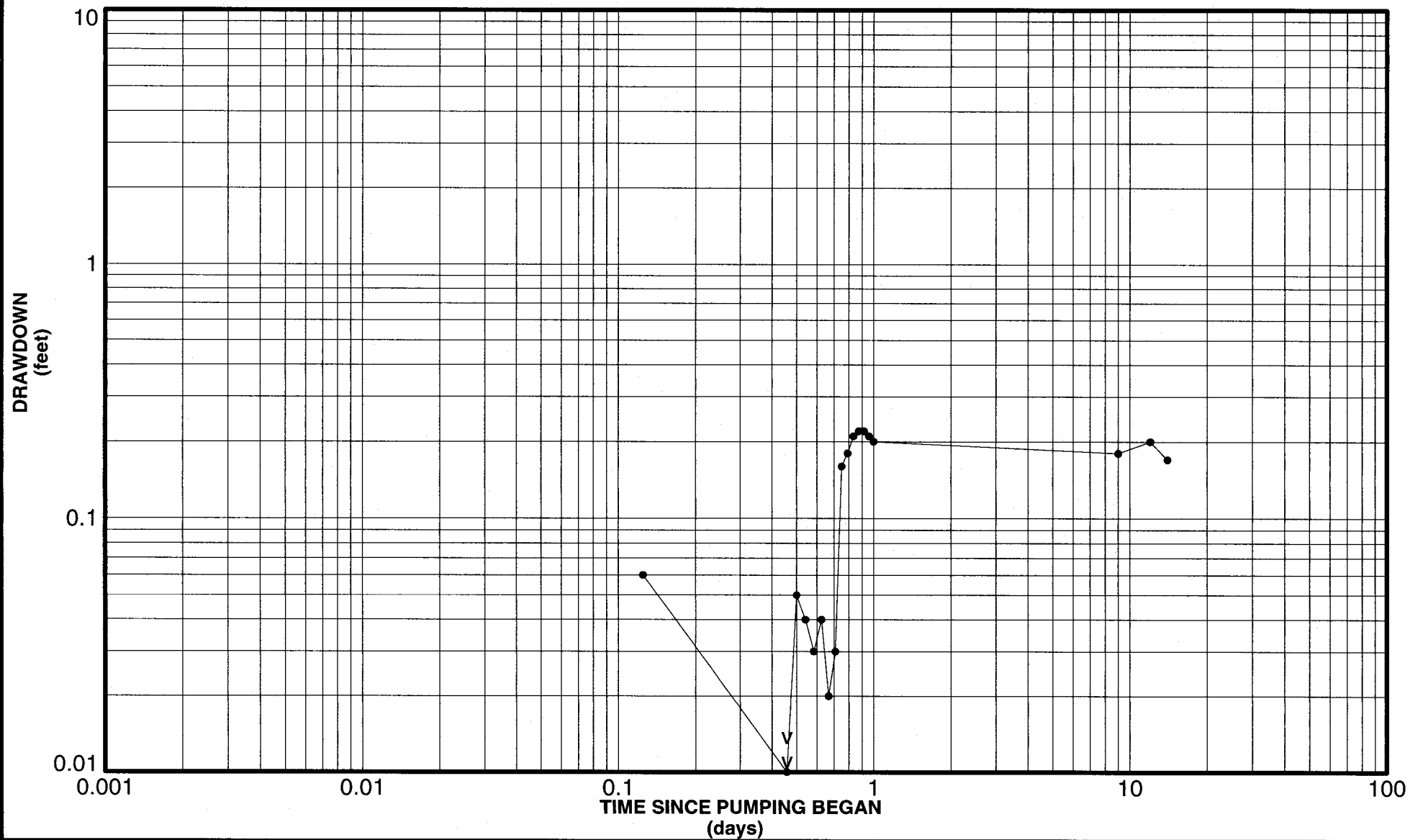
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

SCRN. TOP.: 5
SCRN. BOT.: 15



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

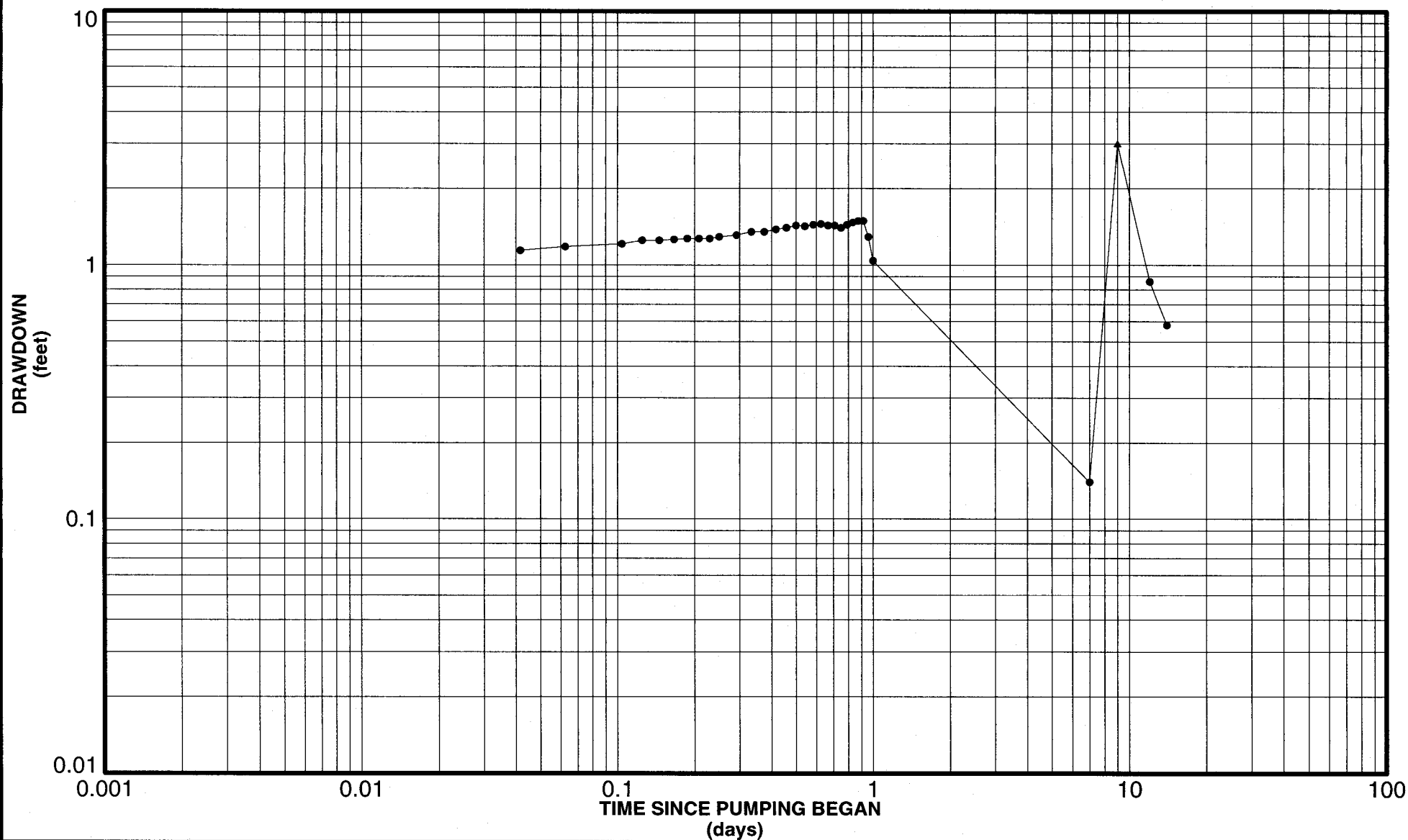
CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-15

PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP
CITY: MCB, CAMP LEJEUNE
PREPARED FOR: Camp Lejeune

SCRN. TOP.: 145
SCRN. BOT.: 150



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-60

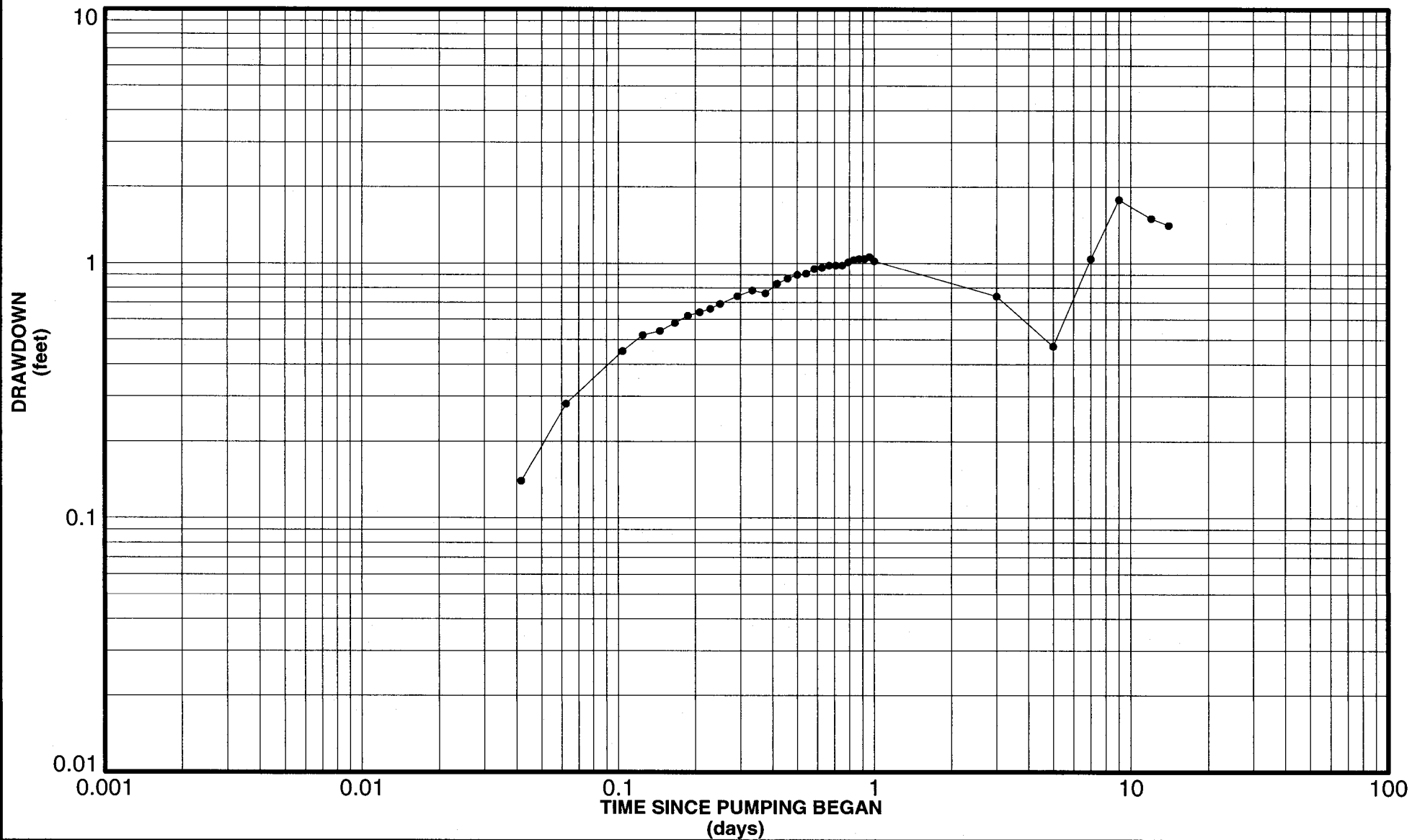
PUMPING TEST DATA
May-2003

PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

SCRN. TOP.: 45
SCRN. BOT.: 50



CATLIN

ENGINEERS and SCIENTISTS
GEOTECHNICAL LABORATORIES

Wilmington, North Carolina

CATLIN NAME:
CATLIN NUM.: 203-047

HPFF-61

PUMPING TEST DATA
May-2003

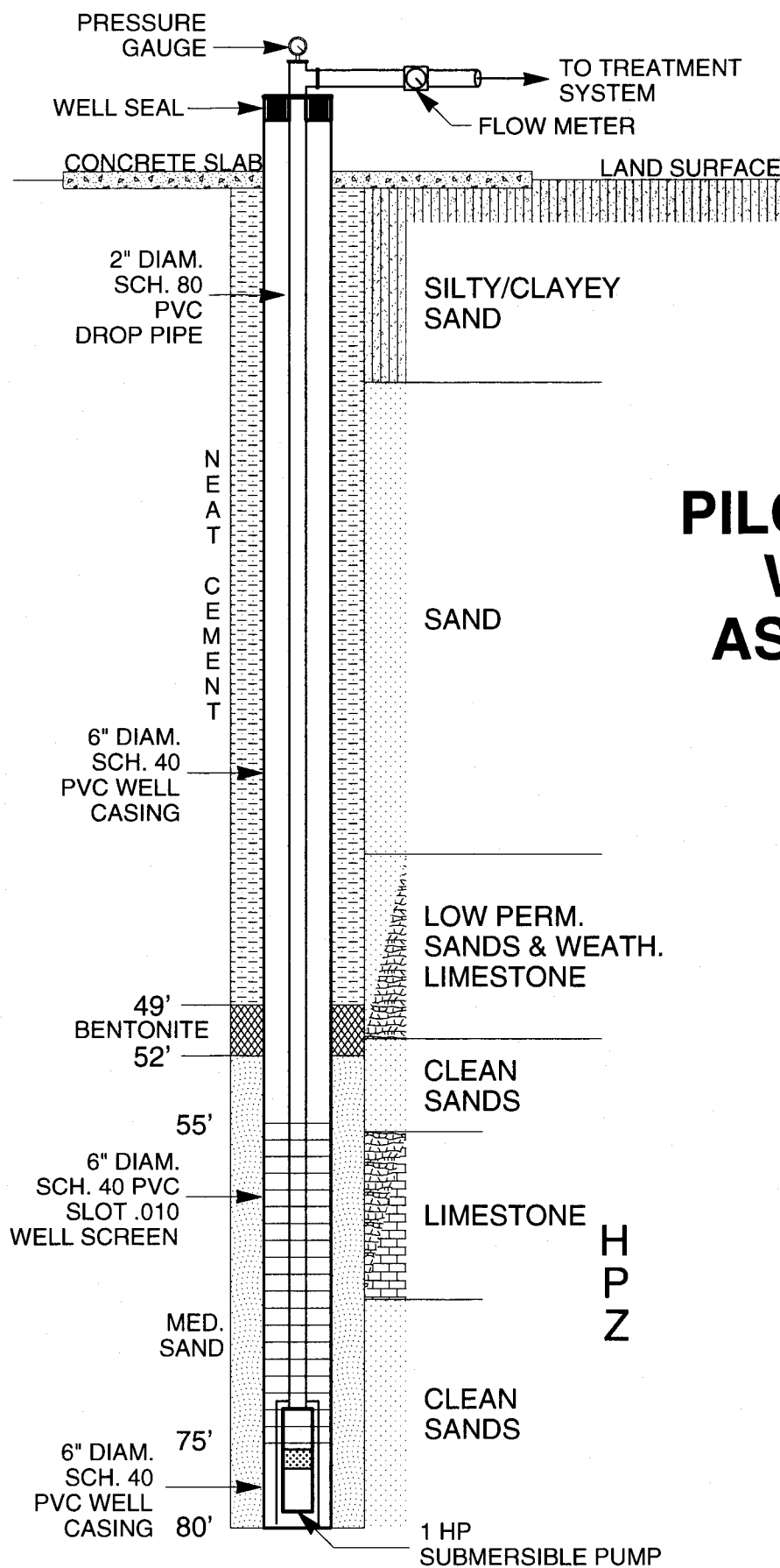
PROJECT NAME: HPFF REVISED CAP

CITY: MCB, CAMP LEJEUNE

PREPARED FOR: Camp Lejeune

APPENDIX B

PILOT TEST WELL AS-BUILTS



PILOT TEST WELL AS-BUILT

APPENDIX C

BORING LOGS, AS-BUILTS AND WELL CONSTRUCTION RECORDS

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 2

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Tom Stetler WELL ID: HPFF-73
DRILLER: Bobbie Fowler
NORTHING: 3,839,354.3 EASTING: 285,791.7 CREW: Scott Price
SYSTEM: UTM NAD83 (m) BORING LOCATION: NW of Holcomb Boulevard T.O.C. ELEV.: 25.27
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: 18.67 BORING DEPTH: 50.0
START DATE: 04/14/03 FINISH DATE: 04/15/03 24 HOUR DTW: 9.95 WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in					0.0	LAND SURFACE	25.8	0.0
									0.3	ASPHALT. Approx. 4".	25.5	-0.5
							SC		2.0	Brownish tan to gray, silty to clayey SAND. Moist. No HCO.	23.8	
3.0									3.0		22.8	
					<1	HPFF-73 (3-5')	CH		5.0	Orange-tan to light gray, mottled CLAY. Trace silty. Moist. No HCO.	20.8	
5.0										LITHOLOGY INFERRED FROM HPFF-74		
									8.0		17.8	
							CH		10.0	Gray, fat CLAY. High plasticity. Homogeneous in color. Well sorted. Very soft. Saturated. No HCO (?).	15.8	
									13.0		12.8	
							CH		15.0	S. A. A. Gray, fat CLAY. Well sorted. Very soft. Saturated. No HCO, but smells like swamp mud.	10.8	
									18.0		7.8	
							CH		20.0	S. A. A. Gray, fat CLAY at top of spoon. Gradational downward change in color to Dark brown. Strong organic smell (or slight HCO?). Slightly less soft than above.	5.8	
									23.0		2.8	
							OH		25.0	Dark brown, organic-rich CLAY. Wood fragments and large root (~1" in diameter) in top 6" of spoon. Bottom of spoon S. A. A. but gray in color with minor silt. Saturated. Strong organic odor.	0.8	
									28.0		-2.2	
							SC/CL		30.0	Greenish gray to brownish gray, silty to clayey, f. to v.f.. SAND. Interlayered CLAY-rich and SAND-rich horizons up to 6" in thickness.	-4.2	

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

 Portland Cement
  Bentonite Pellets
  #2 Medium Sand

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 2

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Tom Stetler	WELL ID: HPFF-73
NORTHING: 3,839,354.3		EASTING: 285,791.7	CREW: Scott Price
SYSTEM: UTM NAD83 (m)		BORING LOCATION: NW of Holcomb Boulevard	T.O.C. ELEV.: 25.27
DRILL MACHINE: Diedrich D-50	METHOD: HSA/MR	0 HOUR DTW: 18.67	BORING DEPTH: 50.0
START DATE: 04/14/03	FINISH DATE: 04/15/03	24 HOUR DTW: 9.95	WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	SOIL AND ROCK		WELL DETAIL
	6in	6in	6in	6in					DEPTH	DESCRIPTION	ELEVATION
										Minor organic-rich (wood) layer (thickness ~1") near top of spoon. Saturated. No HCO.	
									33.0		-7.2
							SM			Similar to above but lower CLAY content. Greenish gray, silty, f. to v.f. SAND. Very thin (several mm in thickness) dark brown, organic-rich layers with regular spacing (~.5' between layers). Saturated. No HCO.	-9.2
									35.0		
									38.0		-12.2
							SC			Greenish gray, poorly sorted, silty to clayey SAND. Minor carbonate cementation. Minor shell fragments (up to 3 mm in diameter), and gravel-sized limestone clasts. No HCO.	-14.2
									40.0		
									43.0		-17.2
							SC/SM			S. A. A. but no Limestone fragments. Greenish gray, poorly sorted, silty to clayey SAND. Shell fragments (up to 3 mm in diameter). Moderately stiff. Moist. Slight HCO?	-19.2
									45.0		
									48.0		-22.2
							SM			S. A. A. but only trace clay. Greenish gray, poorly sorted, silty SAND. Shell frag. to 4mm. Hard, but no cementation. Slight HCO?	-24.2
									50.0		
										Boring Terminated at Elevation -24.2 ft Lithology inferred from HPFF-74 WH = Weight of Hammer S.A.A. = Same as above	

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

	Portland Cement		Bentonite Pellets		#2 Medium Sand
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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 # _____ ASSOCIATED WQ PERMIT # N/A
(if applicable) (if applicable)

HPFF-73

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

Holcolmb Blvd.

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

3. OWNER: LANTDIV NAVFACENGCOM Commanding General

Address: AC/S EMD/Marine Corps Base/PSC Box 20004

(Street or Route No.)

Camp Lejeune

NC

28542-0004

City or Town

State

Zip Code

Area code - Phone number

4. DATE DRILLED: 4/15/03

5. TOTAL DEPTH: 50

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

7. STATIC WATER LEVEL Below Top of Casing 9.95 FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS -0.5 FT. Above Land Surface*

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

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

10. WATER ZONES (depth): Surficial Aquifer

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

13. CASING: Depth Diameter Wall Thickness or Weight/Ft. Material
From 0.5 To 45 ft. 2 in. Sch. 40 PVC
From 0 To 40 ft. 6 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____

14. GROUT: Depth Material Method
From 0 To 35 ft. Portland Cement Tremie
From 35 To 43 ft. Bent. Pellets Tremie

15. SCREEN: Depth Diameter Slot Size Material
From 45 To 50 ft. 2 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____

16. SAND/GRAVEL PACK: Depth Size Material
From 43 To 50 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____

17. REMARKS: Lithology inferred from HPFF-74

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

Northing/Easting of well location

3839354.291/285791.664

UTM NAD83 (m)

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

DEPTH
From To

DRILLING LOG
Formation Description

SEE
ATTACHED

LOCATION SKETCH

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

SEE
ATTACHED

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

Bobbie Fowler

SIGNATURE OF PERSON CONSTRUCTING THE WELL

5-23-03

DATE

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

Modified from:
GW-1 REV.07/2001

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 3

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Tom Stetler WELL ID: HPFF-74
DRILLER: Bobbie Fowler
NORTHING: 3,839,352.4 EASTING: 285,790.3 CREW: Scott Price
SYSTEM: UTM NAD83 (m) BORING LOCATION: NW of Holcomb Boulevard T.O.C. ELEV.: 25.38
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: 4.98 BORING DEPTH: 80.0
START DATE: 04/07/03 FINISH DATE: 04/16/03 24 HOUR DTW: 8.79 WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in									
									0.0	LAND SURFACE	25.9	0.0
0.0	3	7	4	3	23		GW	0.2	Asphalt	25.7	-0.5	
							SC	0.4	Limestone GRAVEL	25.5		
2.0								2.0	Brownish tan to gray, silty to clayey SAND.	23.9		
3.0								3.0		22.9		
5.0	3	4	5	3	21	HPFF-74 (3-5')	SC/CH	5.0	Gray to brownish tan, silty to clayey SAND. Interlayered gray CLAY of high plasticity. Moist. No HCO.	20.9		
8.0								8.0		17.9		
10.0	WHWHWHWH				52		CH	10.0	Gray, fat CLAY. High plasticity. Homogeneous in color. Well sorted. Very soft. Saturated. No HCO (?).	15.9		
13.0								13.0		12.9		
15.0	WHWHWHWH				380		CH	15.0	S. A. A. Gray, fat CLAY. Well sorted. Very soft. Saturated. No HCO, but smells like swamp mud.	10.9		
18.0								18.0		7.9		
20.0	WH	1	1	1	420		CH	20.0	S. A. A. Gray, fat CLAY at top of spoon. Gradational downward change in color to Dark brown. Strong organic smell (or slight HCO?). Slightly less soft than above.	5.9		
23.0								23.0		2.9		
25.0	1	2	2	3	1000+		OH	25.0	Dark brown, organic-rich CLAY. Wood fragments and large root (~1" in diameter) in top 6" of spoon. Bottom of spoon S. A. A. but gray in color with minor silt. Saturated. Strong organic odor.	0.9		
28.0								28.0		-2.1		
	7	6	4	7	1000+		SC/CL	30.0	Greenish gray to brownish gray, silty to clayey, f. to v.f.. SAND. Interlayered CLAY-rich and SAND-rich horizons up to 6" in thickness.	-4.1		

CATLIN BORING LOG 203-047-HPFF CAP G.P.L. CATLIN.GDI 06/15/03

6" Sch. 40 PVC



Portland Cement



Bentonite Pellets



#2 Medium Sand

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 3

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Tom Stetler	WELL ID:
		DRILLER: Bobbie Fowler	HPFF-74
NORTHING: 3,839,352.4	EASTING: 285,790.3	CREW: Scott Price	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: NW of Holcomb Boulevard		T.O.C. ELEV.: 25.38
DRILL MACHINE: Diedrich D-50	METHOD: HSA/MR	0 HOUR DTW: 4.98	BORING DEPTH: 80.0
START DATE: 04/07/03	FINISH DATE: 04/16/03	24 HOUR DTW: 8.79	WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	SOIL AND ROCK DESCRIPTION		ELEVATION	WELL DETAIL
	6in	6in	6in	6in					DEPTH	DESCRIPTION		
30.0										Minor organic-rich (wood) layer (thickness ~1") near top of spoon. Saturated. No HCO.		
33.0									33.0		-7.1	
35.0	7	5	4	6	220		SM		35.0	Similar to above but lower CLAY content. Greenish gray, silty, f. to v.f. SAND. Very thin (several mm in thickness) dark brown, organic-rich layers with regular spacing (~.5' between layers). Saturated. No HCO.	-9.1	
38.0									38.0		-12.1	
40.0	3	2	7	13	210		SC		40.0	Greenish gray, poorly sorted, silty to clayey SAND. Minor carbonate cementation. Minor shell fragments (up to 3 mm in diameter), and gravel-sized limestone clasts. No HCO.	-14.1	
43.0									43.0		-17.1	
45.0	5	7	10	11	110		SC/SM		45.0	S. A. A. but no Limestone fragments. Greenish gray, poorly sorted, silty to clayey SAND. Shell fragments (up to 3 mm in diameter). Moderately stiff. Moist. Slight HCO?	-19.1	
48.0									48.0		-22.1	
50.0	11	16	26	37	93		SM		50.0	S. A. A. but only trace clay. Greenish gray, poorly sorted, silty SAND. Shell fragments up to 4mm in diameter. Hard, but no cementation. Slight HCO?	-24.1	
53.0									53.0		-27.1	
55.0	24	26	25	23	12		GW		54.0	Top of spoon. Light gray LIMESTONE gravels. Very hard. Broken clasts up to 5 mm in diameter in f. SAND matrix.	-28.1	
							SM		55.0	Bottom of spoon, relatively abrupt contact with above. Light gray, silty, f. to v.f. SAND. Minor shell fragments and v.f. opaque mineral grains.	-29.1	
58.0									58.0		-32.1	
60.0	13	28	37	45	40		SP		60.0	Light gray to greenish gray, well sorted, f. to v.f. SAND. Trace v.f. opaque mineral grains. Hard. No HCO, but slight chlorine odor.	-34.1	

2" Sch. 40 PVC

4" Sch. 40 PVC

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03



Portland Cement



Bentonite Pellets



#2 Medium Sand

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 3 OF 3

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Tom Stetler	WELL ID:
		DRILLER: Bobbie Fowler	HPFF-74
NORTHING: 3,839,352.4	EASTING: 285,790.3	CREW: Scott Price	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: NW of Holcomb Boulevard		T.O.C. ELEV.: 25.38
DRILL MACHINE: Diedrich D-50	METHOD: HSA/MR	0 HOUR DTW: 4.98	BORING DEPTH: 80.0
START DATE: 04/07/03	FINISH DATE: 04/16/03	24 HOUR DTW: 8.79	WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	SOIL AND ROCK		WELL DETAIL
	6in	6in	6in	6in					DEPTH	DESCRIPTION	ELEVATION
63.0									63.0		-37.1
65.0	36	43	38	40	39		SP		65.0	S. A. A. Light gray, f. to v.f. SAND. Well sorted. Trace v.f. opaque mineral grains and minor shell fragments. No HCO, but slight chlorine odor.	-39.1
68.0									68.0		-42.1
70.0	15	31	37	41	18		SP		70.0	S. A. A. Light gray, f. to v.f. SAND. Well sorted. v.f. opaque grains and minor shell fragments. No HCO, but slight Chlorine odor.	-44.1
73.0									73.0		-47.1
75.0	9	15	25	32	1.8		SP		75.0	S. A. A. Light gray to greenish gray, f. to v.f. SAND. Trace silt, shell fragments and sea urchin spines. No HCO.	-49.1
78.0									78.0		-52.1
80.0	12	26	31	40	2.6		SP		80.0	S. A. A. Light gray to greenish gray, f. to v.f. SAND. Trace silt, shell fragments up to 3 mm in diameter, v.f. opaque grains. No HCO.	-54.1
										Boring Terminated at Elevation -54.1 ft WH = Weight of Hammer S.A.A. = Same as above	

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

 Portland Cement
  Bentonite Pellets
  #2 Medium Sand

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 # _____ ASSOCIATED WQ PERMIT # N/A
(if applicable) (if applicable)

HPFF-74

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

Holcolmb Blvd.

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

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

4. DATE DRILLED: 4/16/03

5. TOTAL DEPTH: 80

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

7. STATIC WATER LEVEL Below Top of Casing 8.79 FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS -0.5 FT. Above Land Surface*

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

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

10. WATER ZONES (depth): Surficial Aquifer

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

Depth		Diameter	Wall Thickness or Weight/Ft.	Material
From <u>0.5</u>	To <u>75</u> ft.	<u>2</u> in.	<u>Sch. 40</u>	<u>PVC</u>
From <u>0</u>	To <u>69</u> ft.	<u>4</u> in.	<u>Sch. 40</u>	<u>PVC</u>
From <u>0</u>	To <u>39</u> ft.	<u>6</u> in.	<u>Sch. 40</u>	<u>PVC</u>

Depth		Material	Method
From <u>0</u>	To <u>71</u> ft.	<u>Portland Cement</u>	<u>Tremie</u>
From <u>71</u>	To <u>73</u> ft.	<u>Bent. Pellets</u>	<u>Surface Pour</u>

Depth		Diameter	Slot Size	Material
From <u>75</u>	To <u>80</u> ft.	<u>2</u> in.	<u>Slot .010 in.</u>	<u>PVC</u>
From _____	To _____ ft.	_____ in.	_____ in.	_____

Depth		Size	Material
From <u>73</u>	To <u>80</u> ft.	<u>#2 Medium</u>	<u>Torpedo Sand</u>
From _____	To _____ ft.	_____	_____

17. REMARKS: _____

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

Northing/Easting of well location

3839352.36/285790.272

UTM NAD83 (m)

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

DEPTH
From To

DRILLING LOG
Formation Description

SEE
ATTACHED

LOCATION SKETCH

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

SEE
ATTACHED

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

Bobbie Fowler
SIGNATURE OF PERSON CONSTRUCTING THE WELL

5-23-03
DATE

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

Modified from:
GW-1 REV.07/2001

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 2

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Tom Stetler WELL ID: HPFF-75
DRILLER: Bobbie Fowler
NORTHING: 3,839,154.2 EASTING: 286,316.0 CREW: Scott Price
SYSTEM: UTM NAD83 (m) BORING LOCATION: SE of Concrete loading ramp T.O.C. ELEV.: 30.01
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: 1.21 BORING DEPTH: 80.0
START DATE: 03/27/03 FINISH DATE: 03/31/03 24 HOUR DTW: 8.76 WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in									
									0.0	LAND SURFACE	29.0	1.1
									0.5	Dark brown to black, TOPSOIL matrix surrounding tan limestone road gravels (up to .5" in diameter).	28.5	0.0
3.0									3.0		26.0	
5.0	4	5	2	3	1.4	HPFF-75 (3-5')	CL/ML		5.0	Brownish gray, silty CLAY, Moderately well sorted. Minor orange mottling. Moist. No HCO.	24.0	
8.0									8.0		21.0	
10.0	4	3	2	3	1.4		SM		10.0	Brownish gray to tan, silty, vf. SAND. Saturated. Slight HCO (?).	19.0	
13.0									13.0		16.0	
15.0	11	13	12	11	5.0		SP		15.0	Brownish to light gray vf. SAND. Relatively clean (well sorted). Saturated. Slight HCO.	14.0	
18.0									18.0		11.0	
20.0	3	4	4	3	130.0		SP		20.0	S. A. A. Light gray, vf. SAND. Well sorted. Saturated. Slight HCO.	9.0	
23.0									23.0		6.0	
25.0	6	9	13	17	8.0		SP		25.0	S. A. A. but larger in grain size. Light gray, f. SAND. Well sorted. Saturated. Strong HCO.	4.0	
28.0									28.0		1.0	
30.0	7	10	15	20	11.0		SP		30.0	S. A. A. Light gray, f. SAND. Minor vf. opaque mineral grains. Strong HCO.	-1.0	
33.0									33.0		-4.0	
35.0	8	10	13	16	14.0		SP		35.0	Light brown to yellowish orange, f. to vf. SAND. Well sorted. Strong chlorine-like odor. Minor vf. opaque mineral grains. Similar to above in lithology, but different color.	-6.0	
38.0									38.0		-9.0	
40.0	7	8	8	8	9.6		SP		40.0	S. A. A. Light brown to yellowish orange, f. to vf., clean SAND. No HCO. Slight chlorine odor.	-11.0	

6" Sch. 40 PVC

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/05/03

Portland Cement Bentonite Pellets #2 Medium Sand

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 2

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP	LOGGED BY: Tom Stetler	WELL ID: HPFF-75	
	DRILLER: Bobbie Fowler		
NORTHING: 3,839,154.2	EASTING: 286,316.0	CREW: Scott Price	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: SE of Concrete loading ramp	T.O.C. ELEV.: 30.01	
DRILL MACHINE: Diedrich D-50	METHOD: HSA/MR	0 HOUR DTW: 1.21	BORING DEPTH: 80.0
START DATE: 03/27/03	FINISH DATE: 03/31/03	24 HOUR DTW: 8.76	WELL DEPTH: 80.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
43.0									43.0		-14.0	
45.0	12	20	22	27	3.0		SM		45.0	Greenish gray, mod. to poorly sorted, silty, f. to vf. SAND. Poorly carbonate cemented. Shell fragments up to .25" in diameter. Strong chlorine odor. Driller indicated broken limestone layering from 45.5' to 47'.	-16.0	
48.0									48.0		-19.0	
50.0	10	16	22	27	4.2		SM		50.0	S. A. A. Greenish gray, moderately to poorly sorted, silty, f. to vf. SAND. Minor shell fragments up to .2" in diameter. Strong Chlorine odor. Driller noted hard layering between 51.5' and 53'.	-21.0	
53.0									53.0		-24.0	
55.0	22	35	34	39	2.2		SP		55.0	Greenish gray to light gray, f. to vf. SAND. Hard. No shell fragments. Strong chlorine odor. Vf. opaque mineral grains (<2%).	-26.0	55.0
58.0									58.0		-29.0	
60.0	8	12	16	16	3.2		GW/GM		60.0	Greenish gray to light gray, very poorly sorted, silty SAND and limestone gravels. Slight chlorine odor. Fractured limestone clasts, angular, up to 1" in diameter. Shell and fossil fragments. Driller temporarily lost circulation at 60' BLS, and changed over from drag bit to rock bit.	-31.0	
63.0									63.0		-34.0	
65.0	45	50/4			0				65.0	Light gray, fractured LIMESTONE and limestone gravels. Resembles a "fossil marl." Partially carbonate cemented sand, silt and shell fragments broken into gravel-sized clasts up to 1.5" in diameter. Slight chlorine odor.	-36.0	
68.0									68.0		-39.0	
70.0	18	31	44	50/4	6.5		SP		70.0	Light gray, vf. SAND. Hard. No carbonate cementation. Trace vf. opaque mineral grains and shell fragments. Strong chlorine odor, but no HCO.	-41.0	
73.0									73.0		-44.0	
75.0	21	50/5			14.0		SP		75.0	S. A. A. Greenish gray to light gray f. to vf. SAND. Hard. Trace vf. opaque mineral grains. Slight chlorine odor. No HCO.	-46.0	75.0
78.0									78.0		-49.0	
80.0	18	41	50/5		46.0		SP		80.0	S. A. A. Greenish gray to light gray f. to vf. SAND. Hard. Trace vf. opaque mineral grains. Slight chlorine odor(?). No HCO.	-51.0	80.0
Boring Terminated at Elevation -51.0 ft WH = Weight of Hammer S.A.A. = Same as above												

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 08/05/03

6" Slot .010 Sch. 40
PVC

Portland Cement Bentonite Pellets #2 Medium Sand

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 # _____ ASSOCIATED WQ PERMIT # N/A
(if applicable) (if applicable)

HPFF-75

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

Holcolmb Blvd.

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

3. OWNER: LANTDIV NAVFACENGCOM Commanding General

Address: AC/S EMD/Marine Corps Base/PSC Box 20004

(Street or Route No.)

Camp Lejeune

NC

28542-0004

City or Town

State

Zip Code

Area code - Phone number

4. DATE DRILLED: 3/31/03

5. TOTAL DEPTH: 80

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

7. STATIC WATER LEVEL Below Top of Casing 8.76 FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 1.05 FT. Above Land Surface*

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

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

10. WATER ZONES (depth): Surficial Aquifer

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

13. CASING: Depth Diameter Wall Thickness or Weight/Ft. Material
From 1.05 To 55 ft. 6 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____
From _____ To _____ ft. _____ in. _____

14. GROUT: Depth Material Method
From 0 To 49 ft. Portland Cement Tremie
From 49 To 52 ft. Bent. Pellets Surface Pour

15. SCREEN: Depth Diameter Slot Size Material
From 55 To 75 ft. 6 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____ in. _____

16. SAND/GRAVEL PACK: Depth Size Material
From 52 To 80 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____

17. REMARKS: _____

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

Northing/Easting of well location

3839154.183/286315.95

UTM NAD83 (m)

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

DEPTH
From To

DRILLING LOG
Formation Description

SEE
ATTACHED

LOCATION SKETCH

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

SEE
ATTACHED

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

Bobbie Fowler
SIGNATURE OF PERSON CONSTRUCTING THE WELL

5-23-03
DATE

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

Modified from:
GW-1 REV.07/2001

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 2

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
 PROJECT NAME: HPFF REVISED CAP LOGGED BY: Tom Stetler WELL ID:
 DRILLER: Bobbie Fowler
 NORTHING: 3,839,044.3 EASTING: 285,838.5 CREW: Scott Price
 SYSTEM: UTM NAD83 (m) BORING LOCATION: Near Dogwood & West T.O.C. ELEV.: 23.55
 DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: 18.47 BORING DEPTH: 50.0
 START DATE: 04/07/03 FINISH DATE: 04/18/03 24 HOUR DTW: 7.52 WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in								
									0.0 LAND SURFACE	24.0	0.0
0.0	5	4	6	7	<1		SM		0.5 Dark brown TOPSOIL. Grass. Roots.	23.5	-0.4
2.0									2.0 Dark brown, grading downward into gray to tan, silty, f. to vf. SAND. Moist. No HCO.	22.0	
3.0									3.0	21.0	
4.0	4	9	9	10	<1	HPFF-76 (3-5')	SM		Yellowish orange to tan, silty, f. to vf. SAND. Trace clay. Minor orange mottling. Moist. No HCO.	19.0	
5.0									5.0		
8.0									8.0	16.0	
10.0	1	3	4	4	<1		SC/SM		Yellowish orange to tan, silty to clayey, vf. SAND. Some mottling. Saturated. Very soft. No HCO.	14.0	
13.0									13.0	11.0	
15.0	4	6	9	13	<1		SM		Dark brown to light brown, organic-rich, silty, f. to vf. SAND. Dark brown at top of spoon, gradational downward change to light brown. Saturated. Slight HCO(?) - may be organic odor.	9.0	
18.0									18.0	6.0	
20.0	6	4	3	8	<1		SC		Tan clayey, f. to vf. SAND. Similar to above, but high clay component. Stiff along clay-rich horizons (up to 3" in thickness). No HCO.	4.0	
23.0									23.0	0.9	
25.0	2	2	3	6	<1		SC/SM		Light brownish gray, silty to clayey, f. to vf. SAND. Saturated. No HCO. Soft.	-1.1	
28.0									28.0	-4.1	
	1	1	2	2	2.4		SC/SM		Light brownish gray, silty to clayey, f. to vf. SAND. Saturated. No HCO. Very soft. Slight chlorine odor(?).	-6.1	

2" Sch. 40 PVC

6" Sch. 40 PVC



Portland Cement



Bentonite Pellets



#2 Medium Sand

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 2

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Tom Stetler WELL ID: HPFF-76
DRILLER: Bobbie Fowler
NORTHING: 3,839,044.3 EASTING: 285,838.5 CREW: Scott Price
SYSTEM: UTM NAD83 (m) BORING LOCATION: Near Dogwood & West T.O.C. ELEV.: 23.55
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: 18.47 BORING DEPTH: 50.0
START DATE: 04/07/03 FINISH DATE: 04/18/03 24 HOUR DTW: 7.52 WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
30.0												
33.0									33.0		-9.1	
35.0	WH	WH	WH	WH	9.1		SC		35.0	Dark greenish gray, clayey, f. to vf. SAND. Very soft. Saturated. Slight HCO.	-11.1	
38.0									38.0		-14.1	
40.0	2	3	7	7	5.4		GW		40.0	Light gray, poorly consolidated, limey SAND and LIMESTONE gravels. Quartz SAND and shell fragments, fossil clasts up to .5" in diameter. Saturated. Slight HCO.	-16.1	
43.0									43.0		-19.1	
45.0	13	29	30	27	8.0		SP		45.0	Light gray to greenish gray, f. to vf. SAND. Trace silt. Moderately well sorted. Opaque mineral grains make up ~1% of matrix. Also contains f. carbonate grains. Saturated. Slight HCO.	-21.1	
48.0									48.0		-24.1	
50.0	10	23	23	30	4.0		SP		50.0	S. A. A. Light gray to greenish gray, f. to vf. SAND. Trace vf. opaque mineral grains. Saturated. Slight HCO.	-26.1	
										Boring Terminated at Elevation -26.1 ft WH = Weight of Hammer S.A.A. = Same as above		

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

Portland Cement
 Bentonite Pellets
 #2 Medium Sand

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 # _____ ASSOCIATED WQ PERMIT # N/A
(if applicable) (if applicable)

HPFF-76

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

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

Northing/Easting of well location
3839044.311/285838.503

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

UTM NAD83 (m)
Latitude/longitude source: ☒ GPS ☐ Topo. map
(check box)
DEPTH **DRILLING LOG**
From To Formation Description

Area code - Phone number

4. DATE DRILLED: 4/18/03

5. TOTAL DEPTH: 50

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

7. STATIC WATER LEVEL Below Top of Casing 18.47 FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS -0.4 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 0.4 To 45 ft. 2 in. Sch. 40 PVC
From 0 To 39 ft. 6 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____

14. GROUT: Depth Material Method
From 0 To 38 ft. Portland Cement Tremie
From 38 To 43 ft. Bent. Pellets Surface Pour

15. SCREEN: Depth Diameter Slot Size Material
From 45 To 50 ft. 2 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____

16. SAND/GRAVEL PACK: Depth Size Material
From 43 To 50 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____

17. REMARKS: _____

LOCATION SKETCH

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

SEE
ATTACHED

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

Bobbie Fowler

SIGNATURE OF PERSON CONSTRUCTING THE WELL

5-23-03

DATE

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

Modified from:
GW-1 REV.07/2001

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 1 OF 2

PROJECT NO.: 203-047 STATE: NC COUNTY: Onslow LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP LOGGED BY: Tom Stetler WELL ID: HPFF-77
NORTHING: 3,838,876.3 EASTING: 286,274.6 CREW: Scott Price
SYSTEM: UTM NAD83 (m) BORING LOCATION: Near corner of Hammond and Birch St. T.O.C. ELEV.: 29.44
DRILL MACHINE: Diedrich D-50 METHOD: HSA/MR 0 HOUR DTW: 1.33 BORING DEPTH: 50.0
START DATE: 04/02/03 FINISH DATE: 04/10/03 24 HOUR DTW: 9.32 WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
6in	6in	6in	6in									
									0.0	LAND SURFACE	29.7	0.0
0.0	2	3	4	4	0				0.7	Dark brown, TOPSOIL and f. SAND, roots.	29.0	-0.3
2.0							SM		2.0	Brownish gray, silty, f. SAND. In gradational contact with above. Mod. well sorted. Moist. No HCO.	27.7	
3.0									3.0		26.7	
5.0	3	5	5	4	4.1	HPFF-77 (3-5')	SM		5.0	Brownish gray, silty, f. to vf. SAND. Color changes with depth to orange-tan. Moist. No HCO.	24.7	
8.0									8.0		21.7	
10.0	7	11	13	17	7.6		SM		10.0	Tan to orange-tan, silty, f. to vf. SAND. Similar to above. Moist. No HCO.	19.7	
13.0									13.0		16.7	
15.0	5	8	11	11	1.2		SC/SM		15.0	Light gray to tan, silty to clayey, vf. SAND. Similar to above, but higher clay content. Saturated. No HCO.	14.7	
18.0									18.0		11.7	
20.0	6	7	8	7	3.6		SM		20.0	Light gray to orange-tan, f. to vf. SAND. Minor silt component. Minor orange-tan layering (up to 2" in thickness). Saturated. No HCO.	9.7	
23.0									23.0		6.7	
25.0	2	5	5	6	0		SP		25.0	Light gray, f. to vf. SAND. Well sorted. Minor vf. opaque mineral grains. Massive (no bedding or banding). Saturated. No HCO.	4.7	
28.0									28.0		1.7	
	3	3	4	3	0		CH		30.0	Light gray to orange-tan, silty to v. well sorted, CLAY. High plasticity (fat CLAY). Soft. No HCO.	-0.3	30.0

2" Sch. 40 PVC

6" Sch. 40 PVC

 Portland Cement
  Bentonite Pellets
  #2 Medium Sand

CATLIN BORING LOG 203-047-HPFF CAP GEL CATLIN.GDT 06/13/03

WELL LOG

CATLIN
ENGINEERS and SCIENTISTS

Wilmington, North Carolina

SHEET 2 OF 2

PROJECT NO.: 203-047	STATE: NC	COUNTY: Onslow	LOCATION: MCB, CAMP LEJEUNE
PROJECT NAME: HPFF REVISED CAP		LOGGED BY: Tom Stetler	WELL ID:
		DRILLER: Bobbie Fowler	HPFF-77
NORTHING: 3,838,876.3	EASTING: 286,274.6	CREW: Scott Price	
SYSTEM: UTM NAD83 (m)	BORING LOCATION: Near corner of Hammond and Birch St.		T.O.C. ELEV.: 29.44
DRILL MACHINE: Diedrich D-50	METHOD: HSA/MR	0 HOUR DTW: 1.33	BORING DEPTH: 50.0
START DATE: 04/02/03	FINISH DATE: 04/10/03	24 HOUR DTW: 9.32	WELL DEPTH: 50.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	U S C S	L O G	DEPTH	SOIL AND ROCK DESCRIPTION	ELEVATION	WELL DETAIL
	6in	6in	6in	6in								
30.0												
33.0	2	10	7	6	0		CH		33.0 33.5	S. A. A. Light gray to tan, fat CLAY. Sharp contact with above. Light gray to tan, f. to vf. Silty to clayey SAND. Saturated. No HCO.	-3.3 -3.8	
35.0							SC		35.0		-5.3	
38.0	2	2	4	9	0		SM		38.0	Light gray to tan, silty, f. to vf. SAND. Minor interlayered clay-rich horizons (up to 3" in thickness). Saturated. No HCO. Abrupt change in color below 39.5 to light orange-brown. Also change in hardness (see blow counts).	-8.3	
40.0									40.0		-10.3	
43.0	3	6	8	10	0		SM		43.0	Light gray to tan, silty med. to f. SAND. Minor coarse sand and shell fragments. Saturated. No HCO.	-13.3	
45.0									45.0		-15.3	45.0
48.0	3	6	9	13	0		SM		48.0	S. A. A. Light gray, silty, m. to f. SAND. Moderately well sorted. Saturated. No HCO.	-18.3	2" Slot .010 Sch. 40 PVC
50.0									50.0	Boring Terminated at Elevation -20.3 ft WH = Weight of Hammer S.A.A. = Same as above	-20.3	50.0

CATLIN BORING LOG 203-047-HPFF CAP.GPJ CATLIN.GDT 06/13/03

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 # _____ ASSOCIATED WQ PERMIT # N/A
(if applicable) (if applicable)

HPFF-77

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

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

Northing/Easting of well location

3838876.309/286274.613

UTM NAD83 (m)

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 NC 28542-0004
City or Town State Zip Code

DEPTH
From To

DRILLING LOG
Formation Description

Area code - Phone number

4. DATE DRILLED: 4/10/03

5. TOTAL DEPTH: 50

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

7. STATIC WATER LEVEL Below Top of Casing 9.32 FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS -0.3 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 0.3 To 45 ft. 2 in. Sch. 40 PVC
From 0 To 31 ft. 6 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____

14. GROUT: Depth Material Method
From 0 To 30 ft. Portland Cement Tremie
From 30 To 43 ft. Bent. Pellets Surface Pour

15. SCREEN: Depth Diameter Slot Size Material
From 45 To 50 ft. 2 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____

16. SAND/GRAVEL PACK: Depth Size Material
From 43 To 50 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____

17. REMARKS: _____

LOCATION SKETCH

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

SEE
ATTACHED

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

Bobbie Fowler
SIGNATURE OF PERSON CONSTRUCTING THE WELL

5-23-03
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

APPENDIX D
RECOVERY WELL PERMIT

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES
DIVISION OF WATER QUALITY - GROUNDWATER SECTION
APPLICATION FOR PERMIT TO CONSTRUCT A RECOVERY WELL SYSTEM

(Please Type or Print Clearly)

Date: MAY 29, 19 2003 County ONSLOW

In accordance with the provisions of Article 7, Chapter 87, General Statutes of North Carolina and regulations pursuant thereto, application is hereby made for a permit to construct recovery wells.

1. Name of Applicant: LANTDIV NAVFACENGCOM COMMANDING GENERAL (Telephone: _____)
Applicant's Mailing Address: AC/S EMD/MARINE CORPS BASE/PSC BOX 20004/CAMP LEJEUNE, NC 28542-004
2. Name of Property Owner (if different from Well Owner): _____
Owner's Mailing Address: _____
3. Contact Person: NIKKI HALL (I&E/EMD/EOB) (Telephone: (910)-451-9610)
4. Location of Property: HADNOT POINT FUEL FARM, MCB, CAMP LEJEUNE
5. Reason for Recovery Well(s): REMEDATION
(ex: groundwater contamination, remediation, etc.)
6. Type of facility or site for which a recovery well is needed: FORMER BULK STORAGE FACILITY
(ex: existing nondischarge facility, waste disposal site, landfill, underground storage tank, etc.)
7. Type of contamination being recovered (if applicable): PETROLEUM IMPACTED GROUNDWATER
8. Are any existing monitor wells associated with the proposed recovery well(s)? YES If yes, how many? ±140
Monitoring Well Construction Permit No. _____
9. Distance to a known waste or pollution source: ±100 feet
10. Are any water supply wells located less than 500 feet from the proposed recovery wells? NO
If yes, give distance: NA feet
11. Well Contractor: BOBBIE D. FOWLER
12. Well Contractor Certification #: 2869
13. Well Contractor's Address: CATLIN ENGINEERS AND SCIENTISTS

RECOVERY WELL INFORMATION

1. Total Number of Wells to be constructed: 1
No. completed in bedrock? 0
No. completed in unconsolidated sediments? 1
Completed in unconsolidated material? 0
2. Estimated depth of well(s): 80 feet
- 2A. Estimated screen interval (Feet below land surface) 55 to 75
3. Will gravel or sand packs be used?: YES ; If yes, for what interval: 52 ft. to 80 ft.

FOR OFFICE USE ONLY

____ PERMITTED ACTIVITY
____ U.S.T. LEAK DETECTION
____ GROUNDWATER QUALITY STANDARDS
____ VIOLATIONS SUSPECTED FROM UNPERMITTED
ACTIVITIES
____ NOTICE OF NON-COMPLIANCE AT
UNPERMITTED FACILITIES
PERMIT NO. _____ ISSUED _____ 19
INCIDENT # _____

4. Type of casing used: PVC
(ex: PVC, stainless steel, galvanized steel, etc.)
5. Diameter of casing: 6 inches
- Thickness of casing: 0.28 inches
7. How will the well(s) be secured? EXPANDING WELL SEAL
8. Estimated pumping rate: 30 GPM
9. Estimated beginning construction date: MARCH 27, 2003
10. Estimated completion date: MARCH 31, 2003

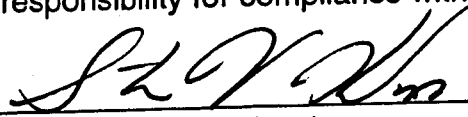
ADDITIONAL INFORMATION [REQUIRED INFORMATION]
(APPLICATION CANNOT BE PROCESSED WITHOUT THIS INFORMATION)

1. ATTACH A SITE MAP SHOWING THE LOCATIONS OF THE FOLLOWING:

- 1 - PROPOSED RECOVERY WELL(S)
- 2 - ALL EXISTING MONITORING AND RECOVERY WELLS OR TEST BORINGS WITH THE PROPERTY BOUNDARY
- 3 - ALL WATER SUPPLY WELLS WITHIN 500 FEET OF THE WASTE SOURCES
- 4 - AT LEAST TWO REFERENCE POINTS (NUMBERED ROADS, INTERSECTIONS, STREAMS, ETC.)

2. PROVIDE A WELL CONSTRUCTION DIAGRAM OF EACH WELL SHOWING DIAMETER, ESTIMATED DEPTH, SCREEN INTERVALS, SAND/GRAVEL PACKS, TYPE OF CASING MATERIAL, CASING WALL THICKNESS, WELL HEAD COMPLETION DETAILS, ETC.)

The Applicant hereby agrees the proposed well(s) will be constructed in accordance with approved specifications and conditions of the Well Construction Permit as regulated under the Well Construction Standards (Title 15A North Carolina Administrative Code, Subchapter 2C) and accepts full responsibility for compliance with these rules.



Signature of Applicant or Agent

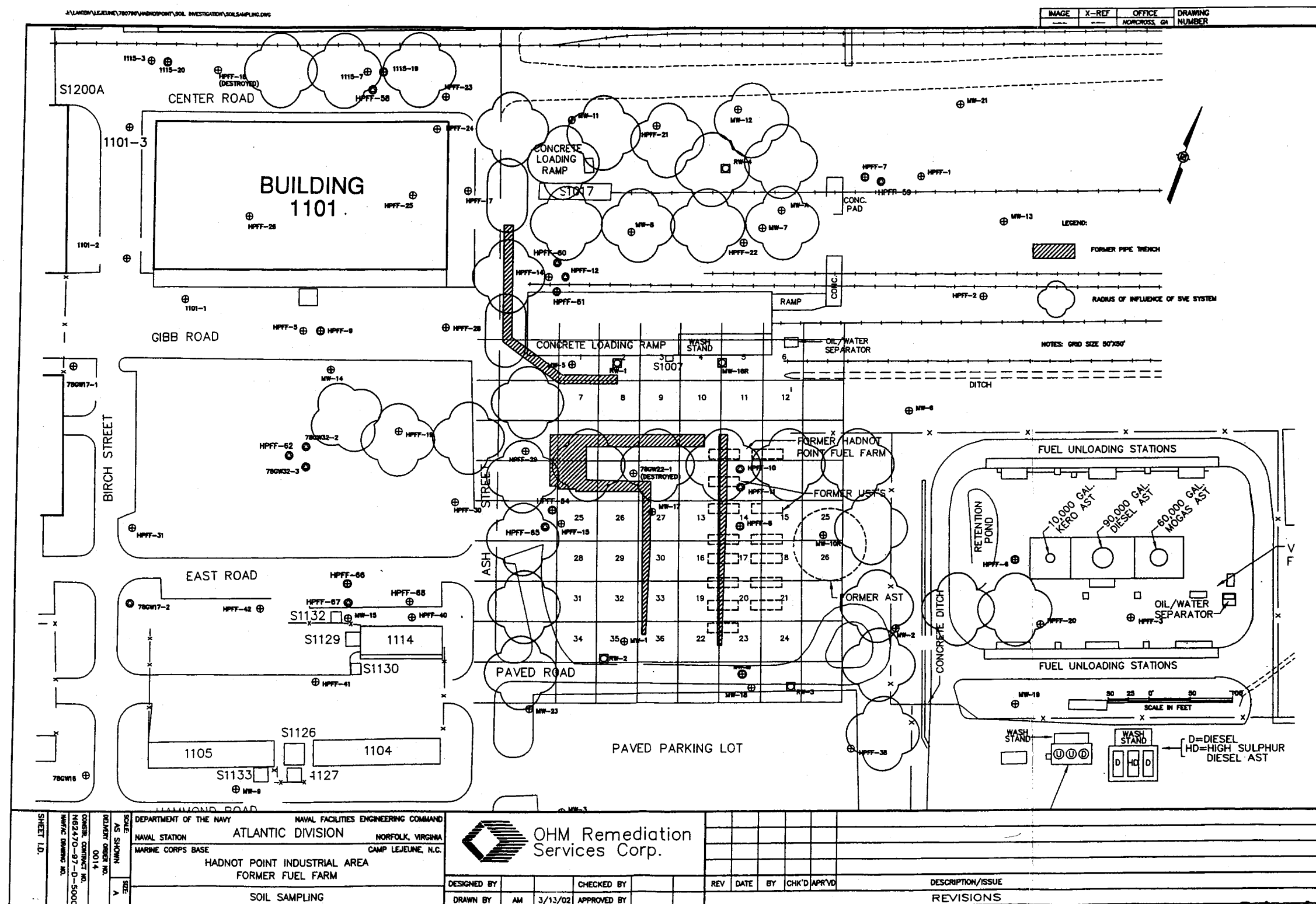
Project Geologist - CATLIN Engineers

Title (if applicable)

If the property is owned by someone other than the applicant, the property owner hereby consents to allow the applicant to construct recovery wells as outlined in this application and that it shall be the responsibility of the applicant to ensure that these recovery wells conform to the Well Construction Standards (Title 15A North Carolina Administrative Code, Subchapter 2C).

Signature of Property Owner (if different from applicant)

APPENDIX E
HISTORICAL SOIL DATA



Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
					watertable.	
8	0-2'	Dark Brown Sandy Soil	0		9'	HPFF-15
8	2'-4'	Brown Silty Sand	21		9'	HPFF-15
8	4'-6'	Brown Silty Sand	1348		9'	HPFF-15
8	6'-8	Gray Silty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	9'	HPFF-15
8	8'-10	Gray Silty Sand	>50,000		9'	HPFF-15
9	0-2'	Dark Brown Topsoil	0		9'	HPFF-15
9	2'-4'	Brown Silty Sand	29		9'	HPFF-15
9	4'-6'	Brown Silty Sand	375		9'	HPFF-15
9	6'-8	Gray Silty Sand	>50,000	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	9'	HPFF-15
9	8'-10	Gray Silty Sand	>50,000		9'	HPFF-15
10	0-2'	Black Sandy Soil	70		15.24'	MW-10
10	2'-4'	Brown Silty Sand/Clay	548		15.24'	MW-10R
10	4'-6'	Brown Sand/Clay Mix with some Silt	14		15.24'	MW-10R
10	6'-8	Brown/Gray Silty Sand	198		15.24'	MW-10R
10	8'-10	Brown Silty Sand	>50,000		15.24'	MW-10R
10	10'-12'	Brown/Gray Silty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
11	0-2'	Black Sandy Soil	73		15.24'	MW-10R
11	2'-4'	Brown Sand/Clay Silty	1629		15.24'	MW-10R
11	4'-6'	Brown Silty Sand	>50,000		15.24'	MW-10R
11	6'-8	Brown Silty Sand	>50,000		15.24'	MW-10R
11	8'-10	Gry Silty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
12	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
12	2'-4'	Brown Silty Sand	0		15.24'	MW-10R
12	4'-6'	Light Brown Silty Sand	176		15.24'	MW-10R
12	6'-8	Gry Silty Sand	195		15.24'	MW-10R
12	8'-10	Gry Silty Sand	26594	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
13	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
13	2'-4'	Dark Brown Sandy Soil	194		15.24'	MW-10R
13	4'-6'	Brown Silty Sand	1363		15.24'	MW-10R
13	6'-8	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
13	8'-10	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
13	10'-12'	Gry Silty Sand	>50,000		15.24'	MW-10R
13	12'-14'	Gry Silty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R

Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
14	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
14	2'-4'	Dark Brown Sandy Soil	29		15.24'	MW-10R
14	4'-6'	Brown Silty Sand	297		15.24'	MW-10R
14	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
14	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
14	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
14	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel ppm Gasoline >100	15.24'	MW-10R
15	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
15	2'-4'	Dark Brown Sandy Soil	34		15.24'	MW-10R
15	4'-6'	Brown Silty Sand	1865		15.24'	MW-10R
15	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
15	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
15	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
15	12'-14'	GrySilty Sand	>50,000	<15 ppm Diesel ppm Gasoline <10	15.24'	MW-10R
16	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
16	2'-4'	Dark Brown Sandy Soil	0		15.24'	MW-10R
16	4'-6'	Brown Silty Sand	0		15.24'	MW-10R
16	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	0		15.24'	MW-10R
16	8'-10'	Redish Brown Silty Sand	0		15.24'	MW-10R
16	10'-12'	GrySilty Sand	37963	>150 ppm Diesel ppm Gasoline >100	15.24'	MW-10R
16	12'-14'	GrySilty Sand	24860		15.24'	MW-10R
17	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
17	2'-4'	Dark Brown Sandy Soil	0		15.24'	MW-10R
17	4'-6'	Brown Silty Sand	12852		15.24'	MW-10R
17	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
17	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
17	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
17	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel ppm Gasoline >100	15.24'	MW-10R
18	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
18	2'-4'	Dark Brown Sandy Soil	357		15.24'	MW-10R
18	4'-6'	Brown Silty Sand	35620		15.24'	MW-10R
18	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
18	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
18	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
18	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel ppm Gasoline >100	15.24'	MW-10R
19	0-2'	Dark Brown Topsoil	3		15.24'	MW-10R
19	2'-4'	Dark Brown Sandy Soil	320		15.24'	MW-10R

Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
19	4'-6'	Brown Silty Sand	480		15.24'	MW-10R
19	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
19	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
19	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
19	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
20	0-2'	Dark Brown Topsoil	16		15.24'	MW-10R
20	2'-4'	Dark Brown Sandy Soil	626		15.24'	MW-10R
20	4'-6'	Brown Silty Sand	17429		15.24'	MW-10R
20	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
20	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
20	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
20	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
21	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
21	2'-4'	Dark Brown Sandy Soil	5		15.24'	MW-10R
21	4'-6'	Brown Silty Sand	18		15.24'	MW-10R
21	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	452		15.24'	MW-10R
21	8'-10'	Redish Brown Silty Sand	1962		15.24'	MW-10R
21	10'-12'	GrySilty Sand	32621		15.24'	MW-10R
21	12'-14'	GrySilty Sand	36497	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
22	0-2'	Dark Brown Topsoil	3		15.24'	MW-10R
22	2'-4'	Dark Brown Sandy Soil	446		15.24'	MW-10R
22	4'-6'	Brown Silty Sand	8972	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
23	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
23	2'-4'	Dark Brown Sandy Soil	56		15.24'	MW-10R
23	4'-6'	Brown Silty Sand	783		15.24'	MW-10R
23	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
23	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
23	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
23	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R

Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
24	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
24	2'-4'	Dark Brown Sandy Soil	0		15.24'	MW-10R
24	4'-6'	Brown Silty Sand	0		15.24'	MW-10R
24	6'-8	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	0		15.24'	MW-10R
24	8'-10	Redish Brown Silty Sand	0		15.24'	MW-10R
24	10'-12'	GrySilty Sand	264	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	15.24'	MW-10R
24	12'-14'	GrySilty Sand	64		15.24'	MW-10R
25	0-2'	Dark Brown Topsoil	9		9'	HPFF-15
25	2'-4'	Dark Brown Sandy Soil	32		9'	HPFF-15
25	4'-6'	Brown Silty Sand	1158		9'	HPFF-15
25	6'-8	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000	>150 ppm Diesel >100 ppm Gasoline	9'	HPFF-15
26	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
26	2'-4'	Dark Brown Sandy Soil	0		15.24'	MW-10R
26	4'-6'	Brown Silty Sand	0		15.24'	MW-10R
26	6'-8	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	53		15.24'	MW-10R
26	8'-10	Redish Brown Silty Sand	4831		15.24'	MW-10R
26	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
26	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
27	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
27	2'-4'	Dark Brown Sandy Soil	2		15.24'	MW-10R
27	4'-6'	Brown Silty Sand	247		15.24'	MW-10R
27	6'-8	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	66		15.24'	MW-10R
27	8'-10	Redish Brown Silty Sand	1146		15.24'	MW-10R
27	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
27	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
28	0-2'	Dark Brown Topsoil	0		9'	HPFF-15
28	2'-4'	Dark Brown Sandy Soil	253		9'	HPFF-15
28	4'-6'	Brown Silty Sand	87		9'	HPFF-15
28	6'-8	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	36921	>150 ppm Diesel >100 ppm Gasoline	9'	HPFF-15

Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
29	0-2'	Dark Brown Topsoil	2.6		15.24'	MW-10R
29	2'-4'	Dark Brown Sandy Soil	162		15.24'	MW-10R
29	4'-6'	Brown Silty Sand	157		15.24'	MW-10R
29	6'-8'	Reddish Brown /Gry silty Sand Vines of Reddish Brown Sand)	220		15.24'	MW-10R
29	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
29	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
29	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
30	0-2'	Dark Brown Topsoil			15.24'	MW-10R
30	2'-4'	Dark Brown Sandy Soil			15.24'	MW-10R
30	4'-6'	Brown Silty Sand			15.24'	MW-10R
30	6'-8'	Reddish Brown /Gry silty Sand Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
30	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
30	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
30	12'-14'	GrySilty Sand	>50,000	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	15.24'	MW-10R
31	0-2'	Dark Brown Topsoil	1		9'	HPFF-15
31	2'-4'	Dark Brown Sandy Soil	287		9'	HPFF-15
31	4'-6'	Brown Silty Sand	33649		9'	HPFF-15
31	6'-8'	Reddish Brown /Gry silty Sand Vines of Reddish Brown Sand)	>50,000	>150 ppm Diesel >100 ppm Gasoline	9'	HPFF-15
32	0-2'	Dark Brown Topsoil	2.4		15.24'	MW-10R
32	2'-4'	Dark Brown Sandy Soil	25		15.24'	MW-10R
32	4'-6'	Brown Silty Sand	65		15.24'	MW-10R
32	6'-8'	Reddish Brown /Gry silty Sand Vines of Reddish Brown Sand)	238		15.24'	MW-10R
32	8'-10'	Redish Brown Silty Sand	90		15.24'	MW-10R
32	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
32	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
33	0-2'	Dark Brown Topsoil			15.24'	MW-10R
33	2'-4'	Dark Brown Sandy Soil			15.24'	MW-10R
33	4'-6'	Brown Silty Sand			15.24'	MW-10R
33	6'-8'	Reddish Brown /Gry silty Sand Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
33	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
33	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
33	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R

Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
34	0-2'	Dark Brown Topsoil	0		9'	HPFF-15
34	2'-4'	Dark Brown Sandy Soil	67		9'	HPFF-15
34	4'-6'	Brown Silty Sand	731		9'	HPFF-15
34	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000	>150 ppm Diesel >100 ppm Gasoline	9'	HPFF-15
35	0-2'	Dark Brown Topsoil	11		15.24'	MW-10R
35	2'-4'	Dark Brown Sandy Soil	132		15.24'	MW-10R
35	4'-6'	Brown Silty Sand	1142		15.24'	MW-10R
35	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	>50,000		15.24'	MW-10R
35	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
35	10'-12'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
35	12'-14'	GrySilty Sand	>50,000		15.24'	MW-10R
36	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
36	2'-4'	Dark Brown Sandy Soil	159		15.24'	MW-10R
36	4'-6'	Brown Silty Sand	42		15.24'	MW-10R
36	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	211		15.24'	MW-10R
36	8'-10'	Redish Brown Silty Sand	>50,000		15.24'	MW-10R
36	10'-12'	GrySilty Sand	>50,000		15.24'	MW-10R
36	12'-14'	GrySilty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
37	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
37	2'-4'	Dark Brown Sandy Soil	0		15.24'	MW-10R
37	4'-6'	Brown Silty Sand	0		15.24'	MW-10R
37	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	52		15.24'	MW-10R
37	8'-10'	Redish Brown Silty Sand	7		15.24'	MW-10R
37	10'-12'	GrySilty Sand	28389		15.24'	MW-10R
37	12'-14'	GrySilty Sand	47863	>150 ppm Diesel >100 ppm Gasoline	15.24'	MW-10R
38	0-2'	Dark Brown Topsoil	0		15.24'	MW-10R
38	2'-4'	Dark Brown Sandy Soil	0		15.24'	MW-10R
38	4'-6'	Brown Silty Sand	0		15.24'	MW-10R
38	6'-8'	Reddish Brown /Gry silty Sand (Vines of Reddish Brown Sand)	110		15.24'	MW-10R
38	8'-10'	Redish Brown Silty Sand	1267		15.24'	MW-10R
38	10'-12'	GrySilty Sand	13486		15.24'	MW-10R
38	12'-14'	GrySilty Sand	>50,000	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	15.24'	MW-10R

All Sand Was Very Fine

Grid #	Sample Depth	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	Ground Water Depth	MW used
1	0-2'	Brown Sandy Topsoil with Rocks	0		7.3'	MW-5
1	2'-4'	Brown Sandy Soil with Rocks	0		7.3'	MW-5
1	4'-6'	Gry Sandy Silty Clay	36		7.3'	MW-5
1	6'-8'	7' Gry Silty Clay/Sand	286	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	7.3'	MW-5
2	0-2'	Brown Sandy Topsoil with Rocks	0		7.3'	MW-5
2	2'-4'	Brown Sandy Soil with Rocks	0		7.3'	MW-5
2	4'-6'	Gry Sandy Silty Clay	241		7.3'	MW-5
2	6'-7'	7' Gry Silty Clay/Sand	15639	>150 ppm Diesel >100 ppm Gasoline	7.3'	MW-5
3	0-2'	Brown Sandy Topsoil	0		7.3'	MW-5
3	2'-4'	Brown Sandy Soil with Rocks	0		7.3'	MW-5
3	4'-6'	Gry Silty Sand/Clay	27		7.3'	MW-5
3	6'-8'	7' Gry Silty Sand	936	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	7.3'	MW-5
4	0-2'	Brown Sandy Soil	0		7.3'	MW-5
4	2'-4'	Brown Clay @ 3' Silty Sand	0		7.3'	MW-5
4	4'-6'	Gry Silty Sand/Clay	>50,000		7.3'	MW-5
4	6'-8'	7' Brown Silty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	7.3'	MW-5
5	0-2'	Brown Sandy Soil	0		7.3'	MW-5
5	2'-4'	Brown Silty Sand	>50,000		7.3'	MW-5
5	4'-6'	Gry Silty Sand/Clay	>50,000		7.3'	MW-5
5	6'-8'	7' Brown Silty Sand	>50,000	>150 ppm Diesel >100 ppm Gasoline	7.3'	MW-5
6	0-2'	Rift Raft From RR	0		Augered to the water level, then took the sample that was collected above the watertable.	
6	2'-4'	Brn Silty Sand	0			
6	4'-6'	Brown Silty Sand	208			
6	6'-8'	Gry Silty Sand	1179			
6	8'-10'	Gry Silty Sand	31041	>150 ppm Diesel >100 ppm Gasoline		
7	0-2'	Brown Mud Saturated, Low area surface water Collects	0		Augered to the water level, then took the sample that was collected above the	
7	2'-4'	Brown Wet Sand and Clay	0			
7	4'-6'	Brown Wet Sand and Clay	289			
7	6'-8'	Dark Gry Wet Sand/Clay odor	>50,000	>150 ppm Diesel >100 ppm Gasoline		

Grid #	Sample Depth	Corresponding Sample Number	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	MADEP VPH	ug/kg	MADEP EPH	ug/kg	DRO mg/kg	GRO mg/kg
4	4' - 6'	F13857-16	Gray Silty Sand	> 50,000	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	9590000 9520000 5450000 8460000 4070000	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	1580000 3610000 1360000 278000	11200	18000
5	4' - 6'	F13857-17	Gray Silty Sand	> 50,000	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	6390000 8210000 3740000 5820000 1120000	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	481000 1200000 392000 ND	3810	15600
5DUP	4' - 6'	F13857-18	Gray Silty Sand	> 50,000	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	2080000 2770000 1880000 1870000 547000 J	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	307000 635000 243000 ND	3240	12800
9	4' - 6'	F13857-15	Brown Silty Sand	32	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	33.8	ND
12	4' - 6'	F13857-14	Light Brown Silty Sand	55	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND 1870 J 1190 J ND 364 J	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND
14	4' - 6'	F13857-10	Brown Silty Sand	10	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND 9720 7890 ND 1830 J	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	14.2	ND
16	6' - 8'	F13857-8	Brown Silty Sand	37	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND
18	4' - 6'	F13857-12	Dark Brown Silty Sand	41	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	4920 5090 2380 2490 J ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	14.5	19.4
20	4' - 6'	F13857-11	Dark Brown Silty Sand	2004	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	223000 977000 838000 223000 139000	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	138000 620000 135000 ND	1010	984

Grid #	Sample Depth	Corresponding Sample Number	Description of Soil	FID Reading (ppm)	On-Site TPH Kit Results	MADEP VPH	ug/kg	MADEP EPH	ug/kg	DRO mg/kg	GRO mg/kg
22	4' - 6'	F13857-9	Brown Silty Sand	785	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	4560 5930 3040 4040 1950 J	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	10.1	4.27 J
24	6' - 8'	F13857-13	Light Brown Silty Sand	150	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND
25	4' - 6'	F13857-1	Dark Brown Silty Sand	95	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	2610 J 9720 4870 2360 J 4450	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND 74200 ND ND	205	7.98
26	8' - 10'	F13857-4	Brown With Streaks of Reddish Brown Silty Sand	27	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND
28	6' - 8'	F13857-2	Brown With Streaks of Reddish Brown Silty Sand	2196	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	242000 497000 355000 233000 90600	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	39800 71000 34000 ND	136	825
30	6' - 8'	F13857-6	Brown With Streaks of Reddish Brown Silty Sand	110	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND
33	4' - 6'	F13857-7	Brown Silty Sand	2247	> 150 ppm Diesel > 100 ppm Gas	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	23400 44400 24800 21900 19800	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	25800 39900 23100 ND	67.4	205
34	4' - 6'	F13857-3	Dark Brown Sandy Clay with Silt	117	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND
35	4' - 6'	F13857-5	Brown Silty Sand	43	>15 - <150 ppm Diesel >10 - <100 ppm Gasoline	C5- C8 Aliphatics (Unadj.) C9- C12 Aliphatics (Unadj.) C9- C10 Aromatics (Unadj.) C5- C8 Aliphatics C9- C12 Aliphatics	ND ND ND ND ND	C11-C22 Aromatics (Unadj.) C9-C18 Aliphatics C11-C22 Aromatics C19-C36 Aliphatics	ND ND ND ND	ND	ND

C* (Data Qualifiers):

J Numerical value is an estimate between laboratory reporting limit and laboratory method detection limit

APPENDIX F

LABORATORY REPORTS AND CHAIN-OF-CUSTODY

FILE COPY

PARADIGM ANALYTICAL LABORATORIES, INC.

5500 Business Drive
Wilmington, North Carolina 28405
(910) 350-1903
Fax (910) 350-1557

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

May 29, 2003

Report Number: G128-1127

Client Project ID: HPFF Pumping Well (Hadnot Point)

Dear Mr. Mason,

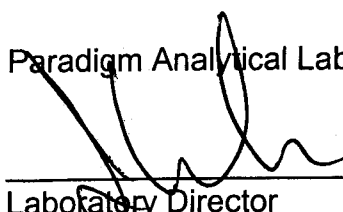
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained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

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

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

Sincerely,

Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-75

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 72712

Lab Project ID: G128-1127

Matrix: Water

Date Collected: 5/14/2003

Date Received: 5/14/2003

Date Analyzed: 5/20/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.2	82
Nitrobenzene-d5	10	8.8	88
4-Terphenyl-d14	10	9.2	92

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: MRC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles by GC 601

Client Sample ID: HPFF-75

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 72712

Lab Project ID: G128-1127

Analyzed By: DCS

Date Collected: 5/14/03

Date Received: 5/14/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	1.0	1	5/22/03
Bromoform	BQL	2.0	1	5/22/03
Bromomethane	BQL	1.0	1	5/22/03
Carbon tetrachloride	BQL	1.0	1	5/22/03
Chlorobenzene	BQL	1.0	1	5/22/03
Chloroethane	BQL	1.0	1	5/22/03
Chloroform	BQL	1.0	1	5/22/03
Chloromethane	BQL	1.0	1	5/22/03
Dibromochloromethane	BQL	1.0	1	5/22/03
1,2-Dibromoethane (EDB)	BQL	1.0	1	5/22/03
1,2-Dichlorobenzene	BQL	1.0	1	5/22/03
1,3-Dichlorobenzene	BQL	1.0	1	5/22/03
1,4-Dichlorobenzene	BQL	1.0	1	5/22/03
1,1-Dichloroethane	BQL	1.0	1	5/22/03
1,2-Dichloroethane	27	1.0	1	5/22/03
1,1-Dichloroethene	BQL	1.0	1	5/22/03
cis-1,2-Dichloroethene	BQL	1.0	1	5/22/03
trans-1,2-Dichloroethene	BQL	1.0	1	5/22/03
1,2-Dichloropropane	BQL	1.0	1	5/22/03
cis-1,3-Dichloropropene	BQL	1.0	1	5/22/03
trans-1,3-Dichloropropene	BQL	1.0	1	5/22/03
Methylene Chloride	BQL	5.0	1	5/22/03
1,1,2,2-Tetrachloroethane	BQL	1.0	1	5/22/03
Tetrachloroethene	BQL	1.0	1	5/22/03
1,1,1-Trichloroethane	BQL	1.0	1	5/22/03
1,1,2-Trichloroethane	BQL	1.0	1	5/22/03
Trichloroethene	BQL	1.0	1	5/22/03
Trichlorofluoromethane	BQL	1.0	1	5/22/03
Vinyl Chloride	BQL	1.0	1	5/22/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	34.1	85.3

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles by GC 602

Client Sample ID: HPFF-75

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 72712

Lab Project ID: G128-1127

Analyzed By: JTF

Date Collected: 5/14/03

Date Received: 5/14/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	1300	50	50	5/20/03
Diisopropyl ether (DIPE)	650	50	50	5/20/03
Ethylbenzene	BQL	50	50	5/20/03
Methyl-tert butyl ether (MTBE)	BQL	100	50	5/20/03
Toluene	BQL	50	50	5/20/03
m/p-Xylene	BQL	100	50	5/20/03
o-Xylene	BQL	100	50	5/20/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.2	97.9

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

ORIGINAL

FILE COPY

PARADIGM ANALYTICAL LABORATORIES, INC.

5500 Business Drive
Wilmington, North Carolina 28405
(910) 350-1903
Fax (910) 350-1557

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

May 22, 2003

Report Number: G128-1120

Client Project ID: HPFF (Hadnot Point) Pumping Well

Dear Mr. Mason,

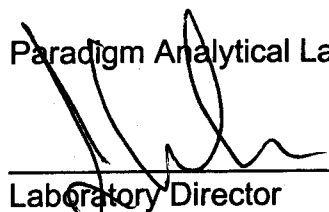
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained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

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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 Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-75

Client Project ID: HPFF (Hadnot Point) Pumping Well

Lab Sample ID: 72318

Lab Project ID: G128-1120

Matrix: Water

Date Collected: 5/7/2003

Date Received: 5/8/2003

Date Analyzed: 5/14/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	9.1	91
Nitrobenzene-d5	10	9.7	97
4-Terphenyl-d14	10	10.1	101

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: MLC

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: HPFF-75

Analyzed By: JTF

Client Project ID: HPFF (Hadnot Point) Pumping Well

Date Collected: 5/7/03

Lab Sample ID: 72318

Date Received: 5/8/03

Lab Project ID: G128-1120

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	1.0	1	5/21/03
Bromoform	BQL	2.0	1	5/21/03
Bromomethane	BQL	1.0	1	5/21/03
Carbon tetrachloride	BQL	1.0	1	5/21/03
Chlorobenzene	BQL	1.0	1	5/21/03
Chloroethane	BQL	1.0	1	5/21/03
Chloroform	BQL	1.0	1	5/21/03
Chloromethane	BQL	1.0	1	5/21/03
Dibromochloromethane	BQL	1.0	1	5/21/03
1,2-Dibromoethane (EDB)	BQL	1.0	1	5/21/03
1,2-Dichlorobenzene	BQL	1.0	1	5/21/03
1,3-Dichlorobenzene	BQL	1.0	1	5/21/03
1,4-Dichlorobenzene	BQL	1.0	1	5/21/03
1,1-Dichloroethane	BQL	1.0	1	5/21/03
1,2-Dichloroethane	20	1.0	1	5/21/03
1,1-Dichloroethene	BQL	1.0	1	5/21/03
cis-1,2-Dichloroethene	BQL	1.0	1	5/21/03
trans-1,2-Dichloroethene	BQL	1.0	1	5/21/03
1,2-Dichloropropane	BQL	1.0	1	5/21/03
cis-1,3-Dichloropropene	BQL	1.0	1	5/21/03
trans-1,3-Dichloropropene	BQL	1.0	1	5/21/03
Methylene Chloride	BQL	5.0	1	5/21/03
1,1,2,2-Tetrachloroethane	BQL	1.0	1	5/21/03
Tetrachloroethene	BQL	1.0	1	5/21/03
1,1,1-Trichloroethane	BQL	1.0	1	5/21/03
1,1,2-Trichloroethane	BQL	1.0	1	5/21/03
Trichloroethene	BQL	1.0	1	5/21/03
Trichlorofluoromethane	BQL	1.0	1	5/21/03
Vinyl Chloride	BQL	1.0	1	5/21/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	40.8	102

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: HPFF-75

Client Project ID: HPFF (Hadnot Point) Pumping Well

Lab Sample ID: 72318

Lab Project ID: G128-1120

Analyzed By: JTF

Date Collected: 5/7/03

Date Received: 5/8/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	650	25	25	5/20/03
Diisopropyl ether (DIPE)	BQL	25	25	5/20/03
Ethylbenzene	BQL	25	25	5/20/03
Methyl-tert butyl ether (MTBE)	BQL	50	25	5/20/03
Toluene	BQL	25	25	5/20/03
m/p-Xylene	BQL	50	25	5/20/03
o-Xylene	BQL	50	25	5/20/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.1	97.8

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

Client: Catlin
 Address: 220 Old Dairy Rd
 Address: Washington Nc 28405
 Phone #: 707 101
 Project ID: MPFF Pumping Well
 Contact: Mike E. Mason
 Phone: 910-452-5861
 Fax: 910-452-7563
 Date: 5-8-03
 Turnaround: Standard
 Job Number: 202-126
 P.O. Number: 230328-2
 Report To: Mike E. Mason
 Invoice To: Shirley C. Catlin

Sample ID	Date	Time	Matrix	Preservatives		Analyses				Comments: Please specify any special reporting requirements	
				IC	HCl	610	601/602 + 446 + 1P + MTSE				
HPHF-75	5-7	10:20 am	CW	✓	✓	✓	✓				G128-1120
											Le Jouv EDD format

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PARADIGM ANALYTICAL LABORATORIES, INC.

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

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

April 8, 2003

Report Number: G128-1087

Client Project ID: HPFF Pumping Test

Dear Mr. Mason,

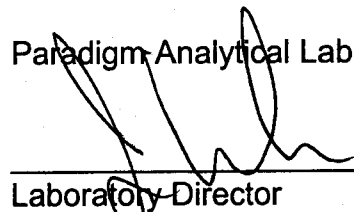
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained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

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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 Total Petroleum

Hydrocarbons

by GC 8015B

Client Sample ID:	HPFF-75 (3-5')	Date Collected:	3/27/03
Client Project ID:	HPFF Pumping Test	Date Received:	3/28/03
Lab Sample ID:	66711	Analyzed By:	BMS
Lab Project ID:	G128-1087	%Solids:	82.9
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Method	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	7.2	5030/8015B	1.0	4/1/03
Diesel Range Organics	8	7.5	3550/8015B	1.0	4/2/03

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

COC#

627 Northchase Parkway SE, Wilmington, NC 28405

Chain-of-Custody Record & Analytical Request

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

FAX: (910)-350-1557

FAX: (910)-350-1557

lient: Catlin

Cettin

Project ID: HPFF Pumping test

Date: 3-28-03

Report To: Mike E. Mason (2)

address: 220 Old Dairy Rd.

Contact: Mike E. Mason

Turnaround: standard

۵۱۱۰

address: Wilmington NC 28405

Phone: 916-452-5861

Job Number: 202-126

note #: DOD 101

Fax: 910-452-7863

P0 Number: 230328-2

[illegible]SEE REVERSE FOR
TERMS AND CONDITIONS

FILE COPY

PARADIGM ANALYTICAL LABORATORIES, INC.

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

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

April 14, 2003

Report Number: G128-1095

Client Project ID: HPFF Pumping Test (Hadnot Point)

Dear Mr. Mason,

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

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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 Total Petroleum

Hydrocarbons

by GC 8015B

Client Sample ID:	HPFF-77 (3-5')	Date Collected:	4/2/03
Client Project ID:	HPFF Pumping Test (Hadnot Point)	Date Received:	4/4/03
Lab Sample ID:	67636	Analyzed By:	BMS
Lab Project ID:	G128-1095	%Solids:	88.0
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Method	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.8	5030/8015B	1.0	4/7/03
Diesel Range Organics	BQL	7.0	3550/8015B	1.0	4/9/03

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

COC#

627 Northchase Parkway SE, Wilmington, NC 28405

Chain-of-Custody Record & Analytical Request

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

Page 1 of _____

(Heel not point)

Client: Catlin

Project ID: HPFF Pumping Test

Date: 4-4-03

Report To: Mike C. Mason (C)

address: 220 Old Dairy Rd

Contact: Mike E. Mason

Turnaround: standard

Catlin

address: Wilmington NC 28405

Phone: 910-452-5861

Job Number: 202-126

note #: DOB 101

Fax: 910-457-7563

PO Number: 2304328-2

Invoice To: Sheila @ Catlin

[illegible]

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

FILE COPY

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

May 8, 2003

Report Number: G128-1109

Client Project ID: HPFF Pumping Well (Hadnot Point)

Dear Mr. Mason,

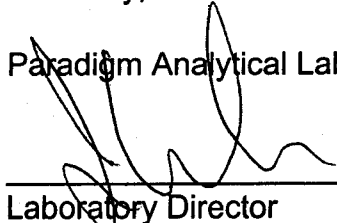
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained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

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Sincerely,

Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-73

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70381

Lab Project ID: G128-1109

Matrix: Water

Date Collected: 4/23/2003

Date Received: 4/24/2003

Date Analyzed: 4/26/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

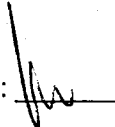
Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.6	86
Nitrobenzene-d5	10	8.8	88
4-Terphenyl-d14	10	9.6	96

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: 

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-73 Dup.

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70382

Lab Project ID: G128-1109

Matrix: Water

Date Collected: 4/23/2003

Date Received: 4/24/2003

Date Analyzed: 4/26/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

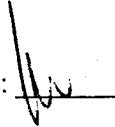
Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.1	81
Nitrobenzene-d5	10	8.3	83
4-Terphenyl-d14	10	9.4	94

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: 

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-74

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70383

Lab Project ID: G128-1109

Matrix: Water

Date Collected: 4/23/2003

Date Received: 4/24/2003

Date Analyzed: 4/26/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

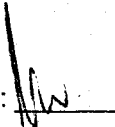
Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.7	87
Nitrobenzene-d5	10	9.2	92
4-Terphenyl-d14	10	10.3	103

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: 

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-76

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70384

Lab Project ID: G128-1109

Matrix: Water

Date Collected: 4/23/2003

Date Received: 4/24/2003

Date Analyzed: 5/1/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

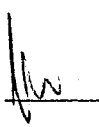
Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.9	89
Nitrobenzene-d5	10	9.4	94
4-Terphenyl-d14	10	11.0	110

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: 

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Polynuclear Aromatic Hydrocarbons

EPA 610 by GCMS 625

Client Sample ID: HPFF-77

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70385

Lab Project ID: G128-1109

Matrix: Water

Date Collected: 4/22/2003

Date Received: 4/24/2003

Date Analyzed: 5/1/2003

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
Chrysene	10	BQL
Dibenzo[a,h]anthracene	10	BQL
Fluoranthene	10	BQL
Fluorene	10	BQL
Indeno(1,2,3-c,d)pyrene	10	BQL
1-Methylnaphthalene	10	BQL
2-Methylnaphthalene	10	BQL
Naphthalene	10	BQL
Phenanthrene	10	BQL
Pyrene	10	BQL

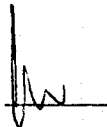
Surrogate Spike Recoveries	Spike Added	Spike Result	Percent Recovered
2-Fluorobiphenyl	10	8.4	84
Nitrobenzene-d5	10	9.1	91
4-Terphenyl-d14	10	12.1	121

Comments:

Results are corrected for %solids and dilution where applicable.

Flags:

BQL = Below Quantitation Limit.

Reviewed By: 

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: HPFF-73

Analyzed By: JTF

Client Project ID: HPFF Pumping Well (Hadnot Point)

Date Collected: 4/23/03

Lab Sample ID: 70381

Date Received: 4/24/03

Lab Project ID: G128-1109

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	1.0	1	4/25/03
Bromoform	BQL	1.0	1	4/25/03
Bromomethane	BQL	1.0	1	4/25/03
Carbon tetrachloride	BQL	1.0	1	4/25/03
Chlorobenzene	BQL	1.0	1	4/25/03
Chloroethane	BQL	1.0	1	4/25/03
Chloroform	BQL	1.0	1	4/25/03
Chloromethane	BQL	1.0	1	4/25/03
Dibromochloromethane	BQL	1.0	1	4/25/03
1,2-Dibromoethane (EDB)	BQL	1.0	1	4/25/03
1,2-Dichlorobenzene	BQL	1.0	1	4/25/03
1,3-Dichlorobenzene	BQL	1.0	1	4/25/03
1,4-Dichlorobenzene	BQL	1.0	1	4/25/03
1,1-Dichloroethane	BQL	1.0	1	4/25/03
1,2-Dichloroethane	BQL	1.0	1	4/25/03
1,1-Dichloroethene	BQL	1.0	1	4/25/03
cis-1,2-Dichloroethene	BQL	1.0	1	4/25/03
trans-1,2-Dichloroethene	BQL	1.0	1	4/25/03
1,2-Dichloropropane	BQL	1.0	1	4/25/03
cis-1,3-Dichloropropene	BQL	1.0	1	4/25/03
trans-1,3-Dichloropropene	BQL	1.0	1	4/25/03
Methylene Chloride	BQL	5.0	1	4/25/03
1,1,2,2-Tetrachloroethane	BQL	2.0	1	4/25/03
Tetrachloroethene	BQL	1.0	1	4/25/03
1,1,1-Trichloroethane	BQL	1.0	1	4/25/03
1,1,2-Trichloroethane	BQL	1.0	1	4/25/03
Trichloroethene	BQL	1.0	1	4/25/03
Trichlorofluoromethane	BQL	1.0	1	4/25/03
Vinyl Chloride	BQL	1.0	1	4/25/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	38.6	96.4

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: HPFF-73 Dup.

Analyzed By: JTF

Client Project ID: HPFF Pumping Well (Hadnot Point)

Date Collected: 4/23/03

Lab Sample ID: 70382

Date Received: 4/24/03

Lab Project ID: G128-1109

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	1.0	1	4/27/03
Bromoform	BQL	1.0	1	4/27/03
Bromomethane	BQL	1.0	1	4/27/03
Carbon tetrachloride	BQL	1.0	1	4/27/03
Chlorobenzene	BQL	1.0	1	4/27/03
Chloroethane	BQL	1.0	1	4/27/03
Chloroform	BQL	1.0	1	4/27/03
Chloromethane	BQL	1.0	1	4/27/03
Dibromochloromethane	BQL	1.0	1	4/27/03
1,2-Dibromoethane (EDB)	BQL	1.0	1	4/27/03
1,2-Dichlorobenzene	BQL	1.0	1	4/27/03
1,3-Dichlorobenzene	BQL	1.0	1	4/27/03
1,4-Dichlorobenzene	BQL	1.0	1	4/27/03
1,1-Dichloroethane	BQL	1.0	1	4/27/03
1,2-Dichloroethane	BQL	1.0	1	4/27/03
1,1-Dichloroethene	BQL	1.0	1	4/27/03
cis-1,2-Dichloroethene	BQL	1.0	1	4/27/03
trans-1,2-Dichloroethene	BQL	1.0	1	4/27/03
1,2-Dichloropropane	BQL	1.0	1	4/27/03
cis-1,3-Dichloropropene	BQL	1.0	1	4/27/03
trans-1,3-Dichloropropene	BQL	1.0	1	4/27/03
Methylene Chloride	BQL	5.0	1	4/27/03
1,1,2,2-Tetrachloroethane	BQL	2.0	1	4/27/03
Tetrachloroethene	BQL	1.0	1	4/27/03
1,1,1-Trichloroethane	BQL	1.0	1	4/27/03
1,1,2-Trichloroethane	BQL	1.0	1	4/27/03
Trichloroethene	BQL	1.0	1	4/27/03
Trichlorofluoromethane	BQL	1.0	1	4/27/03
Vinyl Chloride	BQL	1.0	1	4/27/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	42.4	106

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: HPFF-74

Analyzed By: JTF

Client Project ID: HPFF Pumping Well (Hadnot Point)

Date Collected: 4/23/03

Lab Sample ID: 70383

Date Received: 4/24/03

Lab Project ID: G128-1109

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	1.0	1	4/27/03
Bromoform	BQL	1.0	1	4/27/03
Bromomethane	BQL	1.0	1	4/27/03
Carbon tetrachloride	BQL	1.0	1	4/27/03
Chlorobenzene	BQL	1.0	1	4/27/03
Chloroethane	BQL	1.0	1	4/27/03
Chloroform	1.1	1.0	1	4/27/03
Chloromethane	BQL	1.0	1	4/27/03
Dibromochloromethane	BQL	1.0	1	4/27/03
1,2-Dibromoethane (EDB)	BQL	1.0	1	4/27/03
1,2-Dichlorobenzene	BQL	1.0	1	4/27/03
1,3-Dichlorobenzene	BQL	1.0	1	4/27/03
1,4-Dichlorobenzene	BQL	1.0	1	4/27/03
1,1-Dichloroethane	BQL	1.0	1	4/27/03
1,2-Dichloroethane	BQL	1.0	1	4/27/03
1,1-Dichloroethene	BQL	1.0	1	4/27/03
cis-1,2-Dichloroethene	BQL	1.0	1	4/27/03
trans-1,2-Dichloroethene	BQL	1.0	1	4/27/03
1,2-Dichloropropane	BQL	1.0	1	4/27/03
cis-1,3-Dichloropropene	BQL	1.0	1	4/27/03
trans-1,3-Dichloropropene	BQL	1.0	1	4/27/03
Methylene Chloride	BQL	5.0	1	4/27/03
1,1,2,2-Tetrachloroethane	BQL	2.0	1	4/27/03
Tetrachloroethene	BQL	1.0	1	4/27/03
1,1,1-Trichloroethane	BQL	1.0	1	4/27/03
1,1,2-Trichloroethane	BQL	1.0	1	4/27/03
Trichloroethene	BQL	1.0	1	4/27/03
Trichlorofluoromethane	BQL	1.0	1	4/27/03
Vinyl Chloride	BQL	1.0	1	4/27/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	41.2	103

Comments:

All values corrected for dilution.
BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: HPFF-76

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70384

Lab Project ID: G128-1109

Analyzed By: JTF

Date Collected: 4/23/03

Date Received: 4/24/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	8.0	8	4/28/03
Bromoform	BQL	1.0	8	4/28/03
Bromomethane	BQL	8.0	8	4/28/03
Carbon tetrachloride	BQL	8.0	8	4/28/03
Chlorobenzene	BQL	8.0	8	4/28/03
Chloroethane	BQL	8.0	8	4/28/03
Chloroform	BQL	8.0	8	4/28/03
Chloromethane	BQL	8.0	8	4/28/03
Dibromochloromethane	BQL	8.0	8	4/28/03
1,2-Dibromoethane (EDB)	BQL	8.0	8	4/28/03
1,2-Dichlorobenzene	BQL	8.0	8	4/28/03
1,3-Dichlorobenzene	BQL	8.0	8	4/28/03
1,4-Dichlorobenzene	BQL	8.0	8	4/28/03
1,1-Dichloroethane	BQL	8.0	8	4/28/03
1,2-Dichloroethane	BQL	8.0	8	4/28/03
1,1-Dichloroethene	BQL	8.0	8	4/28/03
cis-1,2-Dichloroethene	BQL	8.0	8	4/28/03
trans-1,2-Dichloroethene	BQL	8.0	8	4/28/03
1,2-Dichloropropane	BQL	8.0	8	4/28/03
cis-1,3-Dichloropropene	BQL	8.0	8	4/28/03
trans-1,3-Dichloropropene	BQL	8.0	8	4/28/03
Methylene Chloride	BQL	40.0	8	4/28/03
1,1,2,2-Tetrachloroethane	BQL	2.0	8	4/28/03
Tetrachloroethene	BQL	8.0	8	4/28/03
1,1,1-Trichloroethane	BQL	8.0	8	4/28/03
1,1,2-Trichloroethane	BQL	8.0	8	4/28/03
Trichloroethene	170	8.0	8	4/28/03
Trichlorofluoromethane	BQL	8.0	8	4/28/03
Vinyl Chloride	BQL	8.0	8	4/28/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	39.9	99.8

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 601

Client Sample ID: HPFF-77

Analyzed By: JTF

Client Project ID: HPFF Pumping Well (Hadnot Point)

Date Collected: 4/22/03

Lab Sample ID: 70385

Date Received: 4/24/03

Lab Project ID: G128-1109

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Bromodichloromethane	BQL	1.0	1	4/27/03
Bromoform	BQL	1.0	1	4/27/03
Bromomethane	BQL	1.0	1	4/27/03
Carbon tetrachloride	BQL	1.0	1	4/27/03
Chlorobenzene	BQL	1.0	1	4/27/03
Chloroethane	BQL	1.0	1	4/27/03
Chloroform	BQL	1.0	1	4/27/03
Chloromethane	BQL	1.0	1	4/27/03
Dibromochloromethane	BQL	1.0	1	4/27/03
1,2-Dibromoethane (EDB)	BQL	1.0	1	4/27/03
1,2-Dichlorobenzene	BQL	1.0	1	4/27/03
1,3-Dichlorobenzene	BQL	1.0	1	4/27/03
1,4-Dichlorobenzene	BQL	1.0	1	4/27/03
1,1-Dichloroethane	BQL	1.0	1	4/27/03
1,2-Dichloroethane	BQL	1.0	1	4/27/03
1,1-Dichloroethene	BQL	1.0	1	4/27/03
cis-1,2-Dichloroethene	BQL	1.0	1	4/27/03
trans-1,2-Dichloroethene	BQL	1.0	1	4/27/03
1,2-Dichloropropane	BQL	1.0	1	4/27/03
cis-1,3-Dichloropropene	BQL	1.0	1	4/27/03
trans-1,3-Dichloropropene	BQL	1.0	1	4/27/03
Methylene Chloride	BQL	5.0	1	4/27/03
1,1,2,2-Tetrachloroethane	BQL	2.0	1	4/27/03
Tetrachloroethene	BQL	1.0	1	4/27/03
1,1,1-Trichloroethane	BQL	1.0	1	4/27/03
1,1,2-Trichloroethane	BQL	1.0	1	4/27/03
Trichloroethene	BQL	1.0	1	4/27/03
Trichlorofluoromethane	BQL	1.0	1	4/27/03
Vinyl Chloride	BQL	1.0	1	4/27/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
1,4-Dichlorobutane	40	41.6	104

Comments:

All values corrected for dilution.
BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: HPFF-73

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70381

Lab Project ID: G128-1109

Analyzed By: JTF

Date Collected: 4/23/03

Date Received: 4/24/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	BQL	1	1	4/25/03
Diisopropyl ether (DIPE)	BQL	1	1	4/25/03
Ethylbenzene	BQL	1	1	4/25/03
Methyl-tert butyl ether (MTBE)	BQL	2	1	4/25/03
Toluene	BQL	1	1	4/25/03
m/p-Xylene	BQL	2	1	4/25/03
o-Xylene	BQL	2	1	4/25/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40	100

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: HPFF-73 Dup.

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70382

Lab Project ID: G128-1109

Analyzed By: JTF

Date Collected: 4/23/03

Date Received: 4/24/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	BQL	1.0	1	4/27/03
Diisopropyl ether (DIPE)	BQL	1.0	1	4/27/03
Ethylbenzene	BQL	1.0	1	4/27/03
Methyl-tert butyl ether (MTBE)	BQL	2.0	1	4/27/03
Toluene	BQL	1.0	1	4/27/03
m/p-Xylene	BQL	2.0	1	4/27/03
o-Xylene	BQL	2.0	1	4/27/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.8	102

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: HPFF-74

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70383

Lab Project ID: G128-1109

Analyzed By: JTF

Date Collected: 4/23/03

Date Received: 4/24/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	BQL	1.0	1	4/27/03
Diisopropyl ether (DIPE)	BQL	1.0	1	4/27/03
Ethylbenzene	BQL	1.0	1	4/27/03
Methyl-tert butyl ether (MTBE)	BQL	2.0	1	4/27/03
Toluene	BQL	1.0	1	4/27/03
m/p-Xylene	BQL	2.0	1	4/27/03
o-Xylene	BQL	2.0	1	4/27/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.4	101

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: HPFF-76

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70384

Lab Project ID: G128-1109

Analyzed By: JTF

Date Collected: 4/23/03

Date Received: 4/24/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	71	2.0	2	4/28/03
Diisopropyl ether (DIPE)	6.4	2.0	2	4/28/03
Ethylbenzene	BQL	2.0	2	4/28/03
Methyl-tert butyl ether (MTBE)	BQL	4.0	2	4/28/03
Toluene	BQL	2.0	2	4/28/03
m/p-Xylene	BQL	4.0	2	4/28/03
o-Xylene	BQL	4.0	2	4/28/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	39.9	99.7

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Volatiles

by GC 602

Client Sample ID: HPFF-77

Client Project ID: HPFF Pumping Well (Hadnot Point)

Lab Sample ID: 70385

Lab Project ID: G128-1109

Analyzed By: JTF

Date Collected: 4/22/03

Date Received: 4/24/03

Matrix: Water

Analyte	Result ug/L	Report Limit ug/L	Dilution Factor	Date Analyzed
Benzene	BQL	1.0	1	4/27/03
Diisopropyl ether (DIPE)	BQL	1.0	1	4/27/03
Ethylbenzene	BQL	1.0	1	4/27/03
Methyl-tert butyl ether (MTBE)	BQL	2.0	1	4/27/03
Toluene	BQL	1.0	1	4/27/03
m/p-Xylene	BQL	2.0	1	4/27/03
o-Xylene	BQL	2.0	1	4/27/03

Surrogate Spike Recoveries

	Spike Added	Spike Result	Percent Recovery
Trifluorotoluene	40	40.8	102

Comments:

All values corrected for dilution.

BQL = Below quantitation limit.

(Hednet Point)

Client: Catlin Project ID: HPFF Pumping well Date: 4-24-03 Report To: Mike E. Mason @
 address: 220 Old Dairy Rd. Contact: Mike E. Mason Turnaround: Standard
 address: Williamington NC 28405 Phone: 910-452-5861 Job Number: 202-126
 quote #: DOD 101 Fax: 910-452-7563 P.O. Number: 230328-2 Invoice To: Sheila @ Catlin

[illegible]

State Certification Requested

NC ☒ SC ☐ Other ☐

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202-120
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PARADIGM ANALYTICAL LABORATORIES, INC.
2627 Northchase Parkway S.E.
Wilmington, North Carolina 28405
(910) 350-1903
Fax (910) 350-1557

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

April 25, 2003

Report Number: G128-1105

Client Project ID: HPFF Pumping Station (Hadnot Point)

Dear Mr. Mason,

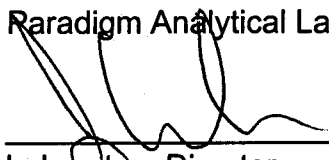
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained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

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

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

Sincerely,

Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Total Petroleum

Hydrocarbons

by GC 8015B

Client Sample ID:	HPFF-73 (3-5')	Date Collected:	4/14/03
Client Project ID:	HPFF Pumping Station (Hadnot Point)	Date Received:	4/16/03
Lab Sample ID:	69259	Analyzed By:	BMS
Lab Project ID:	G128-1105	%Solids:	77.3
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Method	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	7.8	5030/8015B	1.0	4/23/03
Diesel Range Organics	BQL	8.4	3550/8015B	1.0	4/18/03

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Total Petroleum

Hydrocarbons

by GC 8015B

Client Sample ID: HPFF-73 (3-5') Dup Date Collected: 4/14/03
Client Project ID: HPFF Pumping Station (Hadnot Point) Date Received: 4/16/03
Lab Sample ID: 69260 Analyzed By: BMS
Lab Project ID: G128-1105 %Solids: 71.4
Matrix: Soil

Compound	Result (MG/KG)	Quantitation Limit	Method	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	8.4	5030/8015B	1.0	4/23/03
Diesel Range Organics	BQL	9.0	3550/8015B	1.0	4/23/03

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

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

Chain-of Custody Record & Analytical Request

COC# 31007

Page 1 of 1

(Hednot Point)

Client: Catlin

Project ID: HPFF Pumping Station

Contact: Mike E. Mason

Address: Wilmington NC 28405

Quote #: DOO 101Date: 4-16-03

Turnaround: Standard

Job Number: 202-126

P.O. Number: 230328-2

Report To: Mike E. McSara @

Catlin

Invoice To: Sheila @ Catlin

[illegible]NC ☒ SC ☐ Other ☐

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

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

April 15, 2003

Report Number: G128-1096

Client Project ID: HPFF Pumping Test (Hadnot Point)

Dear Mr. Mason,

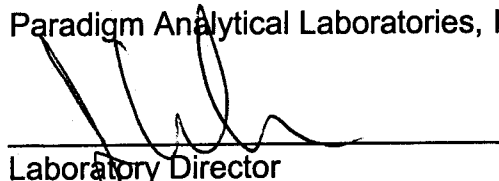
Enclosed are the results of the analytical services performed under the referenced project. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained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

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

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

Sincerely,

Paradigm Analytical Laboratories, Inc.



Laboratory Director
J. Patrick Weaver

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Total Petroleum
Hydrocarbons
by GC 8015B

Client Sample ID:	HPFF-74 (3-5')	Date Collected:	4/7/03
Client Project ID:	HPFF Pumping Test (Hadnot Point)	Date Received:	4/7/03
Lab Sample ID:	67945	Analyzed By:	BMS
Lab Project ID:	G128-1096	%Solids:	77.4
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Method	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	7.8	5030/8015B	1.0	4/15/03
Diesel Range Organics	BQL	7.9	3550/8015B	1.0	4/10/03

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

PARADIGM ANALYTICAL LABORATORIES, INC.

Results for Total Petroleum

Hydrocarbons

by GC 8015B

Client Sample ID:	HPFF-76 (3-5')	Date Collected:	4/7/03
Client Project ID:	HPFF Pumping Test (Hadnot Point)	Date Received:	4/7/03
Lab Sample ID:	67946	Analyzed By:	BMS
Lab Project ID:	G128-1096	%Solids:	84.3
Matrix:	Soil		

Compound	Result (MG/KG)	Quantitation Limit	Method	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	7.1	5030/8015B	1.0	4/15/03
Diesel Range Organics	BQL	7.3	3550/8015B	1.0	4/10/03

Comments:

Quantitation Limits are fully calculated using dilution factors and % solids.
BQL = Undetected or below quantitation limit.

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

Chain-of-Custody Record & Analytical Request

COC#

Page 1 of 1

Client: Catlin Project ID: 4PFF Pumping test
(Had not print)

address: 220 Old Dairy Rd.

Contact: Mike E. Mason

Date: 4-7-03

Turnaround: Standard

address: Wilmingon NC 28405

Phone: 910-452-5861

Job Number: 202-126

note #: DoD 101

Fax: 910-452-7563

P.O. Number: 230328-2

Invoice To: Sheila @ Catlin

Sample ID	Date	Time Matrix	Preservatives			Analyses						Comments: Please specify any special reporting requirements	
HPFF-74 (3-5')	4-7	11:40a	✓										6 June EDD format
HPFF-76 (3-5')	4-7	1:55p	✓										G128-1096
Relinquished By	Date	Time	Received By			Date	Time	Temperature			State Certification Requested		
Tom BTL	4-7	4:55	Julian [Signature]			4/7/03	4:55	cooling 10-5 10-5 10-5			NC ☒ SC ☐ Other ☐		
SEE REVERSE FOR TERMS AND CONDITIONS													

SEE REVERSE FOR
TERMS AND CONDITIONS

APPENDIX G
DESIGN CALCULATIONS

JOB: HADNOT POINT

COMPUTED BY: WALSH

DATE: 5-29-03

DESCRIPTION: 203-047

CHECKED BY: RC

DATE: 5/29/03

1 OF 4

CALCULATE RADIUS OF INFLUENCE AT VARIOUS TARGET DEPTHS FROM PULSE SPARGING

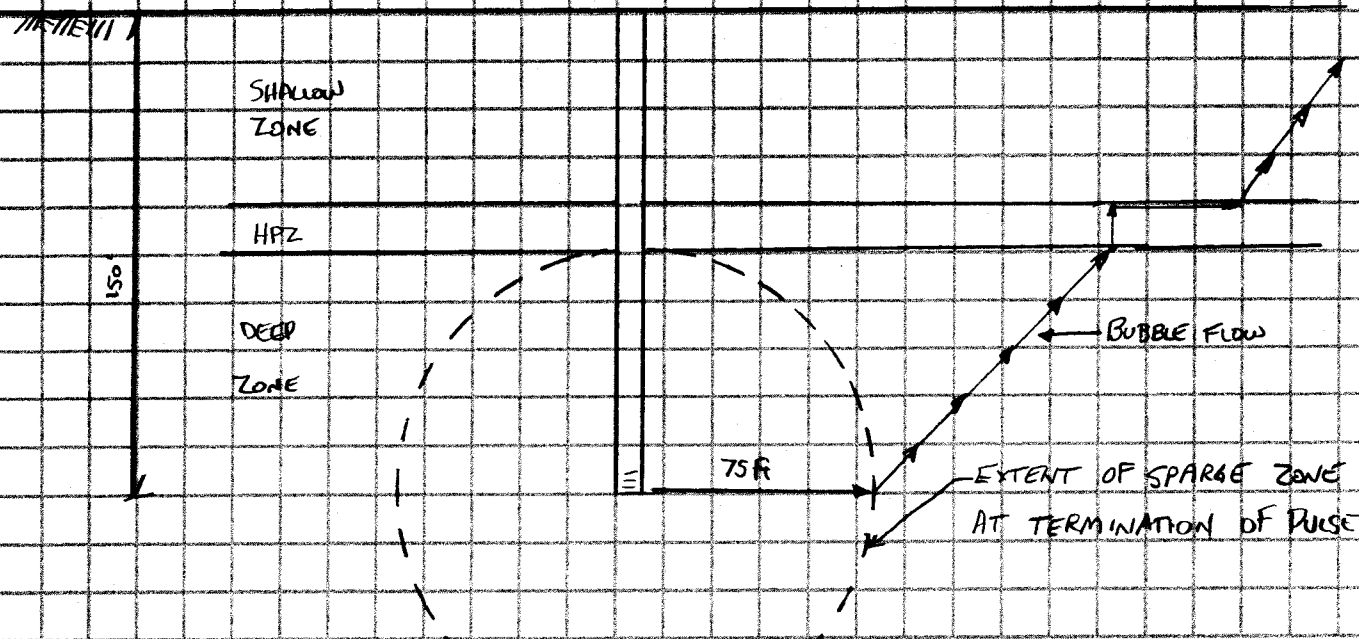
ASSUMPTIONS: + PULSE SPARGE WELL SCREENED 150 FEET BELOW GROUND SURFACE (BGS)

+ SYSTEM SHALL BE DESIGNED TO TERMINATE PULSE PRIOR TO SPARGE ZONE EXPANDING INTO THE HIGH PERMEABILITY ZONE (HPZ) LOCATED APPROXIMATELY FROM 55 FEET TO 75 FEET BGS.

+ BUBBLE RISE RADIATES OUTWARD FROM THE SPARGE WELL IN A CONICAL GEOMETRY AT 45° FROM VERTICAL, WITHIN THE SHALLOW AND DEEP ZONES.

+ BUBBLE RISE IS VERTICAL WITHIN THE HPZ.

+ BUBBLES (AIR) WILL ACCUMULATE AT THE HPZ/SHALLOW ZONE INTERFACE AND MIGRATE OUTWARD UNTIL THE COLLECTIVE PERMEABILITY OF THE SHALLOW AQUIFER EQUALS THE PERMEABILITY OF THE AFFECTED PORTION OF THE HPZ.



CALIN

ENGINEERS and SCIENTISTS

JOB: HADNOT POINTCOMPUTED BY: WALSHDATE: 5-29-03DESCRIPTION: 203-047CHECKED BY: FLDATE: 5/29/03

2 of 4

CALCULATE RADIUS OF INFLUENCE AT VARIOUS TARGET DEPTHS
FROM PULSE SPARGING (CONTINUED)

FROM 150 FEET BGS TO 75 FEET BGS (BELOW THE HPZ):

$$ROI = 75 \text{ ft} + 150 \text{ ft} - \text{DEPTH}$$

FROM 75 FEET BGS TO 55 FEET BGS (WITHIN THE HPZ):

$$ROI = 75 \text{ ft} + 150 \text{ ft} - 75 \text{ ft} = \boxed{150 \text{ ft}}$$

AT 55 FEET BGS (HPZ/SHALLOW ZONE INTERFACE):

CALCULATE PERMEABILITY RATIO BETWEEN HPZ AND SHALLOW ZONE

SHALLOW ZONE: * FROM IN-SITU PERMEABILITY TEST

CONDUCTED ON RW#1 ON 12/15/89 $K = 25.5 \text{ gpd/ft}^2$

* FROM IN-SITU PERMEABILITY TEST

CONDUCTED ON RW#2 ON 12/15/89 $K = 23.6 \text{ gpd/ft}^2$

$$K_{\text{AVE SHALLOW}} = \frac{25.5 \text{ gpd/ft}^2 + 23.6 \text{ gpd/ft}^2}{2} = 24.6 \text{ gpd/ft}^2$$

$$K_{\text{SHALLOW}} = 3.28 \text{ ft/day}$$

HPZ: FROM PUMPING TEST CONDUCTED DURING THIS INVESTIGATION

$$T = 867 \text{ ft}^2/\text{day}$$

$$\text{thickness} = 20 \text{ feet}$$

$$K_{\text{HPZ}} = 43.4 \text{ ft/day}$$

* PRODUCT RECOVERY SYSTEM DESIGN, HADNOT POINT FUEL FARM, MARINE CORPS BASE
CAMP LEJEUNE, NC, JANUARY 1990, O'BRIEN & GERE.

JOB: HADNOT POINTCOMPUTED BY: WALSHDATE: 5-29-03DESCRIPTION: 203-047CHECKED BY: R. CAZDATE: 5/29/03

3 of 4

CALCULATE RADIUS OF INFLUENCE AT VARIOUS TARGET DEPTHS FROM PULSE SPARGING

AT 55 FEET BGS (CONTINUED):

$$\frac{K_{HPZ}}{K_{SHALLOW}} = \frac{43.4 \text{ ft/day}}{3.28 \text{ ft/day}} = 13.2 \rightarrow \text{CALC. RATIO} = 13:1$$

TO BE CONSERVATIVE, A HYDRAULIC CONDUCTIVITY RATIO OF 3:1
WILL BE USED TO CALCULATE RADIUS OF INFLUENCE.

ASSUME: RADIUS OF INFLUENCE WILL INCREASE UNTIL Q_{OUT} OF HPZ
EQUALS Q_{IN} TO SHALLOW ZONE.

$$Q = K \left(\frac{dh}{dr} \right) A$$

$$\left(\frac{dh}{dr} \right)_{SHALLOW} = \left(\frac{dh}{dr} \right)_{HPZ}$$

$$Q_{OUT HPZ} = Q_{IN SHALLOW}$$

$$K_{HPZ} \left(\frac{dh}{dr} \right) A_{HPZ} = K_{SHALLOW} \left(\frac{dh}{dr} \right) A_{SHALLOW}$$

$$\frac{A_{SHALLOW}}{A_{HPZ}} = \frac{K_{HPZ}}{K_{SHALLOW}} = \frac{3}{1}$$

$$\frac{r_{SHALLOW}^2}{r_{HPZ}^2} = 3$$

$$\frac{r_{SHALLOW}}{r_{HPZ}} = 1.73 ; r_{HPZ} = 150 \text{ ft} \therefore r_{55} = 260 \text{ FEET}$$

JOB: HADNOT POINTCOMPUTED BY: WALSHDATE: 5-29-03DESCRIPTION: 203-047CHECKED BY: R.CDATE: 5/29/03

4 of 4

CALCULATE RADIUS OF INFLUENCE AT VARIOUS TARGET DEPTHS
FROM PULSE SPARGING

FROM 55 FEET BGS TO SURFACE (SHALLOW ZONE):

$$ROI = 260 \text{ ft} + 55 \text{ ft} - \text{DEPTH}$$

SUMMARY

DEPTH	RADIUS OF INFLUENCE
0 ft	315 ft
50 ft	265 ft ✓
90 ft	135 ft
150 ft	75 ft

JOB: HADNOT POINT

COMPUTED BY: WALSH

DATE: 6-3-03

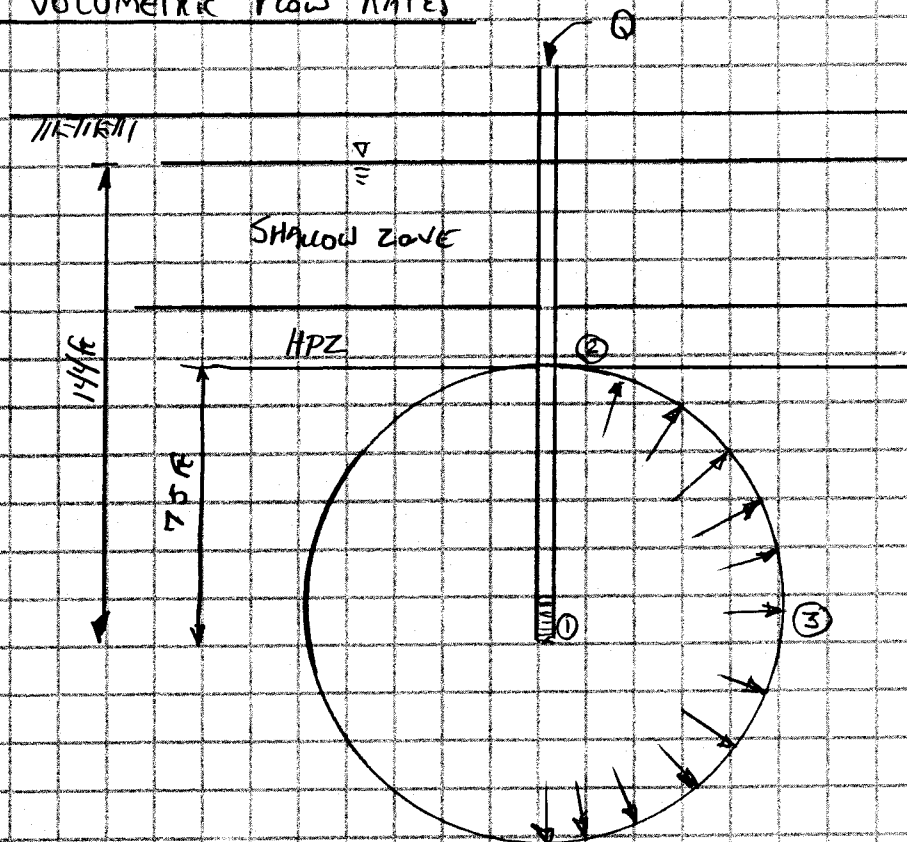
DESCRIPTION: 203-047

CHECKED BY: R. Catlin

DATE: 7/5/03

10F2

CALCULATE VOLUMETRIC FLOW RATES



$$P_1 = \text{PRESSURE AT } \textcircled{1} = \text{INJECTION PRESSURE} = 94.8 \text{ Atg } (2.31 \text{ ft/psi}) \\ = 219 \text{ ft H}_2\text{O}$$

$$P_2 = 69 \text{ ft H}_2\text{O}$$

$$P_3 = \text{PRESSURE AT } \textcircled{3} = \text{HYDROSTATIC PRESSURE} = 144 \text{ ft}$$

DARCY'S EQUATION

$$Q = KA \frac{dh}{dr}$$

$$\text{WHERE: } A = (4\pi R^2) \text{ [SURFACE OF A SPHERE]}$$

$$K = 3.28 \text{ ft/day}$$

$$dh \text{ From } \textcircled{1} \text{ to } \textcircled{2} = 219 \text{ ft H}_2\text{O} - 69 \text{ ft H}_2\text{O} = 150 \text{ ft H}_2\text{O}$$

$$dh \text{ From } \textcircled{1} \text{ to } \textcircled{3} = 219 \text{ ft H}_2\text{O} - 144 \text{ ft H}_2\text{O} = 75 \text{ ft H}_2\text{O}$$

ASSUMPTIONS: • LAMINAR FLOW
• AQUIFER IS
ISOTROPIC & HOMOGENEOUS

JOB: HADNOT POINTCOMPUTED BY: VALSHDATE: 6-3-03DESCRIPTION: 203-047CHECKED BY: P. CATLINDATE: 7/5/03

20F2

CALCULATE VOLUMETRIC FLOW RATES (CONTINUED)

$$dQ = dR$$

$$\text{FOR POINT INJECTION: } Q = 4\pi R^2 K \left(\frac{dh}{dr} \right)$$

FROM ① TO ②

$$Q = 4\pi (75 \text{ ft})^2 (3.28 \text{ ft/day}) \left(\frac{150 \text{ ft}}{75 \text{ ft}} \right)$$

$$Q = 463698.7 \text{ ft}^3/\text{day} \left(\frac{1 \text{ day}}{1440 \text{ min}} \right) = \boxed{322 \text{ CFM}}$$

FROM ① TO ③

$$Q = 4\pi (75 \text{ ft})^2 (3.28 \text{ ft/day}) \left(\frac{75 \text{ ft}}{75 \text{ ft}} \right)$$

$$Q = 231849.3 \text{ ft}^3/\text{day} \left(\frac{1 \text{ day}}{1440 \text{ min}} \right) = \boxed{161 \text{ CFM}}$$

PROVIDE COMPRESSOR(S) CAPABLE OF PROVIDING 322 CFM @ 95 PSIG.

$$\frac{4}{3}\pi r^3 = \text{SPHERE VOLUME}$$

↑
THEORETICAL
MAXACTUAL FLOW
REDUCED BY EFFECTIVE
PERMEABILITY ✓

JOB: HADNOT POINTCOMPUTED BY: WALSHDATE: 6-3-03DESCRIPTION: 203-047CHECKED BY: R. CATLINDATE: 7/5/03

1 of 1

CALCULATE INJECTION PRESSURE

* AIR SPARGE PRESSURE, P_a (psig) = HYDROSTATIC PRESSURE AT BASE OF SPHERE
$$P_a = (d + r_s) \rho / 2.31 \text{ ft/psi}$$

WHERE: d = depth of BIO-SPARGE POINT RELATIVE TO PRE-SPARGE
GROUNDWATER TABLE (ft)

r_s = RADIUS OF SPHERE (ft)

$$P_a = (144 \text{ ft} + 175 \text{ ft}) / 2.31 \text{ ft/psi}$$

$$P_a = 94.8 \text{ psig} \quad | \quad \checkmark$$

* ADOPTED FROM: 1977, D.A. DOWLER, T.A. HOOK, "PULSED AIR SPARSING WITH
REMOTE SOIL VAPOR EXTRACTION: THEORY AND PILOT TEST
CASE STUDY", PHOENIX, ARIZONA.

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ENGINEERS and SCIENTISTS



Pulse Radius and Flow vs Time

