

**LEAKING UNDERGROUND STORAGE TANK
WELL INSTALLATION AND MONITORING**

LIMITED SITE ASSESSMENTS

10 UST SITES

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

DECEMBER 31, 1997

VOLUME I

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**LEAKING UNDERGROUND STORAGE TANK
WELL INSTALLATION AND MONITORING
LIMITED SITE ASSESSMENTS
10 UST SITES**

EXECUTIVE SUMMARY

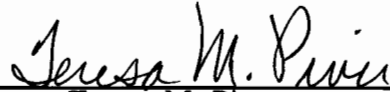
Delivery Order No. 0020 of Contract No. N62470-95-D-6009 was issued by the Atlantic Division (LANTDIV), Naval Facilities Engineering Command (NAVFACENGCOM) for performing limited site assessments at 10 underground storage tank (UST) sites at Camp Lejeune, North Carolina. The workscope was later reduced and the limited site assessments were performed at only nine UST sites, which included: TT-60, SBB-94, HP-250, FC-280, 575-2, TT-48, NH-118-3, AS-1011, and 1817. The purpose of the limited site assessments was to evaluate the need for further assessment or corrective action at each site. The limited site assessments were performed in general accordance with proposed risk-based correction action rules for petroleum USTs dated January 21, 1997 [15A North Carolina Administrative Code (NCAC) 2L .0115].

As part of this investigation, CATLIN Engineers and Scientists drilled a soil boring and installed a ground water monitoring well at each of the nine former UST locations for the purpose of soil and ground water sample collection/analysis. In addition, pertinent information regarding each site was compiled to allow for risk classification.

Based on the findings, sites TT-60, SBB-94, HP-250, FC-280, 575-2, and AS-1011 did not reveal the presence of petroleum contamination. These sites should not require further assessment. Petroleum contamination was identified at sites TT-48 and NH-118-3. Site 1817 revealed the presence of non-petroleum contaminants and may be a candidate for transfer from the Camp Lejeune UST Program to the Installation Restoration (IR) Program for further assessment.

STATEMENT OF PROFESSIONAL CONDUCT

I, Teresa M. Piver, a Professional Geologist in the State of North Carolina, confirm that this report and its contents have been prepared in accordance with the approved Workplan dated August 5, 1997, Delivery Order No. 0020, and with the standards of best professional practice.



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Professional Geologist
State of North Carolina
Registration Number 1409

**LEAKING UNDERGROUND STORAGE TANK
WELL INSTALLATION AND MONITORING
LIMITED SITE ASSESSMENTS
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

DECEMBER 31, 1997

1.0 INTRODUCTION

1.1 *Purpose of Investigation*
(Refer to Figure 1.1 and Appendix A)

The purpose of this Leaking Underground Storage Tank (LUST) Well Installation and Monitoring investigation was to perform limited site characterization at 10 individual underground storage tank (UST) sites aboard Marine Corps Base (MCB), Camp Lejeune, North Carolina. The workscope was later reduced from 10 sites to nine UST sites and included: TT-60, SBB-94, HP-250, FC-280, 575-2, TT-48, NH-118-3, AS-1011, and 1817. The objective of the limited assessments is to provide information to evaluate the need for further assessment or corrective action at each site with regard to the proposed risk-based corrective action rules for petroleum USTs (15A NCAC 2L .0115) proposed for adoption dated January 21, 1997 and published by the North Carolina (NC) Department of Environment and Natural Resources (NCDENR). The locations of the nine UST sites are shown in Figure 1.1.

CATLIN Engineers and Scientists was authorized to perform this work by the Commander of the Atlantic Division (LANTDIV), Naval Facilities Engineering Command (NAVFACENGCOM) in accordance with the Order for Supplies Contract No. N62470-95-D-6009, Delivery Order No. 0020. This document was prepared in accordance with the Workplan (Appendix A) approved by LANTDIV NAVFACENGCOM, and the Environmental Management Department (EMD) of the MCB Camp Lejeune.

1.2 *Scope of Work*

The limited site assessments included the installation of one monitoring well at each site within the source area. Available information (i.e. preliminary UST closure data, buried utilities, etc.) was used to aid in the placement of the monitoring wells. Soil and ground water samples were collected from each borehole/well and analyzed by GeoChem, Inc. environmental laboratory for target parameters. Water supply wells were identified within a 1,500-foot radius of each UST site. The sites were also evaluated with regard to designated Wellhead Protection Areas (WPAs) and whether potential vapors may pose a threat to public health or welfare. Upon completion of the limited site assessments, well abandonment was performed on selected wells.

1.3 Site Locations (Refer to Figure 1.1)

The limited site assessments were performed at the following sites:

- TT-60
- SBB-94
- HP-250
- FC-280
- 575-2
- TT-48
- NH-118-3
- AS-1011
- 1817

Figure 1.1 depicts the nine UST site locations.

1.4 Site Descriptions and Source Characterizations (Refer to Figures 1.1 through 1.10)

The former nine UST sites are located throughout the MCB Camp Lejeune and New River Marine Corps Air Station (MCAS). Figure 1.1 depicts the site locations within the MCB and MCAS. The following is a brief description of each site.

- TT-60 - The site is the Tarawa Terrace I Primary School. The former 10,000-gallon UST contained heating oil. Refer to Figure 1.2 for site location.
- SBB-94 - The site is a sports complex in the Courthouse Bay area of the MCB. One 4,000-gallon and one 6,000-gallon capacity gasoline USTs were removed. Refer to Figure 1.3 for site location.
- HP-250 - The site is a vehicle maintenance facility in the Hadnot Point area of the MCB. One 4,000-gallon and two 550-gallon capacity diesel USTs were removed. The USTs were replaced with a new 4,000-gallon capacity UST in the same tank basin. Refer to Figure 1.4 for site location.
- FC-280 - The site is a vehicle maintenance facility located in the French Creek area of the MCB. The former 550-gallon capacity UST contained diesel fuel. Refer to Figure 1.5 for site location.
- 575-2 - The site is a light armored vehicle maintenance facility in the Headquarters Area of the MCB. The former 6,000-gallon capacity UST contained diesel fuel. Two existing USTs remain in the tank pit. Refer to Figure 1.6 for site location.
- TT-48 - The site is the Tarawa Terrace II Elementary School. The former 8,000-gallon capacity UST contained heating oil. Refer to Figure 1.7 for site location.

- NH-118-3 - The site is the Naval Hospital Vehicle Maintenance Shop in the Hadnot Point area of the MCB. The former 280-gallon capacity UST contained waste oil. Refer to Figure 1.8 for site location
- AS-1011 - The site is located at the Officer Enlisted Married Housing area at New River MCAS. The former 280-gallon capacity UST contained heating oil. Refer to Figure 1.9 for site location.
- 1817 - The site is a warehouse located in the Headquarters Area of the MCB. The former 300-gallon capacity UST contained waste oil. Refer to Figure 1.10 for site location.

1.5 Previous Investigations, Remediation and/or Closures (Refer to Appendix B)

Past documents reveal that UST closure activities were performed at the referenced sites. The following reports were reviewed for assistance in preparation of the Workplan and in determining well locations.

- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. TT-48, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. SBB-94, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 1817, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. TT-60, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 118-1, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. HP-250, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 572-2, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 280, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Engineering & Environmental Science Company, March 26, 1997, Tank Closure Report Non-Regulated 280-Gallon Heating Fuel Oil, MCAS Housing (AS-1011), Marine Corps Base, Marine Corps Air Station, NC, N6247-98-6 (Final).

The final UST closure reports are provided in Appendix B.

2.0 WELLHEAD PROTECTION AREA STATUS

A Wellhead Protection Program (WPP) study was conducted by Geophex, Ltd. in September 1991 for MCB Camp Lejeune and adjoining MCAS at New River under Contract No. N63470-90-D-6756. Wellhead Protection Areas (WPAs) were identified in order to delineate and control the release of contaminating substances within the well fields at the Holcomb-Hadnot Point and MCAS areas.

As the primary basis for establishing proposed WPAs, Geophex, Ltd. recommended utilizing the time-of-travel criterion. This allows existing wells near potential contamination sources to be inventoried and identified as being within a 10-year zone of travel (ZOT). The 10-year ZOT was proposed by Geophex, Ltd. because it provides the necessary time for discovery and clean-up of contaminants before they reach a well, or provides adequate time to install additional wells if necessary. The 10-year ZOT for each active production well in the Holcomb-Hadnot Point area covers 65 acres, measuring 2,100 x 1,700 feet, and the 10-year ZOT for MCAS covers an area of 34 acres with dimensions of 1,400 x 1,350 feet. Of the nine UST sites investigated by CATLIN, the following three appear to fall within the vicinity of proposed WPAs: FC-280, SBB-94, and AS-1011. The remaining sites investigated by CATLIN are not located within proposed WPAs.

3.0 HYDROLOGIC/RECHARGE CHARACTERISTICS

The MCB Camp Lejeune lies within the Coastal Plain Physiographic province. The North Carolina Coastal Plain is approximately 90 to 150 miles wide from the Atlantic Ocean westward to its boundary with the Piedmont Province. Two natural subdivisions of the Coastal Plain were described by Stuckey (1965): The Tidewater Region and the Inner Coastal Plain. The MCB is located within the Tidewater region which consists of the coastal area where large streams and many of their tributaries are affected by ocean tides (Winner and Coble, 1989).

The Coastal Plain ground water system consists of aquifers comprised of permeable sands, gravels, and limestone separated by confining units of less permeable sediments (LeGrand, 1960). The hydrogeologic framework at Camp Lejeune consists of the surficial, Castle Hayne, Beaufort, and Pee Dee aquifers and confining units (Cardinell et al, 1993).

The Castle Hayne aquifer has been utilized to supply Camp Lejeune with potable water for approximately 50 years. The surficial, Beaufort, and Pee Dee aquifers are not used for water supply (Cardinell et al, 1993). The Castle Hayne aquifer and confining units underlie the surficial aquifer. The Castle Hayne confining unit consists of beds of clay, sandy clay, and silt (Winner and Coble, 1989). The thickness of the Castle Hayne confining unit at Camp Lejeune ranges from zero to 26 feet, and averages approximately nine feet. The confining unit is absent in areas where it has been eroded by the New River and/or major tributaries. The Castle Hayne aquifer is composed predominantly of

limestone and sand with minor amounts of clay. There is enough sand throughout most of the Castle Hayne confining unit to allow leakage between the Castle Hayne and overlying aquifers. However, the effectiveness of the confining unit is sufficient to support a head difference between aquifers (Winner and Coble, 1989). In the Camp Lejeune area the Castle Hayne aquifer ranges from 156 feet to 400 feet. The aquifer is thinnest in the Camp Geiger area. Recharge of the Castle Hayne aquifer is via downward percolation from the surficial aquifer in interstream areas (Cardinell et al, 1993).

Evaluation of hydrogeologic data from selected supply wells at Camp Lejeune (Cardinell et al, 1993) revealed that the Castle Hayne confining unit is present in the vicinity of each site. Following is a summary of the average thickness of the Castle Hayne confining unit in relation to the nine UST sites.

Site	Average Thickness of Castle Hayne Confining Unit
TT-60	7 feet
SBB-94	15 feet
HP-250	5 feet
FC-280	8 feet
575-2	5 feet
TT-48	9 feet
NH-118-3	9 feet
AS-1011	6 feet
1817	12 feet

This confining unit may be partly effective in retarding vertical movement of ground water between the surficial and Castle Hayne aquifers (Cardinell et al, 1993).

4.0 IMMINENT DANGERS

Petroleum migration may result in multi-media contamination, upon its release to the land surface or subsurface environment. As petroleum seeps through the subsurface, petroleum-related hydrocarbons adsorb onto soil particles and volatilize into pore spaces. The remaining petroleum moves vertically downward (in the absence of preferred lateral routes of migration) until it reaches the capillary fringe (in the absence of an impermeable barrier above the capillary fringe). Upon reaching the capillary fringe, petroleum spreads laterally and also dissolves into the ground water. As a result, receptors may be potentially exposed to petroleum hydrocarbons (contaminants) through a variety of mechanisms.

Petroleum vapors can accumulate in areas of confined space or migrate along preferential pathways such as utility trenches. An accumulation of vapors in these areas may result in hazardous conditions such as explosive environments or an oxygen deficient atmosphere. Migration of vapors along utility trenches may enter buildings and receptors may be exposed to contaminants via inhalation of vapors.

Based on several factors, there does not appear to be evidence of vapor accumulation in confined spaces or an imminent threat to public health or the environment. Of the nine UST sites, only one, SBB-94, contained gasoline which is volatile in nature. The other site's USTs contained diesel, heating oil, or waste oil which are less volatile. It is not expected that vapor accumulation/migration would occur where less volatile petroleum was contained. Buildings at the nine former UST sites are all of slab-on-grade construction. This type of construction does not provide confined spaces such as basements and crawl spaces between the land surface and the underside of the structure.

Underground utility depths are reportedly less than 10 feet deep. Sites TT-60, FC-280, TT-48, and NH-118-3 have utility trenches located within the former UST basins. Though the locations and shallow depths of the utility trenches may be considered a migration pathway, due to the low volatility of the petroleum at these sites, it is deemed unlikely for vapor concentrations to pose a health or environmental risk.

5.0 LIMITED SITE ASSESSMENTS

5.1 *Assessment Activities* *(Refer to Appendices A through E)*

One monitoring well was installed at each of the nine UST sites located throughout the MCB and MCAS as part of the limited site assessments. Based on information received from Draft UST Closure Reports (see Appendix B), an attempt was made to install the shallow monitoring wells in the former UST basins in order to collect soil and ground water samples representative of the "worst case" locations. Utilities and trees, as well as existing USTs, were obstacles which in some cases prevented the installation in the UST basins. Therefore, some monitoring wells were installed adjacent to the UST excavation areas. Monitoring wells were installed in the former UST basins at three site locations (TT-48, FC-280, and 575-2); however, a native soil sample within the vadose zone was not obtainable. Therefore, additional borings were performed outside the UST excavation areas in order to collect the soil samples.

During the well installations, soils were collected at different intervals using the split-spoon device in accordance with procedures established in the Workplan (see Appendix A). Soils were described in the field by a geologist trained in using visual/manual techniques as described in ASTM D-2488-84. In addition, soils were screened for organic vapor content utilizing a flame-ionization detector (FID). The soils were classified in accordance with the Unified Soils Classification System (USCS) and a boring record of each borehole was produced. Boring logs are provided in Appendix C. Geology beneath the sites appear to be

underlain by interfingering layers of very fine to medium grained sands, silty sands/sand-clay mixtures to a depth of approximately 25 feet. The monitoring wells were installed to a depth of approximately five feet below the water table. The screened portion of the wells were positioned to intersect the water table. As-built well details and North Carolina Well Construction records are provided in Appendix D.

The ground water sampling program consisted of purging approximately three volumes of water from each monitoring well, then collecting ground water samples from each (Sampling Field Data Worksheets provided in Appendix E). The sampling was performed in accordance with the procedures established in the Workplan (Appendix A).

5.2 Limited Site Assessment Results

5.2.1 TT-60

(Refer to Tables 5.1, 5.2A, 5.3A, and 5.3B, Figure 5.1, and Appendix F)

This area of investigation is located at the Tarawa Terrace I Primary School. Clean-East Associates, Inc. performed the UST closure which included the removal of the former UST, as well as collecting soil and ground water samples for laboratory analysis. According to the Draft UST Closure Report (July 1997) a 10,000-gallon heating oil UST was removed on January 26, 1996. The excavation of the UST basin extended to a depth of approximately 11 feet below land surface (BLS), at which depth ground water was encountered. Results of ground water and soil samples, collected as part of closure activities, revealed the presence of petroleum contamination above NC Groundwater Quality Standards (NCAC T15A:02L) and NCDENR Action Levels. Based on the data, Clean-East Associates, Inc. recommended further investigation.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (TT60MW01) and the collection of soil and ground water samples for laboratory analysis. An attempt to install the well in the former UST basin was made. However, due to the location of underground utilities and existing flower beds, the well was installed 3.5 feet outside of the excavation area to a depth of 12 feet BLS (location of well shown on Figure 5.1). The FID readings are summarized in Table 5.1.

A soil sample (TT60MW01) from three to five feet BLS was obtained and analyzed for Total Petroleum Hydrocarbon (TPH) content (gasoline/diesel) per EPA Methods 5030/3550/8015. The laboratory results indicated that concentrations of gasoline and diesel were below detection limits. Laboratory results are provided in Table 5.2A and Appendix F.

A ground water sample was collected and analyzed for Purgeable Aromatics (EPA Method 602) and Base/Neutral and Acid Extractables plus 10 Largest Peaks (EPA Method 625). The Purgeable Aromatics analysis revealed all concentrations below detection limits. The Base/Neutral and Acid extractables analysis detected concentrations of naphthalene at 15.3 ug/L, not exceeding the interim NC Groundwater Quality Standard of 21 ug/L. The 10 largest peaks analysis identified an unknown hydrocarbon, pentadecane, hexadecane, and heptadecene. Tables 5.3A and 5.3B summarize the laboratory data and provide a comparison to NC Groundwater Quality Standards. The laboratory reports are in Appendix F. Free product was not encountered during assessment activities.

As a result of this limited site assessment, there is no indication of vadose of dissolved contaminants associated with the former heating oil UST in excess of established NCDENR Action Levels or NC Groundwater Quality Standards.

5.2.2 SBB-94

(Refer to Tables 5.1, 5.2A, 5.3A, 5.C, and 5.3D, Figure 5.2, and Appendix F)

This area of investigation is a sports complex located in the Courthouse Bay area of the MCB. Clean-East Associates, Inc. performed the UST closure which included the removal of the former UST, as well as collecting soil and ground water samples for laboratory analysis. The Draft UST Closure Report revealed that two gasoline USTs (4,000-gallon and 6,000-gallon) were removed on February 6, 1996. The depth of the excavation of the UST basin was not clearly stated in the Draft UST Closure Report; however, it was documented that "soils were only excavated enough to sufficiently remove the tanks, product lines, and dispenser." Ground water was encountered at approximately 6.0 feet below the surface. As a result, soil samples were not collected at this site. A water sample was collected from the excavation and analysis revealed benzene and lead concentrations exceeded the NC Groundwater Quality Standards.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (SBB94MW01) and the collection of soil and ground water samples for laboratory analysis. An attempt to install the well in the former UST basin was made; however, due to the location of overhead power lines and the assumed direction of ground water flow (given in the Draft UST Closure Report), the well was installed hydraulically downgradient, approximately 10 feet adjacent to the excavation area (refer to Figure 5.2). The well was installed to a depth of 12 feet BLS. The FID readings are provided in Table 5.1.

A soil sample (SBB94MW01) from two to four feet BLS was obtained and analyzed for TPH content (gasoline) per EPA Methods 5030/8015. The laboratory results indicated that concentrations of gasoline were below detection limits. Laboratory results are provided in Table 5.2A and Appendix F.

Ground water samples (SBB94MW01 and SBB94MW01 DUPLICATE) were collected and analyzed for 1,2-dibromoethane (EDB) (EPA Method 504.1), Volatile Halocarbons (Standard Method 6230D), and Total Lead (EPA Methods 3030C/239.2). The EDB analysis revealed the concentration below detection limits. Concentrations of m/p-xylene and o-xylene were below NCAC T15A:02L Groundwater Quality Standards with values of 1.2 ug/L and 0.6 ug/L, respectively. Total Lead concentrations were reportedly below quantitation limits (BQL). Tables 5.3A, 5.3C, and 5.3D summarize the laboratory data and provide a comparison to NC Groundwater Quality Standards. Refer to Appendix F for laboratory reports. Free product was not detected during the assessment activities.

As a result of this limited site assessment, there is no indication of vadose or dissolved petroleum contaminants associated with the former gasoline oil USTs in excess of established NCDENR Action Levels or Groundwater Quality Standards.

5.2.3 HP-250

(Refer to Tables 5.1, 5.2A, 5.3A and 5.3B, Figure 5.3, and Appendix F)

This area of investigation is located at a vehicle maintenance facility, Building HP-250. Clean-East Associates, Inc. performed the UST closure which included the removal of the former USTs, as well as collecting soil and ground water samples for laboratory analysis. The Draft UST Closure Report revealed that three diesel USTs (one 4,000-gallon and two 550-gallon) were removed on February 19, 1996. The excavation of the UST basin was not clearly stated in the Draft UST Closure Report; however, it was documented that "pea gravel was only excavated enough to sufficiently remove the tanks." Ground water was encountered at approximately 11.8 feet below the surface. Results of a water sample collected during closure indicated that benzene and lead concentrations exceeded State Groundwater Quality Standards.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (HP250MW01) and the collection of soil and ground water samples for laboratory analysis. An attempt to install the well in the former UST basin was made; however, a 4,000-gallon replacement UST was placed in the same tank basin. Therefore, the well was installed approximately five feet adjacent to the concrete pad overlying the basin. The well was installed to a depth of 15

feet BLS (location of well as shown on Figure 5.3). The soil screening FID readings are provided in Table 5.1.

A soil sample (HP250MW01) from five to seven feet BLS was obtained and analyzed for TPH content (gasoline/diesel) per EPA Methods 5030/3550/8015. The laboratory results indicated that concentrations of gasoline and diesel were below detection limits. Laboratory results are provided in Table 5.2A and Appendix F.

A ground water sample (HP250MW01) was collected and analyzed for Purgeable Aromatics (EPA Method 602) and Base/Neutral and Acid extractables plus 10 Largest Peaks (EPA Method 625). The Purgeable Aromatics analysis revealed all concentrations below detection limits. The Base/Neutral and Acid extractables analysis resulted in all concentrations below detection limits. The 10 largest peaks analysis revealed the presence of an unknown compound. Tables 5.3A and 5.3B summarize the laboratory data and compares it to NC Groundwater Quality Standards. Refer to Appendix F for laboratory reports. Free product was not encountered during this investigation.

The results of this limited site assessment indicate there is no vadose or dissolved contamination associated with the former USTs in excess of established NCDENR Action Levels or NC Groundwater Quality Standards.

5.2.4 FC-280

(Refer to Tables 5.1, 5.2A, 5.3A, and 5.3B, Figure 5.4, and Appendix F)

This area of investigation is located at a vehicle maintenance facility (Building FC-280) in the French Creek area. Clean East Associates, Inc. performed the UST closure which included the removal of the former UST, as well as collecting soil samples for laboratory analysis. The Draft UST Closure Report revealed that a 550-gallon diesel UST was removed on April 8, 1996. The excavation of the UST basin extended to a depth of 6 feet 11 inches BLS. Ground water was not encountered during this excavation. One soil sample was collected and analyzed for TPH content (gasoline/diesel). The laboratory analysis indicted a diesel content in excess of the NCDENR Action Level of 40 mg/kg.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (FC280MW01) and the collection of soil and ground water samples for laboratory analysis. The well was installed in the former UST basin to a depth of 12 feet BLS. Samples were classified as pea gravel within the vadose zone; therefore, after the installation of the well, an additional boring was performed adjacent to the UST excavation (FC280SB01) in order to collect the soil

sample. Refer to Table 5.1 for soil screening results. Refer to Figure 5.4 for well location.

A soil sample (identified as FC280MW01) from six to seven feet BLS was obtained and analyzed for TPH content (gasoline/diesel) per EPA Methods 5030/3550/8015. The laboratory results indicated that concentrations were below detection limits in comparison with the NCDENR Action Levels of 10 mg/Kg and 40 mg/Kg, respectively. Laboratory results are provided in Table 5.2A and Appendix F.

Ground water samples (FC280MW01 and FC280MW01 DUPLICATE) were collected and analyzed for Purgeable Aromatics (EPA Method 602) and Base/Neutral and Acid Extractables plus 10 Largest Peaks (EPA Method 625). The purgeable aromatics analysis revealed all concentrations below detection limits. The base/neutral and acid extractable analysis detected all concentrations below detection limits. The 10 largest peaks analysis did not detect additional compounds. Tables 5.3A and 5.3B summarize the laboratory data and compare it to NC Groundwater Quality Standards. Refer to Appendix F for laboratory report. Free product was not encountered during this investigation.

As a result of this limited site assessment, there is no indication of vadose or dissolved petroleum contaminants associated with the former UST in excess of established NCDENR Action Levels or NC Groundwater Quality Standards.

5.2.5 575-2

(Refer to Tables 5.1, 5.2A, 5.3A, 5.3B, Figure 5.5, and Appendix F)

This area of investigation is located at a vehicle maintenance facility, Building 575. Clean-East Associates, Inc. performed the UST closure which included the removal of the former UST, as well as collecting soil and water samples for laboratory analysis. The Draft UST Closure Report revealed that a 6,000-gallon diesel UST was removed on January 27, 1996. The depth of the excavation of the UST basin was not clearly stated in the Draft UST Closure Report; however, it was documented that the excavation extended to approximately two to four feet below the product lines and dispenser of the UST. Ground water was encountered at 11 feet 8 inches below the surface. Laboratory analysis of the soil and ground water samples revealed petroleum contaminant in excess of NCDENR Action Levels and NC Groundwater Quality Standards.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (575MW01) and the collection of soil and ground water samples for laboratory analysis. The well was installed in the former UST basin to a depth of 20 feet BLS. Samples were classified as pea gravel within the vadose zone; therefore, after the

installation of the well, an additional boring was performed adjacent to the UST excavation in order to collect the soil sample. Refer to Table 5.1 for soil screening data. Refer to Figure 5.5 for well location.

A soil sample (575MW01) from 10 to 11 feet BLS was obtained and analyzed for TPH (gasoline/diesel) per EPA Methods 5030/3550/8015. The laboratory results indicated that concentrations were below detection limits. Laboratory results are provided in Table 5.2A and Appendix F.

Ground water samples (575MW01 and 575MW01 DUPLICATE) were collected and analyzed for Purgeable Aromatics (EPA Method 602) and Base/Neutral and Acid Extractables plus 10 Largest Peaks (EPA Method 625). Purgeable aromatics analysis revealed all concentrations below detection limits. The base/neutral and acid extractable analysis revealed all concentrations below detection limits. The 10 largest peaks analysis did not detect any additional dissolved compounds. Laboratory reports are provided in Appendix F and summarized in Tables 5.3A and 5.3B. Free product was not encountered during assessment activities.

As a result of this limited site assessment, there is no indication of vadose or dissolved petroleum contaminants associated with the former UST in excess of established NCDENR Action Levels or NC Groundwater Quality Standards.

5.2.6 TT-48

(Refer to Tables 5.1, 5.2A, 5.3A, 5.3B, Figure 5.6, and Appendix F)

This area of investigation is located at the Tarawa Terrace II Primary School. Clean East Associates, Inc. performed the UST closure which included the removal of the former UST, as well as collecting soil samples for laboratory analysis. The Draft UST Closure Report revealed that an 8,000-gallon heating oil UST was removed on January 27, 1996. The depth of the excavation of the UST basin was not clearly stated in the Draft UST Closure Report; however, it was documented that the excavation extended to approximately one foot beneath the tank. Ground water was not encountered during the excavation. Results of the soil sample collected from the east end of the excavation exceeded the State Action Level of 40 mg/kg for TPH-diesel.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (TT48MW01) and the collection of soil and ground water samples for laboratory analysis. The well was installed in the former UST basin to a depth of 12 feet BLS. Samples were classified as pea gravel within the vadose zone; therefore, after the installation of the well, an additional boring was performed adjacent to the excavation (TT48SB01) in order to collect the soil sample.

Refer to Table 5.1 for soil screening data. Refer to Figure 5.6 for well/boring locations.

A soil sample (identified as TT48MW01) from three to five feet BLS was collected and analyzed for TPH (gasoline/diesel) per EPA Methods 5030/3550/8015. The laboratory results indicated that concentrations were below detection limits for TPH-gasoline and 391 mg/Kg for TPH-diesel. The TPH-diesel concentration (391 mg/kg) exceeds the State Action Level of 40 mg/kg. Laboratory results are provided in Table 5.2A and Appendix F.

A ground water sample (TT48MW01) was collected and analyzed for Purgeable Aromatics (EPA Method 602) and Base/Neutral and Acid Extractables plus 10 Largest Peaks (EPA Method 625). Results of the laboratory analysis revealed below detection limits for all parameters. The laboratory report is provided in Appendix F and results are summarized in Tables 5.3A and 5.3B. Free product was not detected during this investigation.

As a result of this limited site assessment, there is no indication of dissolved contaminants associated with the former UST in excess of established NC Groundwater Quality Standards. However, the soil sample exceeded the NCDENR Action Level for TPH-diesel.

5.2.7 NH-118-3

(Refer to Tables 5.1, 5.2A, 5.2B, 5.2C, 5.3B, 5.3C, 5.3E, Figure 5.7, and Appendix F)

This area of investigation is located in the Naval Hospital Vehicle Maintenance Shop (Building NH-118). Clean-East Associates, Inc. performed the UST closure which included the removal of the former UST, as well as collecting soil samples for laboratory analysis. The Draft UST Closure Report revealed that a 280-gallon waste oil UST was removed on January 23, 1996. The depth of the excavation of the UST basin was not clearly stated in the Draft UST Closure Report; however, it was documented that the excavation extended to approximately one foot "beneath the product lines and dispensers." Ground water was not encountered during the excavation. Two soil samples were collected beneath the east and west ends of the tank. Samples were analyzed for TPH (gasoline) per EPA Method 5030. Laboratory analysis revealed no gasoline concentration in either of the samples.

The limited site assessment performed by CATLIN included the installation of one shallow monitoring well (NH118MW01) and the collection of soil and ground water samples for laboratory analysis. An attempt to install the well in the former UST basin was made; however, due to the location of an underground power line and the position of a

tree, fence and storage building. The well was installed at 20 feet BLS at the southeast corner of the UST basin. All other sides were not obtainable with the drill rig. Refer to Table 5.1 for soil screening data. Figure 5.7 depicts the location of the monitoring well/boring.

A soil sample (identified as NH118MW01) from 10 to 12 feet BLS was collected and analyzed for Oil & Grease per EPA Method 9071, Halogenated and Aromatic Volatiles (EPA Method 8021), Toxicity Characteristic Leaching Procedure (TCLP) for eight RCRA Metals (EPA Method 1311). The laboratory results indicated a concentration of 34.341 mg/kg for Oil & Grease in comparison with the NCDENR Action Level of 250 mg/kg. Halogenated and Aromatic Volatile compounds and concentrations were identified as follows: 1,3,5-trimethylbenzene (1.4 ug/kg), 1,2,4-trimethylbenzene (6.5 mg/kg), sec-butylbenzene (0.9 ug/kg), n-butylbenzene (3.9 ug/kg), naphthalene (10.0 ug/kg), and tert-butylbenzene (0.9 ug/kg). Results of the TCLP RCRA Metals analysis revealed all compounds to be below quantitation limits (BQL). Laboratory results are provided in Tables 5.2A through 5.2C and Appendix F.

Currently, soil quality standards have not been established by the NCDENR for Halogenated and Aromatic Volatile compounds. According to the NCDEHNR (March 17, 1997), the reportable concentrations are any amount above the laboratory method detection limit.

Water samples (NH118MW01 and NH118MW01 DUPLICATE) were collected and analyzed for Base/Neutral and Acid Extractables plus 10 Largest Peaks (EPA Method 625), Volatile Halocarbons (Standard Method 6230D), and Total RCRA Metals (EPA Method 3030C). Results of the laboratory analysis revealed below detection limits for all tested parameters. The laboratory results are summarized in Tables 5.3B and 5.3C. The laboratory reports are provided in Appendix F.

As a result of this limited site assessment, there is no indication of dissolved contaminants associated with the former UST in excess of established NC Groundwater Quality Standards. However, low concentrations of halogenated and aromatic volatiles compounds were identified from the vadose zone sample.

5.2.8 AS-1011

(Refer to Tables 5.1, 5.2A, 5.3A, 5.3B, Figure 5.8, and Appendix F)

This area of investigation is located at a residence in the Officer Enlisted Married Housing area at New River MCAS. Onslow Environmental Contractor Engineering & Environmental Science Company (EESA) conducted UST closure which included the removal of the UST, as well as collecting soil and water samples for analysis. The Closure Report revealed that a 280-gallon heating oil tank was removed on November 20,

1996. The depth of the UST excavation was described as "conducted sufficiently to remove the tank." Ground water was encountered at approximately 2.5 feet BLS. Subsequent to the UST closure, Engineering & Environmental Science Company collected a water sample from a hand auger boring installed at the site. Results of the sampling indicated a release of petroleum.

This limited site assessment included the installation of one shallow monitoring well (AS1011MW01) and the collection of soil and ground water samples for laboratory analysis. The well was installed adjacent to the former UST basin to a depth of 10 feet BLS. Refer to Figure 5.8 for well location. The soil sample was collected from a depth of zero to three feet BLS. Table 5.1 provides the FID readings obtained from the field screening process and indicates the sample selected for laboratory analysis. The soil sample (AS1011MW01) was analyzed for TPH-gasoline and diesel (EPA Methods 3550/5030/8015). Results of the analyses were below detection limits for both TPH fractions. Refer to Table 5.2A for laboratory results and Appendix F for laboratory reports.

A ground water sample (AS1011MW01) was collected and analyzed for Purgeable Aromatics (EPA Method 602) and Base/Neutral and Acid Extractions plus 10 Largest Peaks (EPA Method 625). Both analyses revealed all parameters to be below detection limits. In addition, no additional peaks were detected as part of the base/neutrals and acids analysis. Tables 5.3A and 5.3B summarize the laboratory data and compares it to the NC Groundwater Quality Standards.

The results of the limited site assessment indicate there is no vadose or dissolved petroleum contamination in excess of NCDENR Action Levels or NC Groundwater Quality Standards associated with the former UST.

5.2.9 1817

(Refer to Tables 5.1, 5.2A through 5.2C, 5.3B, 5.3C, Figure 5.9, and Appendix F)

The area of investigation is a warehouse (Building 1817) in the Headquarters area of the MCB. Clean East Associates, Inc. performed the closure of one 300-gallon capacity waste oil UST. According to the UST Closure Report (July 30, 1997), ground water was not encountered during excavation/removal procedures. The closure results confirmed a petroleum release.

This limited site assessment included the installation of one monitoring well (1817MW01) and the collection of soil and ground water samples for laboratory analysis. The well was installed adjacent to the former UST basin to a depth of 25 feet BLS. Refer to Figure 5.9 for well location.

A soil sample (1817MW01) was collected from the borehole at a depth of 17 to 19 feet BLS. Table 5.1 provides the FID readings obtained from the field screening process and identifies the sample selected for laboratory analysis. The soil sample was analyzed for Oil & Grease (EPA Method 9071), Halogenated and Aromatic Volatiles (EPA Method 8021), and TCLP Metals (EPA Method 1311). Results of the soil analyses revealed detectable concentrations of target analytes. Oil & grease was detected at a concentration of 162.987 mg/kg. This concentration is less than the Action Level of 250 mg/kg (NCDEHNR, March 1997). The halogenated and aromatic volatiles analysis identified tetrachloroethene at a concentration of 1.3 ug/kg. Laboratory results are summarized in Tables 5.2A through 5.2C. The laboratory reports are provided in Appendix F.

Currently, there is no soil quality standard established for tetrachloroethene. According to the NCDEHNR (March 17, 1997), the reportable concentration is any amount above the laboratory detection limit.

A ground water sample (1817MW01) was collected and analyzed for Base/Neutral and Acid Extractables plus 10 Largest Peaks (EPA Method 625) and Volatile Halocarbons (Standard Method 6230D). Results of the EPA Method 625 analysis revealed all target compounds to be below the laboratory detection limits. The 10 largest peaks search identified tetrachloroethene and an unknown compound. The following volatile halocarbons and concentrations were identified from the Standard Method 6230D: 1,1,1-trichloroethane (4.9 ug/L), trichloroethene (320.0 ug/L), trans-1,2-dichloroethene (1.8 ug/L), tetrachloroethene (3,480.0 ug/L), cis-1,2-dichloroethene (620.0 ug/L), and methyl tert-butyl ether (1.7 ug/L). Trichloroethene, tetrachloroethene, and cis-1,2-dichloroethene concentrations exceed the NC Groundwater Quality Standards. Results of the analysis are summarized in Tables 5.3B and 5.3C. The laboratory reports are provided in Appendix F.

Based on the results of this limited site assessment, soil and ground water have been impacted at this site. The nature of the contaminants identified suggests a source other than petroleum. It is likely that solvents may have been stored in the waste oil UST at some time.

5.3 Well Abandonment *(Refer to Appendix D)*

Following the completion of field data collection activities, the following wells were abandoned: 575MW01, HP250MW01, AS1011MW01, SBB94MW01, TT48MW01, TT60MW01, and FC280MW01. The wells were abandoned by filling the well with neat cement grout from the bottom upward via a tremie pipe.

The wellheads/pads in unpaved areas were removed. Well abandonment records are provided in Appendix D.

6.0 PUBLIC WATER SUPPLIES

(Refer to Figures 1.2 through 1.10)

It is reported that potable water aboard the MCB is obtained from the Castle Hayne aquifer. The Camp Lejeune water production system has utilized more than 110 ground water production wells to supply potable water for the MCB and MCAS. The following is a discussion of the production wells identified within a 1,500-foot radius of each site. Refer to Figures 1.2 through 1.10 for the production well locations with regard to the former UST locations.

- **TT-60:** The Tarawa Terrace Water Treatment Facility is no longer used and the production wells have been permanently abandoned. Water is supplied to the Tarawa Terrace area from the Holcomb Water Treatment Plant. Low levels of volatile organic compounds were previously identified in three of the Tarawa Terrace wells (Geophex, 1993). Figure 1.2 depicts the 1,500-foot search radius of TT-60, in which no active production wells were identified.
- **SBB-94:** In the SBB-94 area, one active production well (BB47) and one deactivated production well (BB43) are located within the 1,500-foot search radius (Figure 1.3). More specifically, the wells are located approximately 1,000 feet northeast of the SBB-94 former UST. Active well BB47 is approximately 200 feet deep. Deactivated well BB43 is approximately 60 feet deep (Geophex, 1993).
- **HP-250:** No water supply wells were identified with 1,500 feet of the site (Figure 1.4). The area is served by the Hadnot Point Water Treatment Plant.
- **FC-280:** One active production well (HP-609) was identified approximately 1,500 feet northeast of site FC-280 (Figure 1.5). The Hadnot Point Water Treatment Plant supplies water to the French Creek (FC) area of Camp Lejeune. Well HP-609 is approximately 150 feet deep and screened from 65 to 80 feet, 100 to 110 feet, and 130 to 150 feet.
- **575-2:** No production wells were identified within the 1,500-foot radius of the site (Figure 1.6). This area of the MCB is served by the Hadnot Point Water Treatment facility.
- **TT-48:** As previously discussed, the Tarawa Terrace wells have been permanently abandoned and the area is now served by the Holcomb Water Treatment Plant. Figure 1.7 depicts the 1,500-foot radius of the site.

- **NH-118-3:** No water supply wells were identified within the 1,500-foot search radius of this site (Figure 1.8). The Holcomb Boulevard Water Treatment Plant provides potable water to this area of the MCB.
- **AS-1011:** Three active production wells (TC1251, AS106, and AS203) are located within the 1,500-foot radius of the site (Figure 1.9). More specifically, the locations of the wells are: TC1251 is 1,000 feet west, AS106 is 270 feet south, and AS203 is 770 feet southeast of the site.
- **1817:** No production wells were identified within the 1,500-foot search radius (Figure 1.10). This area is served by the Hadnot Point Water Treatment Plant.

7.0 SURROUNDING LAND USE

(Refer to Figures 1.2 through 1.10)

As discussed, the sites are located aboard the MCB Camp Lejeune and MCAS New River. The following is a discussion of the surrounding land use within 1,500 feet of each site.

- **TT-60:** Building TT-60 is an elementary school within the Terawa Terrace area of the MCB. The area surrounding the school on Base is primarily residential, recreational areas (ball fields), and Base maintenance facilities. North of NC Highway 24 is commercial with various types of businesses (refer to Figure 1.2).
- **SBB-94:** Building SBB-94 is a sports complex in the Courthouse Bay area of the MCB. Located within the 1,500-foot radius is the Courthouse Bay Water Treatment Plant, various training facilities, a service station/garage, dry cleaner/laundry, and the New River. Figure 1.3 depicts the 1,500-foot radius around SBB-94.
- **HP-250:** Building HP-250 is a vehicle maintenance facility located in the Hadnot Point Industrial Area (HPIA) of Camp Lejeune. The area surrounding the site is industrial. The New River lies approximately 500 feet west of the site (refer to Figure 1.4).
- **FC-280:** Building FC-280 is a vehicle maintenance facility in the French Creek area of the MCB. The area surrounding FC-280 includes various maintenance facilities, training facilities, and other military operations (refer to Figure 1.5).
- **575-2:** Building 575 is a light armored maintenance facility in the HPIA. Various maintenance facilities and military operations surround the 575 site. Cogdels Creek is located approximately 450 feet to the east-southeast of the site (refer to Figure 1.6).

- **TT-48:** Building TT-48 is the Tarawa Terrace II Elementary School. The area is primarily residential with light maintenance facilities scattered throughout. Refer to Figure 1.7 for site location and 1,500-foot search radius.
- **NH-118-3:** Building NH-118 is the Naval Hospital Vehicle Maintenance shop. Other than the hospital, the area is primarily undeveloped. The Northeast Creek is located approximately 1,500 feet to the north-northwest of the site. Unnamed tributaries of the Northeast Creek are located approximately 250 feet to the east of the site. Refer to Figure 1.8 for site location.
- **AS-1011:** This site is a residence in the Officer Enlisted Married Housing area at the New River MCAS. The area is residential to the north and east. Various military operations are located to the south and west of the site (Figure 1.9).
- **1817:** Building 1817 is a warehouse in the HPIA. The area is industrial with various military operations (Figure 1.10).

8.0 CONDITIONS AFFECTING RISK CLASSIFICATION

The limited site assessments performed at sites TT-60, SBB-94, HP-250, FC-280, 575-2, and AS-1011 did not reveal the presence of petroleum contamination. These sites should not require further assessment.

The following sites are further discussed regarding site specific conditions affecting risk classification:

- **TT-48:** The site would be deemed a "Category E" or "low priority" in accordance with the NCDEHNR March 17, 1997 "Guidelines For The Investigation and Remediation of Soil and Groundwater" (Guidelines).

The primary source (UST) has been removed. Soil contamination (TPH-diesel) was identified from the three to five foot sample interval at a concentration of 391 mg/kg. Though the depth to ground water is shallow (approximately 5.6 feet below land surface), the data indicates that ground water has not been impacted by the release.

The risk for exposure to the soil contamination is considered unlikely as long as the subsurface soils are not disturbed or brought to the surface. In addition, there are no active drinking water wells in the Tarawa Terrace area of the MCB.

- **NH-118-3:** This site would be deemed a "Category E" or "low priority" according to the NCDEHNR "Guidelines" (March 17, 1997).

The primary source (UST) has been removed. An Oil & Grease concentration (34.341 mg/kg) was identified from the 10 to 12 foot sample interval. This concentration is less than the NCDENR Action Level (250 mg/kg). Low concentrations (0.9 to 10.0 ug/kg) of halogenated and aromatic compounds were also identified. The data indicates that ground water has not been impacted by the release.

The risk for exposure to the soil contamination is considered unlikely as long as the soils are not disturbed or brought to the surface. In addition, there are no active drinking water wells located within a 1,500 foot radius of the source area.

- **1817:** In regard to the NCDEHNR March 17, 1997 "Guidelines," the site would be ranked a "Category E" or "low priority."

The primary source (UST) has been removed. Oil & Grease was identified from the 17 to 19 foot sample interval at a concentration of 162.987 mg/kg. This concentration is less than the NCDENR Action Level (250 mg/kg). Tetrachloroethene was identified at a concentration of 1.3 ug/kg. Volatile halocarbon compounds dissolved in ground water were identified ranging from 3,480.0 ug/L to 1.7 ug/L.

Due to the nature of the primary contaminants identified (tetrachloroethene, trichloroethane, cis-1,2-dichloroethene), the site may be a candidate for removal from the MCB UST Program and incorporation into the ongoing investigation under CERCLA for the HPIA.

9.0 UST AND PROPERTY OWNERSHIP

The USTs and all properties are owned by the MCB, Camp Lejeune.

10.0 RECOMMENDATIONS

Based on the limited site assessment data, the following recommendations are provided:

- Petroleum contamination was not identified at sites TT-60, SBB-94, HP-250, FC-280, 575-2, and AS-1011. No further assessment is recommended.
- Petroleum compounds were identified in soil samples from sites TT-48 and NH-118-3 at concentrations in excess of NCDENR Action Levels/reportable concentrations. Data indicates that ground water has not been impacted at either site. Based on the priority ranking criteria these sites would be considered as "low priority." Senate

Bill 1317 temporarily suspends the requirement to clean up a discharge or release from petroleum USTs for low priority sites.

- Non-petroleum contamination was identified in both the soil and ground water at site 1817 at concentrations in excess of NCDENR Action Levels and NC Groundwater Quality Standards. The site may be a candidate for the MCB IR Program for further assessment.

11.0 REFERENCES

- American Society for Testing and Materials (ASTM) Description and Identification of Soils (Visual-Manual Procedure), D2488-84, p. 409-423.
- Cardinell, A.P., Berg, S.A., and Lloyd, Jr., O.B., 1993, Hydrogeologic Frame Work of U.S. Marine Corps Base at Camp Lejeune, North Carolina: U.S. Geological Survey, Water Resources Investigations Report 93-4049, 44 pp.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. TT-48, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., July 24, 1997, Tank Closure Report, Bldg. TT-48, Camp Lejeune, NC, N62470-93-C-5310 (Final).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. SBB-94, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., July 30, 1997, Tank Closure Report, Bldg. SBB-94, Camp Lejeune, NC, N62470-93-C-5310 (Final).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 1817, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., June 30, 1997, Tank Closure Report, Bldg. 1817, Camp Lejeune, NC, N62470-93-C-5310 (Final).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. TT-60, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., July 31, 1997, Tank Closure Report, Bldg. TT-60, Camp Lejeune, NC, N62470-93-C-5310 (Final).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 118-1, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., August 1, 1997, Tank Closure Report, Bldg. 118-1, Camp Lejeune, NC, N62470-93-C-5310 (Final).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. HP-250, Camp Lejeune, NC, N62470-93-C-5310 (Draft).
- Clean-East Associates, Inc., July 29, 1997, Tank Closure Report, Bldg. HP-250, Camp Lejeune, NC, N62470-93-C-5310 (Final).
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 572-2, Camp Lejeune, NC, N62470-93-C-5310 (Draft).

Clean-East Associates, Inc., July 31, 1997, Tank Closure Report, Bldg. 572-2, Camp Lejeune, NC, N62470-93-C-5310 (Final).

Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 280, Camp Lejeune, NC, N62470-93-C-5310 (Draft).

Clean-East Associates, Inc., July 29, 1997, Tank Closure Report, Bldg. 280, Camp Lejeune, NC, N62470-93-C-5310 (Final).

Engineering & Environmental Science Company, March 26, 1997, Tank Closure Report Non-Regulated 280-Gallon Heating Fuel Oil, MCAS Housing (AS-1011), Marine Corps Base, Marine Corps Air Station, NC, N6247-98-6 (Final).

Geophex, Ltd., March 1991, Well Head Management Programs Engineering Study 91-36, Contract No. N62470-90-D-6756, 89 pp.

LeGrand, H.E., 1960, Geology and Ground Water Resources of the Wilmington-New Bern Area: North Carolina Department of Water Resources, Division of Ground Water, Ground-Water Bulletin, No. 1, 80 pp.

North Carolina Administrative Code, Title 15A, Chapter 2, Subchapter 2L, Sections .0103 through .0106, September 2, 1993, Draft Version, Groundwater Classification and Standards, North Carolina Environmental Management Commission, Raleigh, North Carolina, 22 pp.

North Carolina Administrative Code, Title 15A, Chapter 2, Subchapter 2L, November, 1993, Groundwater Classification and Standards, North Carolina Environmental Management Commission, Raleigh, North Carolina, 25 pp.

North Carolina Administrative Code, Title 15A, Chapter 2, Subchapter 2C, February 2, 1993, Well Construction Standards, North Carolina Environmental Management Commission, Raleigh, North Carolina, 26 pp.

North Carolina Administrative Code, Title 15A, Chapter 2, Subchapter 2N, January 1, 1991, Underground Storage Tanks, North Carolina Environmental Management Commission, Raleigh, North Carolina, 56 pp.

North Carolina Department of Environment, Health, & Natural Resources (NCDEHNR), March 1993, Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater, 95 pp.

Stuckey, J.L., 1965, North Carolina: Its Geology and Mineral Resources, North Carolina Department of Conservation and Development, Raleigh, North Carolina, 550 pp.

Winner, Jr., M.D., and Coble, R.W., 1989, Hydrogeologic Framework of the North Carolina Coastal Plain Aquifer System: U.S. Geological Survey, Open File Report 87-690, 150 pp.

TABLES

TABLE 5.1 (PAGE 1 OF 4)

SUMMARY OF HEADSPACE ANALYSIS

10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

SAMPLE I.D.	SAMPLE DEPTH (ft)	FID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
TT60MW01	0 - 3	200	
TT60MW01	3 - 5	100	*
TT60MW01	5 - 7	100	
TT60MW01	7 - 9	90	
TT60MW01	9 - 11	60	
SBB94MW01	0 - 2	0	
SBB94MW01	2 - 4	0	*
SBB94MW01	5 - 7	0	
SBB94MW01	10 - 12	0	
HP250MW01	0 - 3	30	
HP250MW01	3 - 5	0	
HP250MW01	5 - 7	0	*
HP250MW01	7 - 9	0	
HP250MW01	9 - 11	0	
HP250MW01	11 - 13	0	
HP250MW01	13 - 15	0	
FC280MW01	0 - 3	**	
FC280MW01	3 - 5	**	
FC280MW01	5 - 7	**	
FC280MW01	6 - 7	**	*

Notes:

FID zeroed on upgradient ambient air

FID reading = Total organic volatiles in ppm

ppm = parts per million

* = Sample submitted to laboratory for analysis

** = OVA not operating properly

TABLE 5.1 (PAGE 2 OF 4)

SUMMARY OF HEADSPACE ANALYSIS

10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

SAMPLE I.D.	SAMPLE DEPTH (ft)	FID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
FC280MW01	7 - 9	**	
FC280MW01	9 - 11	**	
FC280MW01	11 - 13	**	
575MW01	0 - 3	0	
575MW01	3 - 5	0	
575MW01	5 - 7	0	
575MW01	7 - 9	0	
575MW01	9 - 11	70	
575MW01	10 - 11	20	*
575MW01	11 - 13	70	
575MW01	13 - 15	35	
575MW01	15 - 17	2	
575MW01	17 - 20	2	
TT48MW01	0 - 3	0	
TT48MW01	3 - 5	4	*
TT48MW01	5 - 7	1	
TT48MW01	7 - 9	1	
TT48MW01	9 - 12	1	
NH118MW01	0 - 2	0	
NH118MW01	2 - 4	0	

Notes:

FID zeroed on upgradient ambient air

FID reading = Total organic volatiles in ppm

ppm = parts per million

* = Sample submitted to laboratory for analysis

** = OVA not operating properly

TABLE 5.1 (PAGE 3 OF 4)

SUMMARY OF HEADSPACE ANALYSIS

10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

SAMPLE I.D.	SAMPLE DEPTH (ft)	FID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
NH118MW01	4 - 6	3	
NH118MW01	6 - 8	3	
NH118MW01	8 - 10	3	
NH118MW01	10 - 12	8	*
NH118MW01	12 - 14	5	
NH118MW01	14 - 16	3	
NH118MW01	16 - 18	3	
NH118MW01	18 - 20	3	
AS1011MW01	0 - 3	0	*
AS1011MW01	3 - 5	0	
AS1011MW01	5 - 7	1	
AS1011MW01	10 - 12	0	
1817MW01	0 - 3	6	
1817MW01	3 - 5	0	
1817MW01	5 - 7	0	
1817MW01	7 - 9	0	
1817MW01	9 - 11	0	
1817MW01	11 - 13	0	
1817MW01	13 - 15	0	
1817MW01	15 - 17	0	

Notes:

FID zeroed on upgradient ambient air

FID reading = Total organic volatiles in ppm

ppm = parts per million

* = Sample submitted to laboratory for analysis

** = OVA not operating properly

TABLE 5.1 (PAGE 4 OF 4)**SUMMARY OF HEADSPACE ANALYSIS****10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

SAMPLE I.D.	SAMPLE DEPTH (ft)	FID READING (ppm)	SAMPLE SELECTED FOR LABORATORY ANALYSIS
1817MW01	17 - 19	0	*
1817MW01	19 - 21	0	
1817MW01	21 - 23	0	
1817MW01	23 - 25	0	

FC280MW01 was installed in the "worst-case" location in the vicinity of the tank basin; however, in order to receive a non-saturated, native soil sample for laboratory analysis, the soil sample was retrieved 5 feet outside of the tank basin and 6' -7' BLS.

575MW01 was installed in the "worst-case" location in the vicinity of the tank basin; however, in order to receive a non-saturated, native soil sample for laboratory analysis, the soil sample was retrieved 10 feet outside of the tank basin and 10' -11' BLS.

TT48MW01 was installed in the "worst-case" location in the vicinity of the tank basin; however, in order to receive a non-saturated, native soil sample for laboratory analysis, the soil sample was retrieved 9 feet outside of the tank basin and 3' -5' BLS.

Notes:

FID zeroed on upgradient ambient air

FID reading = Total organic volatiles in ppm

ppm = parts per million

* = Sample submitted to laboratory for analysis

** = OVA not operating properly

TABLE 5.2A (Page 1 of 1)

SUMMARY OF LABORATORY ANALYTICAL RESULTS - SOIL

TPH AND OIL & GREASE -
EPA METHODS 5030/8015, 3550/8015, AND 9071

10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

SAMPLE I.D.	DATE SAMPLED	SAMPLE DEPTH (ft)	LABORATORY RESULTS		
			TPH GASOLINE (mg/Kg)	TPH DIESEL (mg/Kg)	OIL & GREASE (mg/Kg)
TT60MW01	8/8/97	3 - 5	BDL	BDL	NA
SBB94MW01	8/13/97	2 - 4	BDL	NA	NA
HP250MW01	8/14/97	5 - 7	BDL	BDL	NA
FC280MW01	8/15/97	6 - 7	BDL	BDL	NA
575MW01	8/18/97	10 - 11	BDL	BDL	NA
TT48MW01	8/11/97	3 - 5	BDL	391	NA
NH118MW01	8/13/97	10 - 12	NA	NA	34.341
AS1011MW01	8/14/97	0 - 3	BDL	BDL	NA
1817MW01	8/14/97	17 - 19	NA	NA	162.987
WASTE SOIL	8/26/97	Composite	BDL	BQL	594.851
NCDENR ACTION LEVELS			10	40	250

NOTES:

mg/Kg = parts per million (ppm)

BDL = Below Detection Limits

BQL = Below Quantitation Limits

NA = Not Analyzed

Shaded areas indicate concentrations above NCDENR Action Levels.

TABLE 5.2B (Page 1 of 1)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* - SOIL
HALOGENATED AND AROMATIC VOLATILES - EPA METHOD 8021**

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	REPORTABLE LEVEL⁽¹⁾	NH118MW01 (10-12')	1817MW01 (17-19')	WASTE SOIL
DATE SAMPLED		8/13/97	8/14/97	8/26/97
ANALYTE				
1,3,5-Trimethylbenzene	MDL	1.4	BDL	BDL
1,2,4-Trimethylbenzene	MDL	6.5	BDL	BDL
sec-Butylbenzene	MDL	0.9	BDL	BDL
n-Butylbenzene	MDL	3.9	BDL	BDL
Naphthalene	MDL	10.0	BDL	BDL
tert-Butylbenzene	MDL	0.9	BDL	BDL
Tetrachloroethene	MDL	BDL	1.3	BDL
All other compounds**	MDL	BDL	BDL	BDL
TOTALS		23.6	1.3	BDL

* Results in ug/kg = parts per billion (ppb)

** All other compounds listed in Laboratory Analytical Reports in Appendix F.

MDL Method Detection Limit

⁽¹⁾ NCDEHNR "Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater", March 17, 1997.

BDL Below Detection Limits

Shaded areas indicate reportable concentrations.

TABLE 5.2C (Page 1 of 1)

SUMMARY OF LABORATORY ANALYTICAL RESULTS* - SOIL

TCLP RCRA METALS - EPA METHOD 1311

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	REPORTABLE LEVEL⁽¹⁾	NH118MW01 (10-12')	1817MW01 (17-19')	WASTE SOIL
DATE SAMPLED		8/13/97	8/14/97	8/26/97
ANALYTE				
Arsenic	MDL	BQL	BDL	BQL
Barium	MDL	BQL	BQL	BQL
Cadmium	MDL	BQL	BQL	BDL
Chromium	MDL	BQL	BQL	BQL
Lead	MDL	BQL	BQL	BDL
Mercury	MDL	BQL	BQL	BQL
Selenium	MDL	BQL	BQL	BQL
Silver	MDL	BQL	BQL	BQL

* All results in ug/kg = parts per billion (ppb)

(1) NCDEHNR "Groundwater Section Guidelines for the Investigation and remediation of Soil and Groundwater," March 17, 1997.

BDL Below Detection Limits

BQL Below Quantitation Limits

MDL Method Detection Limit

TABLE 5.3A (Page 1 of 2)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES**

PURGEABLE AROMATICS + EDB - EPA METHODS 602 AND 504.1

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	N.C. GROUND WATER STANDARD*	TT60MW01	SBB94MW01	HP250MW01	FC280MW01	575MW01
DATE SAMPLED		8/25/97	8/25/97	8/25/97	8/25/97	8/25/97
ANALYTE						
Benzene	1	BDL	NA	BDL	BDL	BDL
Toluene	1000	BDL	NA	BDL	BDL	BDL
Chlorobenzene	50	BDL	NA	BDL	BDL	BDL
Ethylbenzene	29	BDL	NA	BDL	BDL	BDL
Xylenes	530	BDL	NA	BDL	BDL	BDL
1,3 Dichlorobenzene	620	BDL	NA	BDL	BDL	BDL
1,4 Dichlorobenzene	75	BDL	NA	BDL	BDL	BDL
1,2 Dichlorobenzene	620	BDL	NA	BDL	BDL	BDL
1,2-Dibromoethane (EDB)	.0004	NA	BDL	NA	NA	NA
TOTALS		BDL	BDL	BDL	BDL	BDL

* All results in ug/L = parts per billion (ppb)

NA Not Analyzed

BDL Below Detection Limits

TABLE 5.3A (Page 2 of 2)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES**

PURGEABLE AROMATICS + EDB - EPA METHODS 602 AND 504.1

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

DATE SAMPLED	N.C. GROUND WATER STANDARD*	575MW01 DUPLICATE	TT48MW01	AS1011MW01	WASTE WATER	QC TRIP
ANALYTE						
Benzene	1	BDL	BDL	BDL	NA	BDL
Toluene	1000	BDL	BDL	BDL	NA	BDL
Chlorobenzene	50	BDL	BDL	BDL	NA	BDL
Ethylbenzene	29	BDL	BDL	BDL	NA	BDL
Xylenes	530	BDL	BDL	BDL	NA	BDL
1,3 Dichlorobenzene	620	BDL	BDL	BDL	NA	BDL
1,4 Dichlorobenzene	75	BDL	BDL	BDL	NA	BDL
1,2 Dichlorobenzene	620	BDL	BDL	BDL	NA	BDL
1,2-Dibromoethane (EDB)	.0004	NA	NA	NA	BDL	NA
TOTALS		BDL	BDL	BDL	BDL	BDL

* All results in ug/L = parts per billion (ppb)

NA Not Analyzed

BDL Below Detection Limits

TABLE 5.3B (Page 1 of 2)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES**

BASE/NEUTRAL AND ACID EXTRACTABLES + 10 LARGEST PEAKS - EPA METHOD 625

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	N.C. GROUND WATER STANDARD*	TT60MW01	HP250MW01	FC280MW01	FC280MW01 DUPLICATE	575MW01	TT48MW01
DATE SAMPLED		8/25/97	8/25/97	8/25/97	8/25/97	8/25/97	8/26/97
ANALYTE		BASE/NEUTRAL EXTRACTABLES					
Naphthalene	21	15.3	BDL	BDL	BDL	BDL	BDL
All Other Compounds**	Varies	BDL	BDL	BDL	BDL	BDL	BDL
TOTALS		15.3	BDL	BDL	BDL	BDL	BDL
ANALYTE		10 LARGEST PEAKS+					
Tetrachloroethene	0.7	ND	ND	ND	ND	ND	ND
Unknown	NE	ND	25	ND	ND	ND	ND
Unknown Hydrocarbon	NE	48	ND	ND	ND	ND	14
Pentadecane	NE	10	ND	ND	ND	ND	ND
Hexadecane	NE	18	ND	ND	ND	ND	ND
Heptadecane	NE	15	ND	ND	ND	ND	ND

* All results in ug/L = parts per billion (ppb)

** All other compounds listed in Laboratory Analytical Reports in Appendix F.

+ Estimation of Concentration

NE None Established

ND Not Detected

BDL Below Detection Limits

TABLE 5.3B (Page 2 of 2)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES**

BASE/NEUTRAL AND ACID EXTRACTABLES + 10 LARGEST PEAKS - EPA METHOD 625

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	N.C. GROUND WATER STANDARD*	NH118MW01	AS1011MW01	1817MW01	WASTE WATER	QC TRIP
DATE SAMPLED		8/26/97	8/26/97	8/26/97	8/26/97	8/25/97
ANALYTE		BASE/NEUTRAL EXTRACTABLES				
Naphthalene	21	BDL	BDL	BDL	BDL	BDL
All Other Compounds**	Varies	BDL	BDL	BDL	BDL	BDL
TOTALS		BDL	BDL	BDL	BDL	BDL
ANALYTE		10 LARGEST PEAKS+				
Tetrachloroethene	0.7	ND	ND	490	ND	ND
Unknown	NE	ND	ND	13	ND	ND
Unknown Hydrocarbon	NE	ND	ND	ND	ND	ND
Pentadecane	NE	ND	ND	ND	ND	ND
Hexadecane	NE	ND	ND	ND	ND	ND
Heptadecane	NE	ND	ND	ND	ND	ND

* All results in ug/L = parts per billion (ppb)

** All other compounds listed in Laboratory Analytical Reports in Appendix F.

+ Estimation of Concentration

NE None Established

ND Not Detected

BDL Below Detection Limits

TABLE 5.3C (Page 1 of 1)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES**

VOLATILE HALOCARBONS - STANDARD METHOD 6230D

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	NC GROUND WATER STANDARD*	SBB94MW01	NH118MW01	NH118MW01 DUPLICATE	1817MW01	WASTE WATER
DATE SAMPLED		8/25/97	8/26/97	8/26/97	8/26/97	8/26/97
ANALYTE						
1,1,1-Trichloroethane	200	BDL	BDL	BDL	4.9	BDL
Trichloroethene	2.8	BDL	BDL	BDL	320.0	3.1
Carbon Tetrachloride	0.3	BDL	BDL	BDL	BDL	BDL
m/o/p-Xylene	530	1.8	BDL	BDL	BDL	BDL
trans-1,2-Dichloroethene	70	BDL	BDL	BDL	1.8	BDL
Tetrachloroethene	.7	BDL	BDL	BDL	3,480.0	44.3
cis-1,2-Dichloroethene	70	BDL	BDL	BDL	620.0	5.1
Methyl Tert-Butyl Ether	200	BDL	BDL	BDL	1.7	BDL
Dichlorodifluoromethane	1,400	BDL	BDL	BDL	BDL	1.6
All Other Compounds**	Varies	BDL	BDL	BDL	BDL	BDL
TOTALS:		1.8	BDL	BDL	4,428.4	54.1

* All results in ug/L = parts per billion (ppb)

** All other compounds listed in Laboratory Analytical Reports in Appendix F.

BDL Below Detection Limits

Shaded areas indicate concentrations in excess of NCAC T15A:02L Standards.

TABLE 5.3D (Page 1 of 1)

**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES**

TOTAL LEAD - EPA METHODS 3030C/239.2

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	NC GROUND WATER STANDARD*	SBB94MW01	SBB94MW01 DUPLICATE
DATE SAMPLED		8/25/97	8/25/97
ANALYTE			
Lead	0.015	BQL	BQL

* All results in ug/L = parts per billion (ppb)

BQL Below Quantitation Limits

TABLE 5.3E**SUMMARY OF LABORATORY ANALYTICAL RESULTS* -
MONITORING WELL GROUND WATER SAMPLES****TOTAL RCRA METALS - EPA METHOD 3030C****10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

	NC GROUND WATER STANDARD*	NH118MW01	1817MW01	WASTE WATER
DATE SAMPLED		8/26/97	8/26/97	8/26/97
ANALYTE				
Arsenic	0.05	BQL	BQL	0.018
Barium	2.0	BQL	BQL	BQL
Cadmium	0.005	BQL	BQL	BQL
Chromium	0.05	BQL	BQL	0.061
Lead	0.015	BDL	BDL	BQL
Mercury	0.0011	BQL	BQL	BQL
Selenium	0.05	BDL	BQL	BQL
Silver	0.018	BQL	BQL	BQL

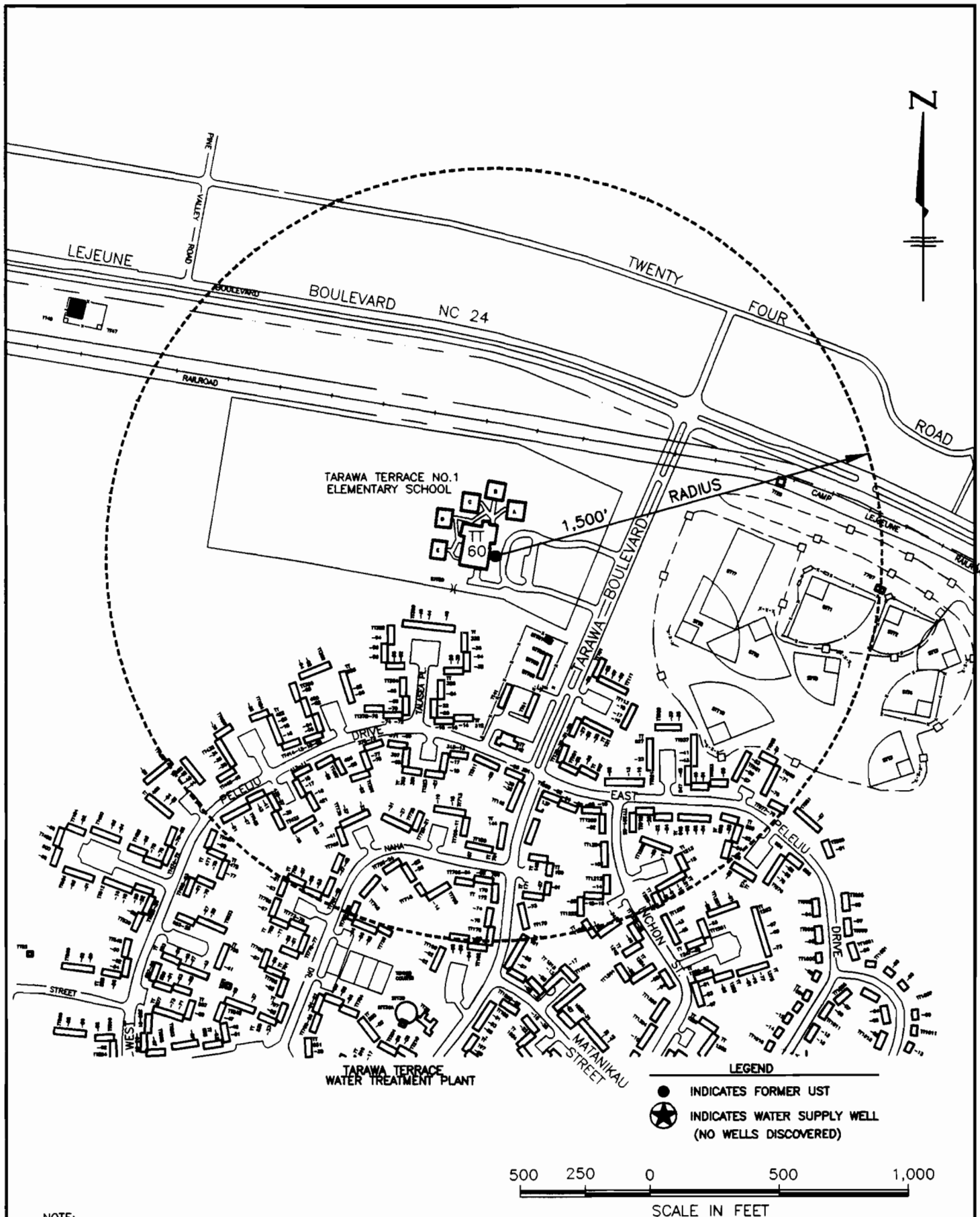
* All results in mg/L = parts per million (ppm)

BDL Below Detection Limits

BQL Below Quantitation Limits

Shaded areas indicate concentrations in excess of NCAC T15A:02L Standards.

FIGURES



NOTE:
MAP ADAPTED FROM CAMP LEJEUNE DATABASE

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PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
SITE LOCATION—
TT-60

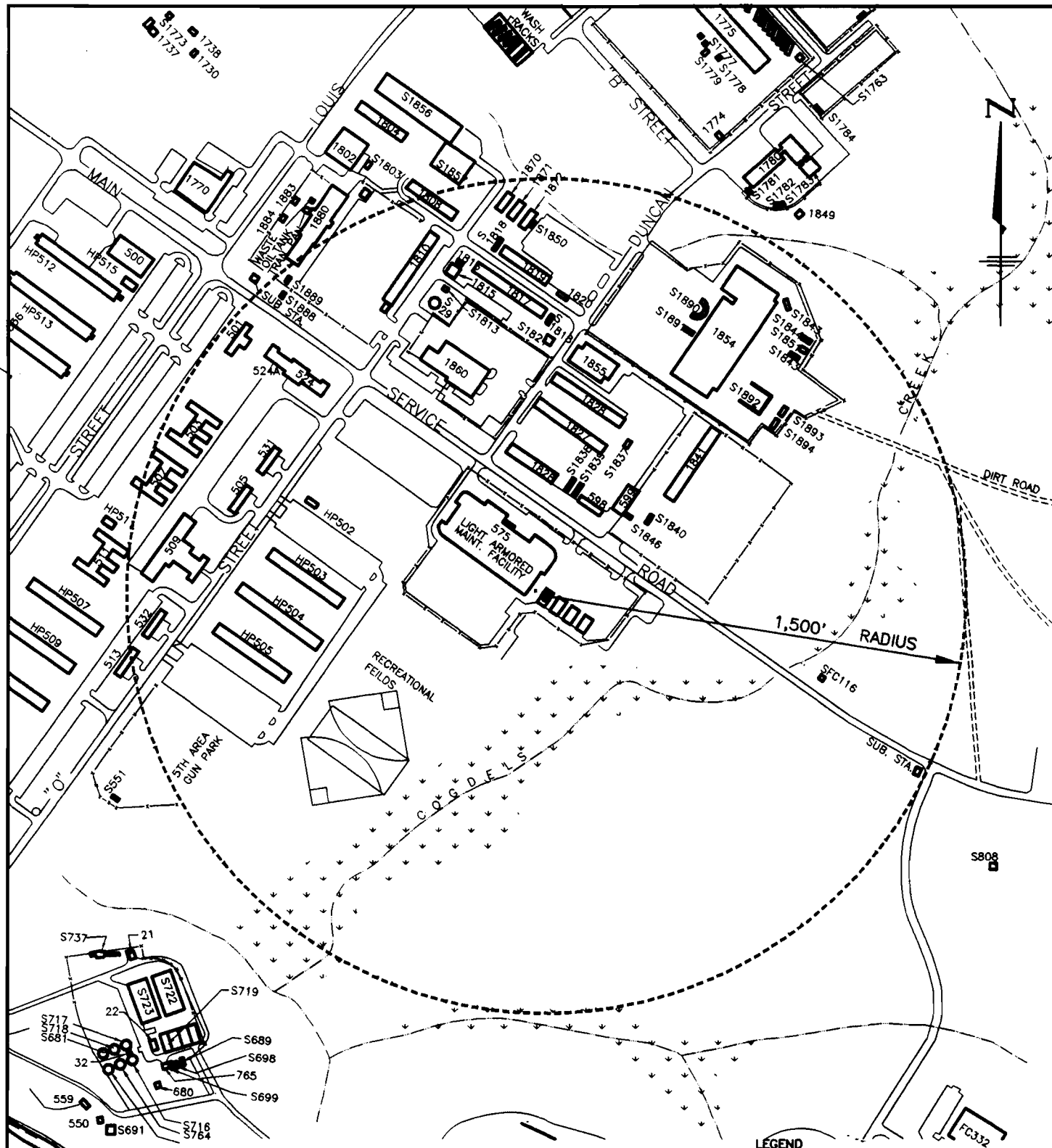
FIGURE

1.2

JOB NO: 97147 DATE: DEC 1997 SCALE: 1"=500' DRAWN BY: WHW CHECKED BY: TMP



1.5



NOTE:
MAP ADAPTED FROM CAMP LEJEUNE DATABASE

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PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

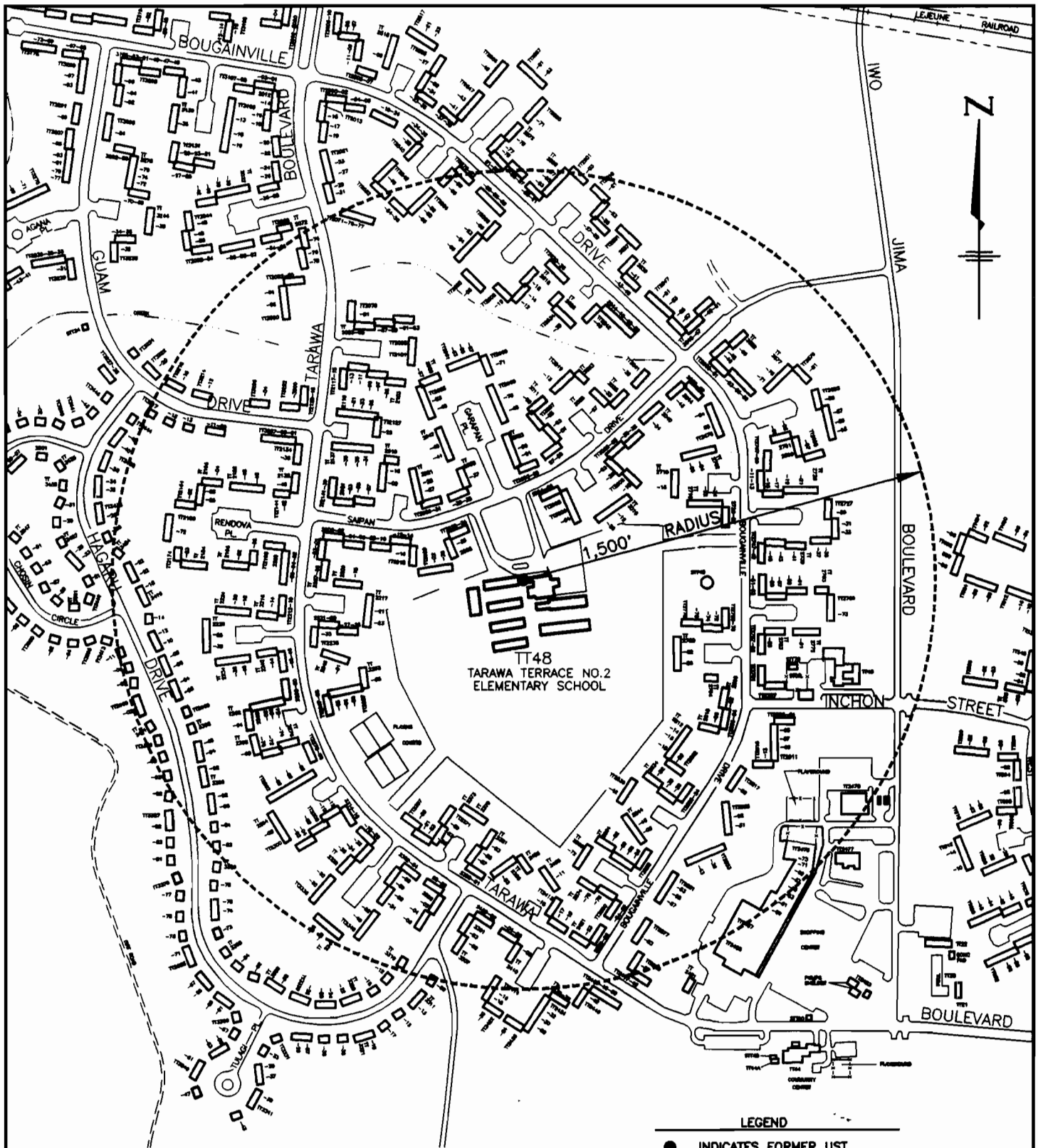
JOB NO: 97147 DATE: DEC 1997

TITLE
SITE LOCATION—
575-2

SCALE: 1"=500' DRAWN BY: WHW CHECKED BY: TMP

FIGURE

1.6



LEGEND

- INDICATES FORMER UST
- ★ INDICATES WATER SUPPLY WELL
(NO WELLS DETECTED)



NOTE:
MAP ADAPTED FROM CAMP LEJEUNE DATABASE

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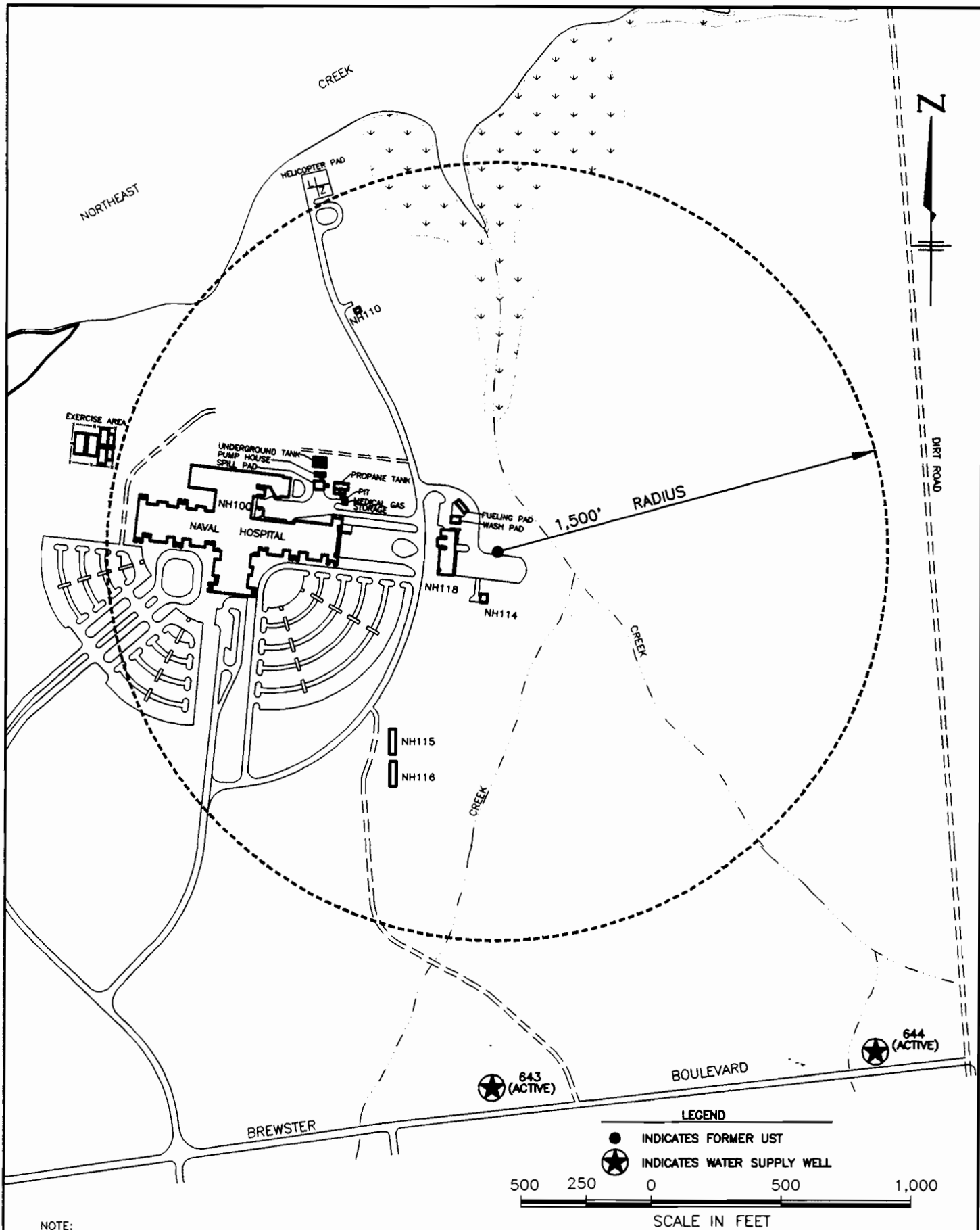
PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
SITE LOCATION—
TT-48

FIGURE

1.7

JOB NO: 97147 DATE: DEC 1997 SCALE: 1"=500' DRAWN BY: WHW CHECKED BY: TMP



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10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
SITE LOCATION—
NH-118-3

FIGURE

1.8

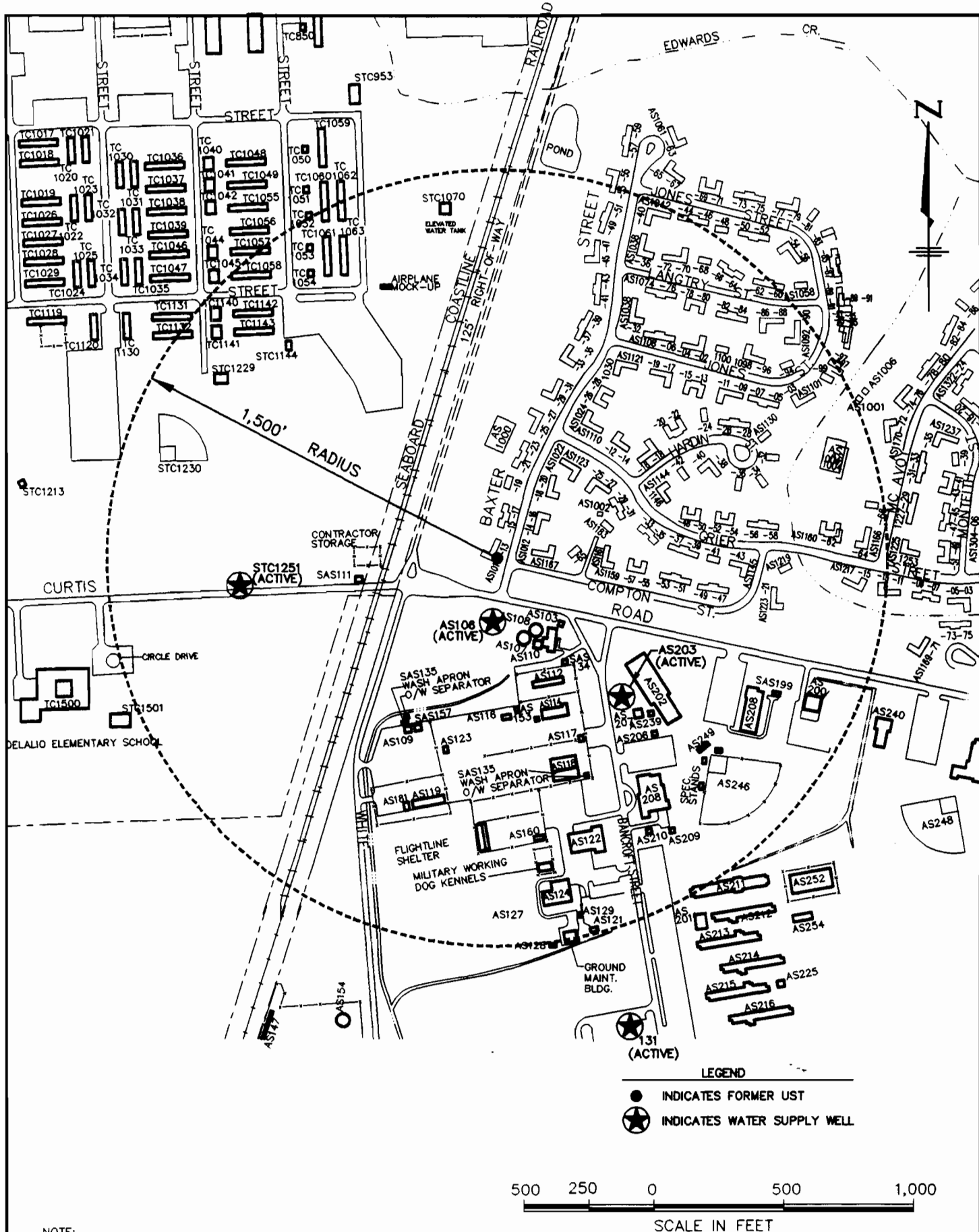
JOB NO: 97147

DATE: DEC 1997

SCALE: 1"=500'

DRAWN BY: WHW

CHECKED BY: TMP



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PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

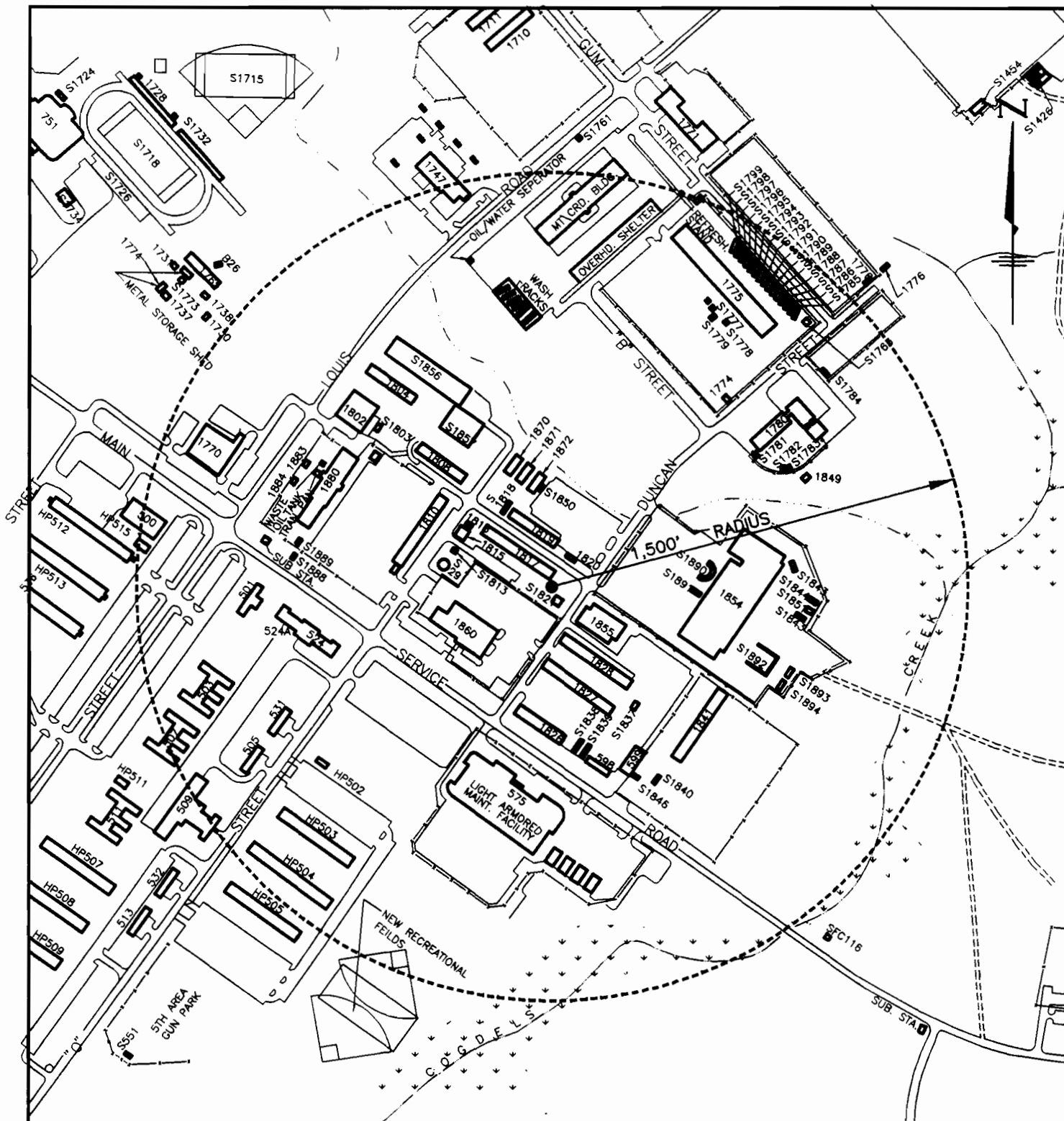
TITLE
SITE LOCATION-
AS-1011

FIGURE

1.9

JOB NO. 97147 DATE: DEC 1997

SCALE: 1"=500' DRAWN BY: WHW CHECKED BY: TMP



NOTE:
MAP ADAPTED FROM CAMP LEJEUNE DATABASE

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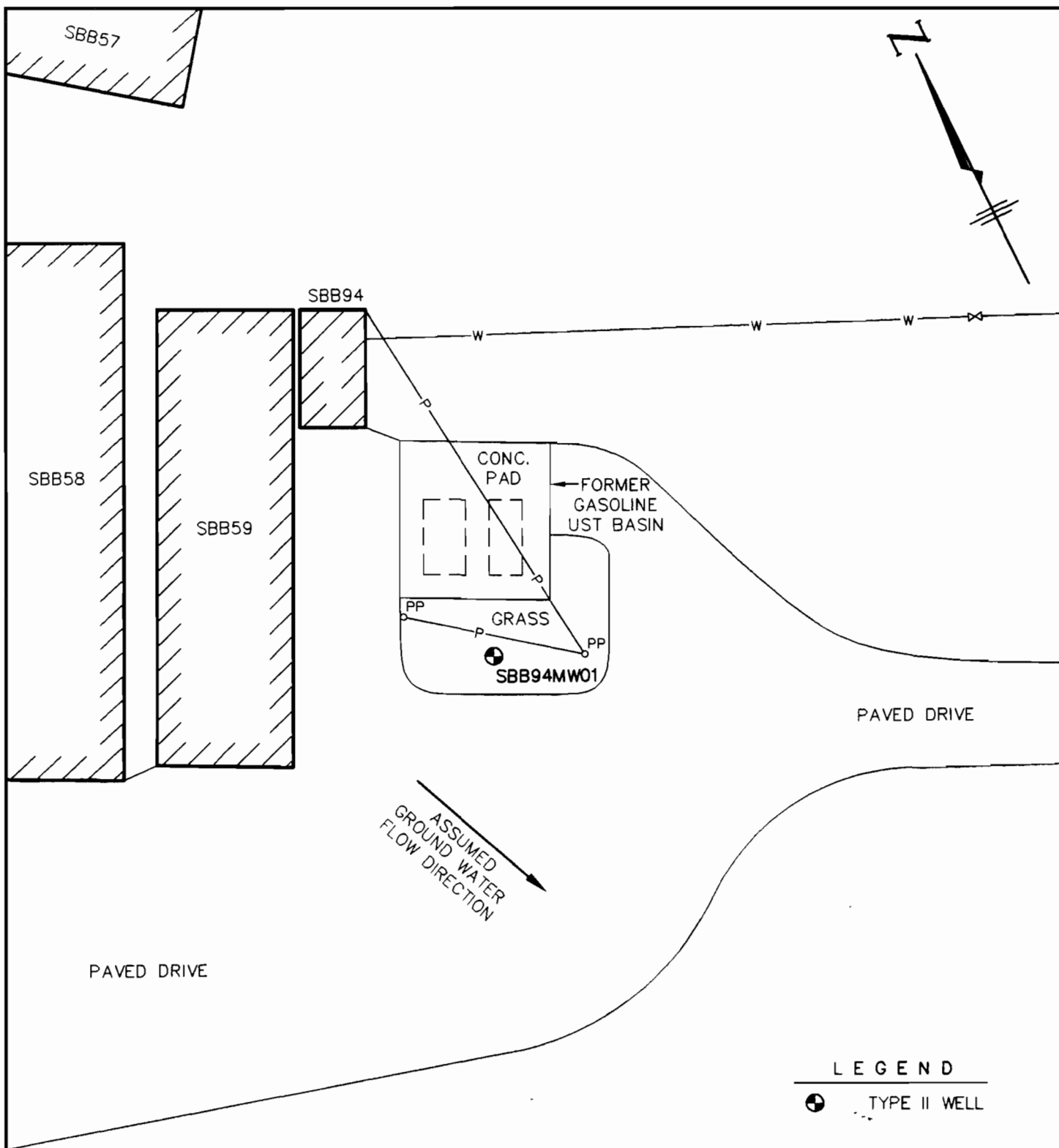
PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
SITE LOCATION-
1817

FIGURE

1.10

JOB NO: 97147 DATE: DEC 1997 SCALE: 1"=500' DRAWN BY: WHW CHECKED BY: TMP

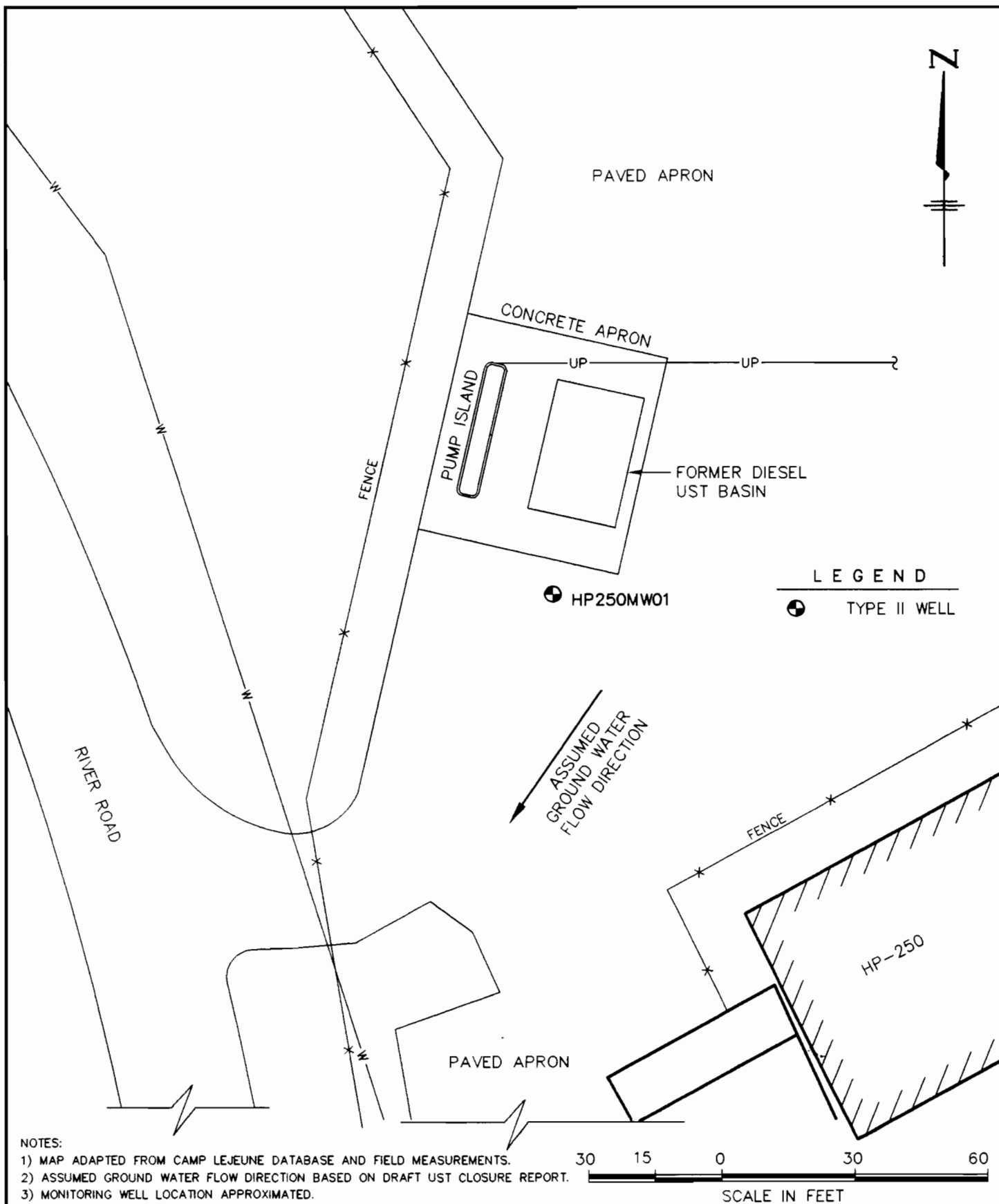


NOTES:

- 1) MAP ADAPTED FROM CAMP LEJEUNE DATABASE AND FIELD MEASUREMENTS.
- 2) ASSUMED GROUND WATER FLOW DIRECTION BASED ON DRAFT UST CLOSURE REPORT.
- 3) MONITORING WELL LOCATION APPROXIMATED.



CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT	TITLE		FIGURE
	10 UST SITES MARINE CORPS BASE CAMP LEJEUNE, N.C.	SITE PLAN- SBB-94		5.2
JOB NO: 97147	DATE: DEC 1997	SCALE: 1"=30'	DRAWN BY: WHW	CHECKED BY: TMP



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PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
SITE PLAN-
HP-250

FIGURE

5.3

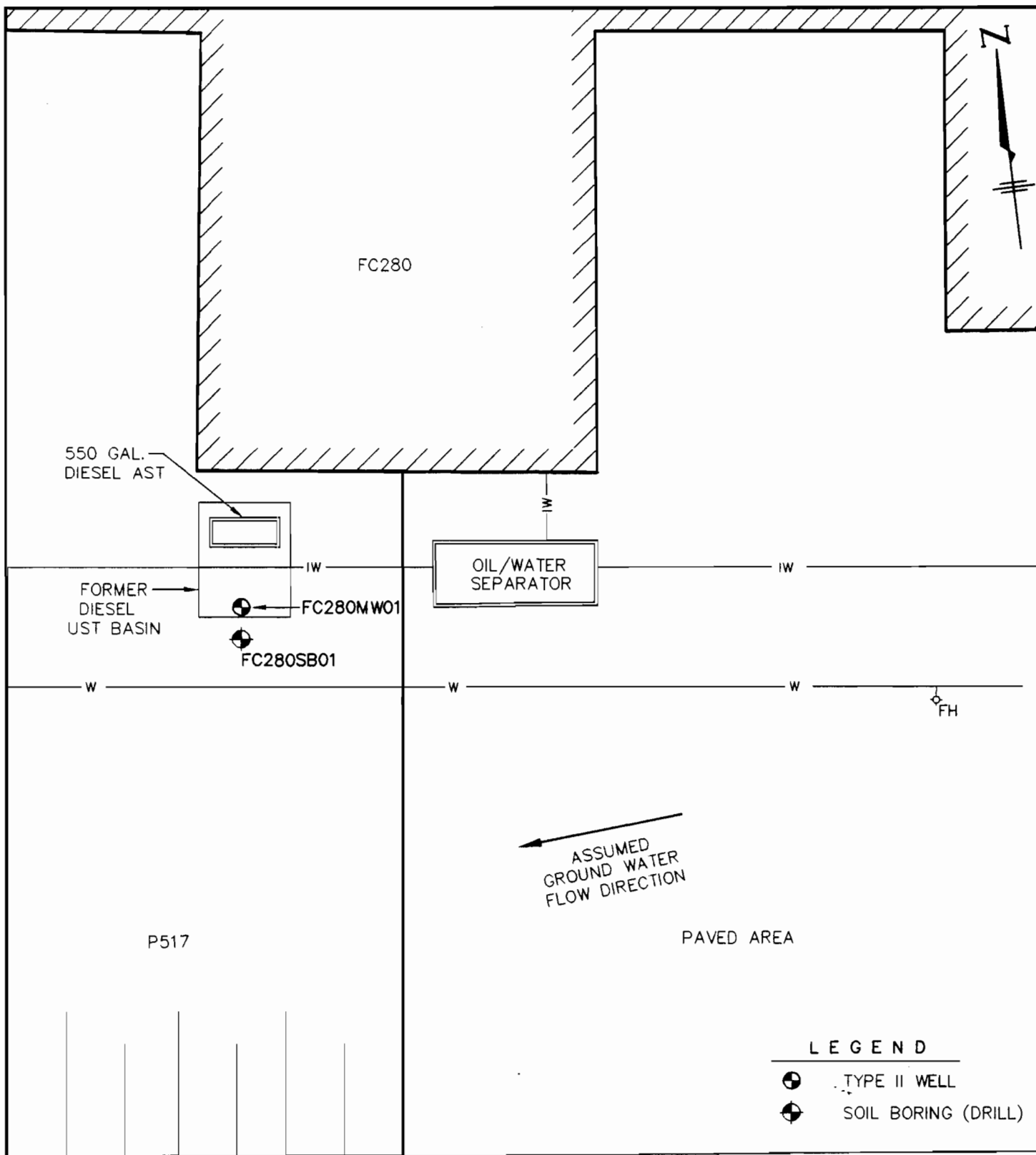
JOB NO: 97147

DATE: DEC 1997

SCALE: 1"=30'

DRAWN BY: WHW

CHECKED BY: TMP



NOTES:

- 1) MAP ADAPTED FROM CAMP LEJEUNE DATABASE AND FIELD MEASUREMENTS.
- 2) ASSUMED GROUND WATER FLOW DIRECTION BASED ON DRAFT UST CLOSURE REPORT.
- 3) MONITORING WELL LOCATION APPROXIMATED.

30 15 0 30 60
SCALE IN FEET

LEGEND

- ⊕ TYPE II WELL
- ⊕ SOIL BORING (DRILL)

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PROJECT
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
SITE PLAN-
FC-280

FIGURE

5.4

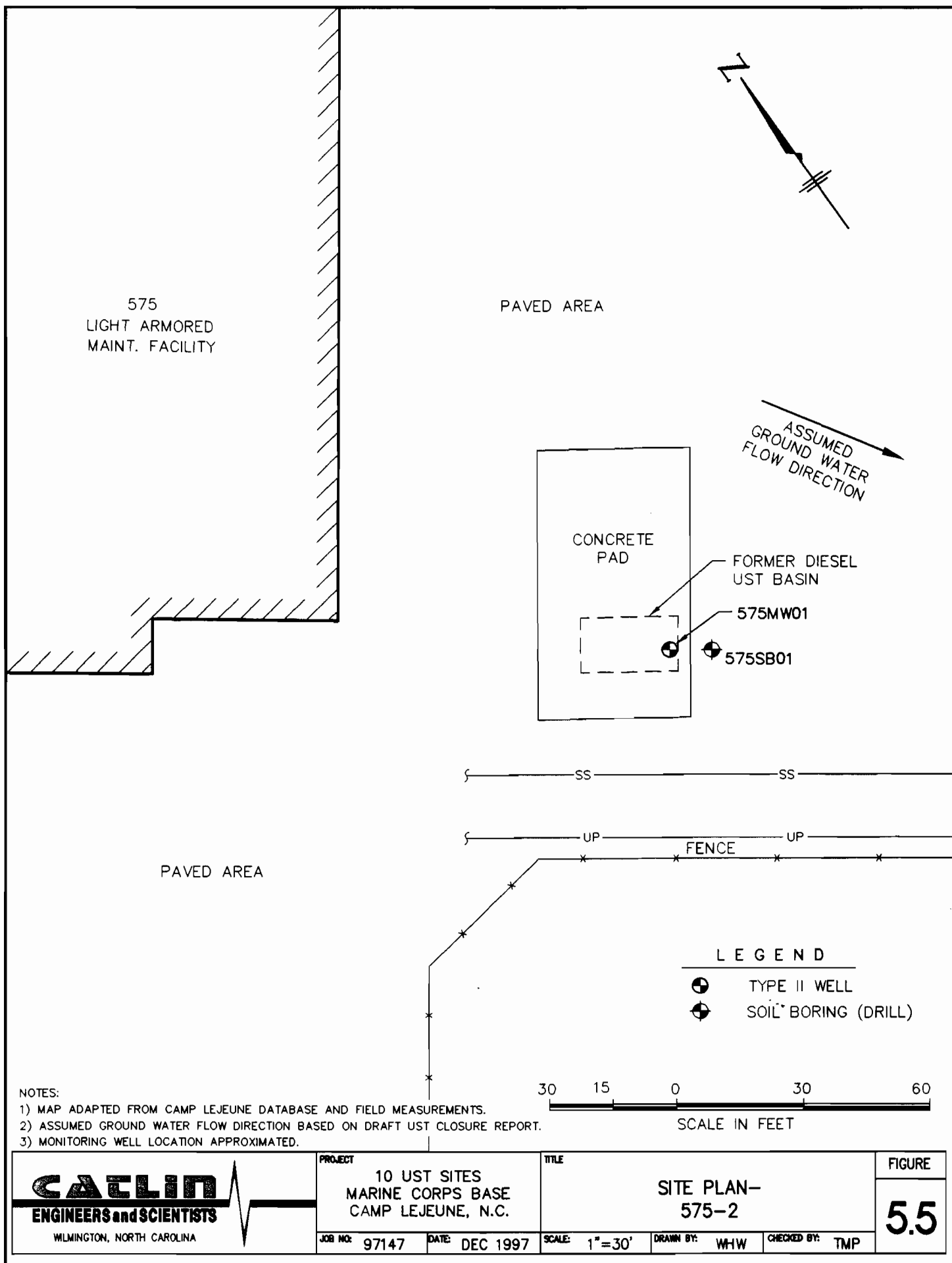
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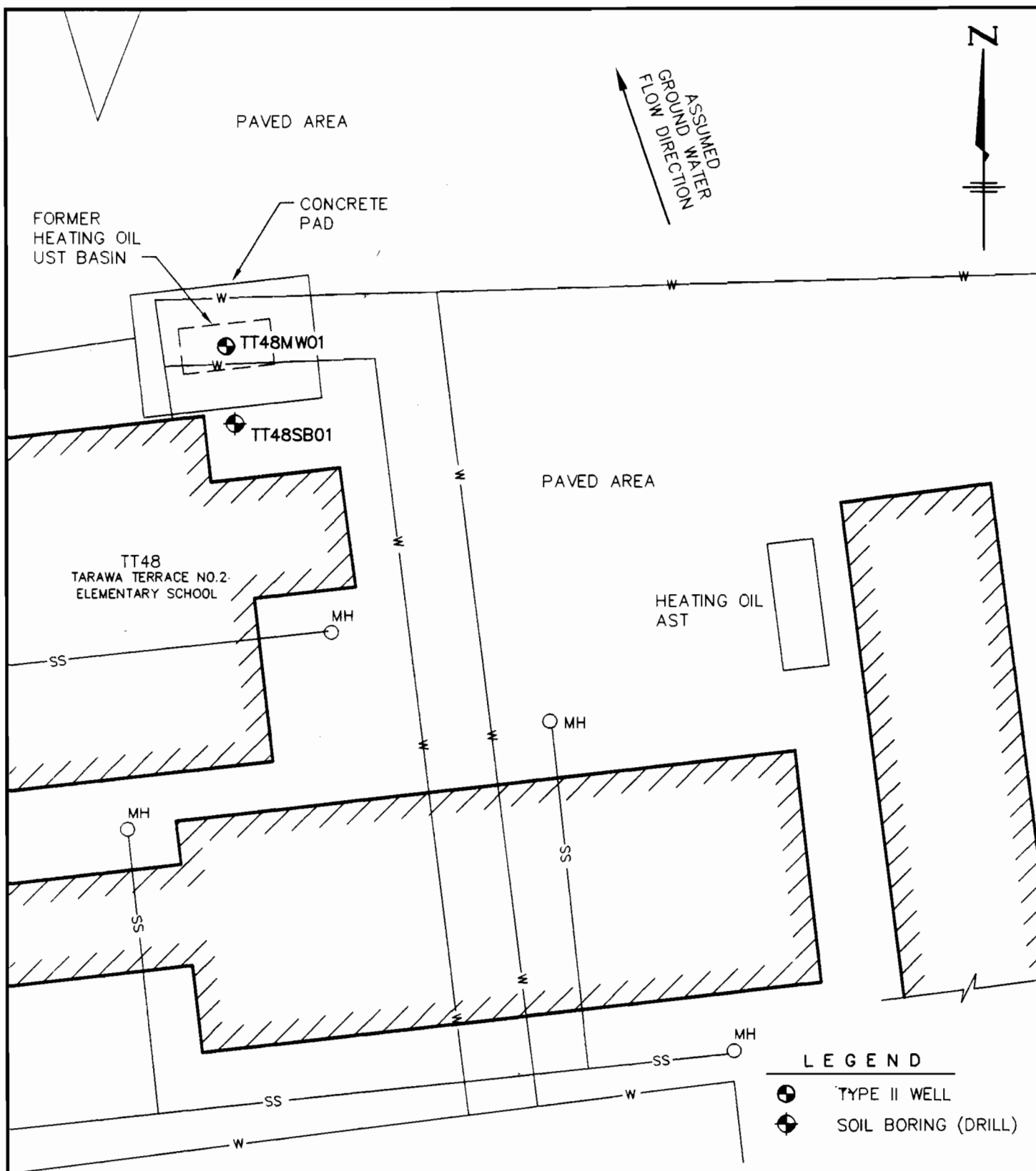
DATE: DEC 1997

SCALE: 1"=30'

DRAWN BY: WHW

CHECKED BY: TMP





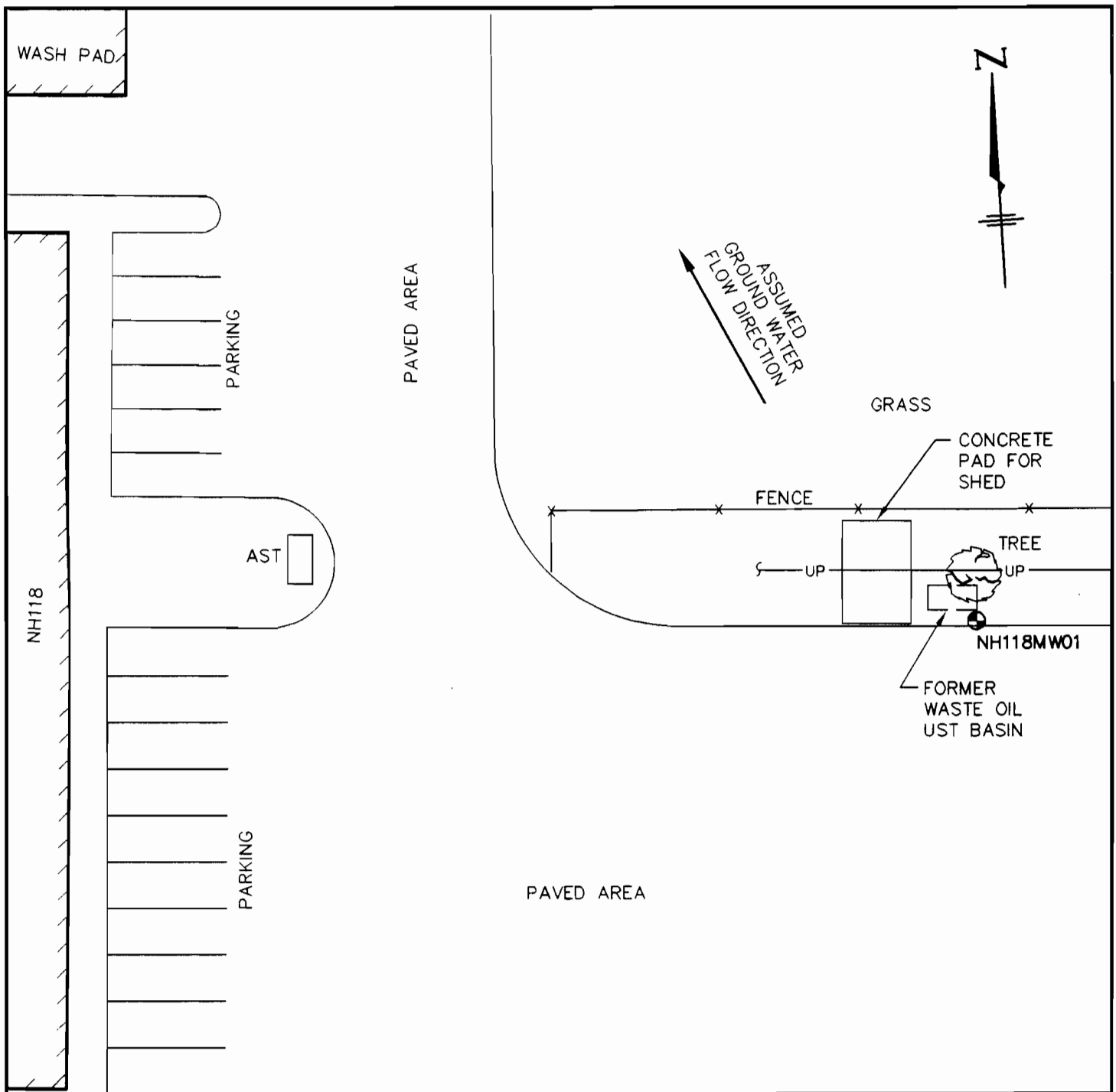
NOTES:

- 1) MAP ADAPTED FROM CAMP LEJEUNE DATABASE AND FIELD MEASUREMENTS.
- 2) ASSUMED GROUND WATER FLOW DIRECTION BASED ON DRAFT UST CLOSURE REPORT.
- 3) MONITORING WELL LOCATION APPROXIMATED.

30 15 0 30 60

SCALE IN FEET

CALIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT 10 UST SITES MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN- TT-48	FIGURE 5.6
	JOB NO: 97147	DATE: DEC 1997	SCALE: 1"=30' DRAWN BY: WHW CHECKED BY: TMP



LEGEND

⊕ TYPE II WELL



NOTES:

- 1) MAP ADAPTED FROM CAMP LEJEUNE DATABASE AND FIELD MEASUREMENTS.
- 2) ASSUMED GROUND WATER FLOW DIRECTION BASED ON DRAFT UST CLOSURE REPORT.
- 3) MONITORING WELL LOCATION APPROXIMATED.

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PROJECT

10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE

SITE PLAN-
NH-118-3

FIGURE

5.7

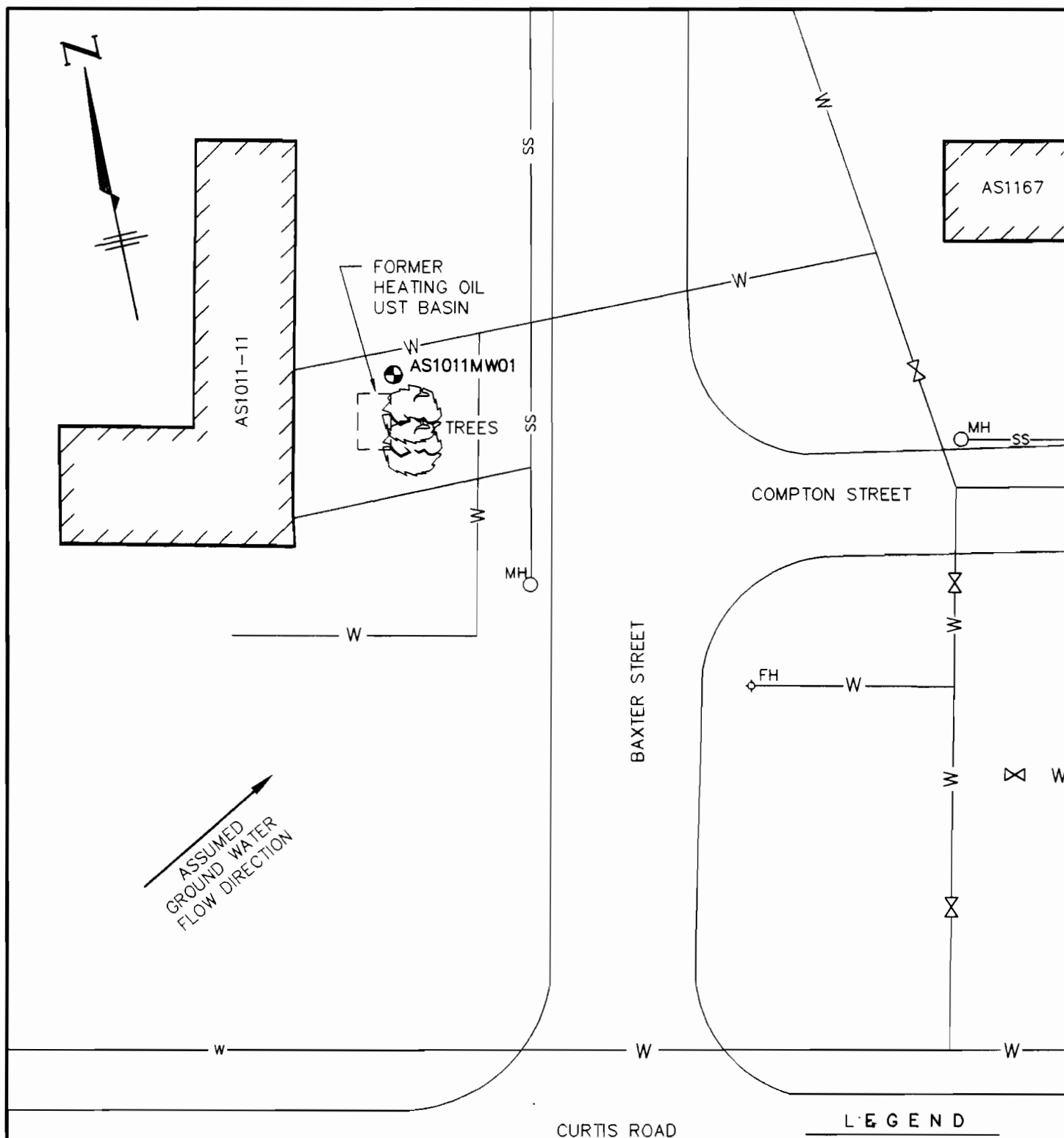
JOB NO: 97147

DATE: DEC 1997

SCALE: 1"=30'

DRAWN BY: WHW

CHECKED BY: TMP

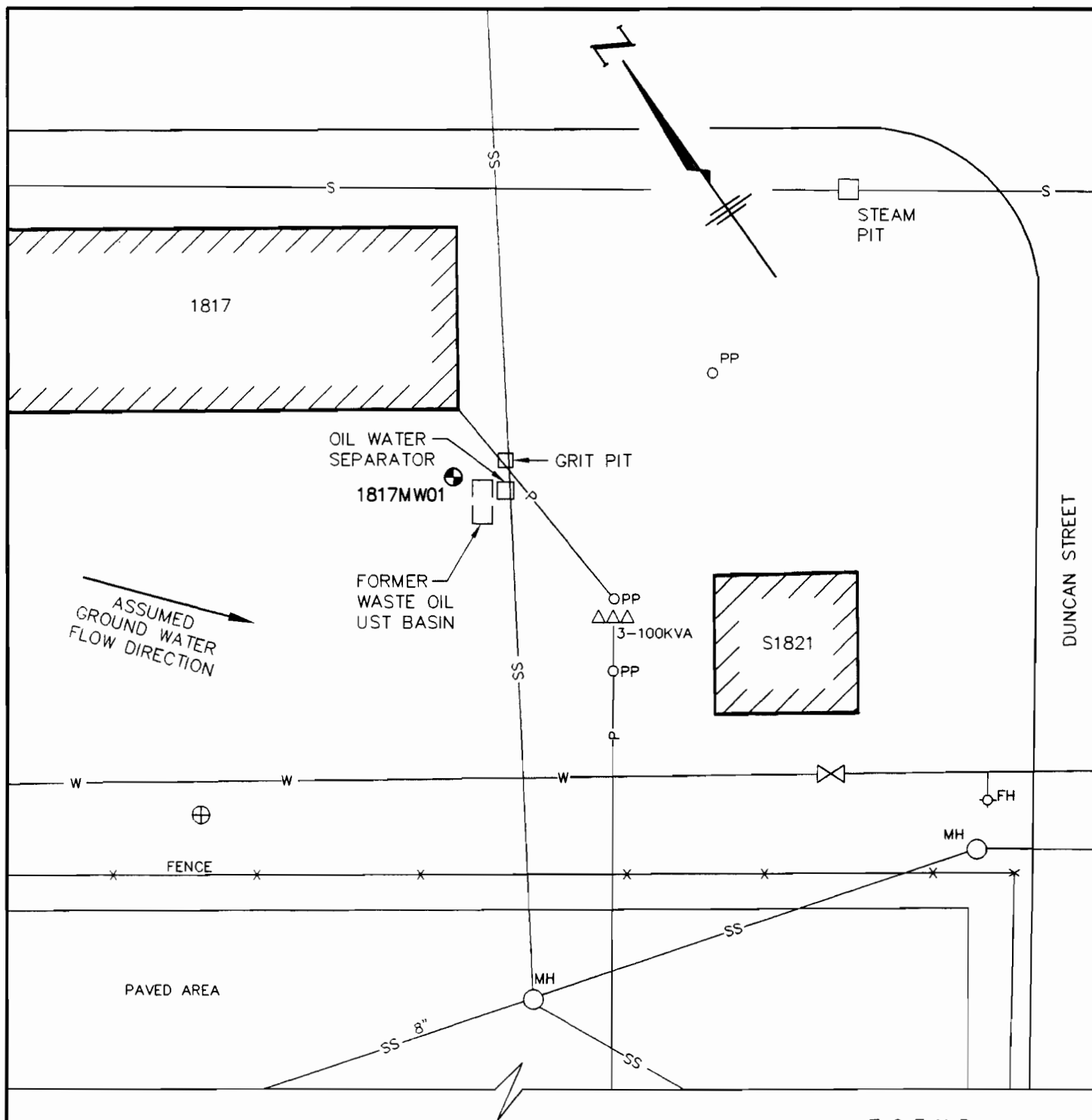


NOTES:

- 1) MAP ADAPTED FROM CAMP LEJEUNE DATABASE AND FIELD MEASUREMENTS.
- 2) ASSUMED GROUND WATER FLOW DIRECTION BASED ON DRAFT UST CLOSURE REPORT.
- 3) MONITORING WELL LOCATION APPROXIMATED.

30 15 0 30 60
SCALE IN FEET

CAELIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT 10 UST SITES MARINE CORPS BASE CAMP LEJEUNE, N.C.	TITLE SITE PLAN- AS-1011	FIGURE 5.8
JOB NO: 97147	DATE: DEC 1997	SCALE: 1"=30'	DRAWN BY: WHW
		CHECKED BY: TMP	



LEGEND

NEW EXISTING
 ⊕ ⊕ TYPE II WELL

NOTES:

- 1) MAP ADAPTED FROM CAMP LEJEUNE DATABASE AND FIELD MEASUREMENTS.
- 2) ASSUMED GROUND WATER FLOW DIRECTION BASED ON DRAFT UST CLOSURE REPORT.
- 3) MONITORING WELL LOCATION APPROXIMATED.



CAELIN
 ENGINEERS and SCIENTISTS
 WILMINGTON, NORTH CAROLINA

PROJECT
 10 UST SITES
 MARINE CORPS BASE
 CAMP LEJEUNE, N.C.

TITLE
 SITE PLAN-
 1817

FIGURE

5.9

JOB NO: 97147 DATE: DEC 1997 SCALE: 1"=30' DRAWN BY: WHW CHECKED BY: TMP

APPENDICES

APPENDIX A

COMPREHENSIVE SITE ASSESSMENT WORKPLAN

**LEAKING UNDERGROUND STORAGE TANK (LUST)
WELL INSTALLATION AND MONITORING WORKPLAN**

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

Issued: August 5, 1997

**Contract No. N62470-95-D-6009
Delivery Order No. 0020
Richard Catlin & Associates, Inc. Project No. 97147-A**

Prepared by:

**Richard Catlin & Associates, Inc.
Wilmington, North Carolina**

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APPENDICES

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Appendix II	Boring Log As-Built Well Detail NC Well Construction Record Well Sampling Worksheet Chain of Custody Record
Appendix III	Project Schedule

LEAKING UNDERGROUND STORAGE TANK (LUST)
WELL INSTALLATION AND MONITORING WORKPLAN
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

RC&A PROJECT NO. 97147-A

AUGUST 5, 1997

1.0 INTRODUCTION

1.1 Purpose and Scope of Investigation

The purpose of this Leaking Underground Storage Tank (LUST) Well Installation and Monitoring Workplan (Workplan) is to serve as a guidance document and procedural manual for performing tasks to aid in performing limited site characterization at 10 individual underground storage tank (UST) sites aboard Marine Corps Base (MCB), Camp Lejeune, North Carolina as shown in Figure 1.1.

This Workplan was prepared in accordance with Delivery Order No. 0020 developed by the Naval Facilities Engineering Command (NAVFACENGCOM) and the proposed risk-based corrective action rules for petroleum USTs provided by the North Carolina Department of Environment, Health and Natural Resources (NCDEHNR). The objective of the limited assessment is to provide information to evaluate the need for further assessment or corrective action at each site.

The project will involve the installation of one monitoring well at each site with collection and laboratory analysis of soil and ground water samples; identification of water supply wells within the project area; a determination of whether the source areas are within a designated wellhead protection area; and whether potential vapors may pose a threat to public health or welfare.

1.2 Site Locations

The limited site characterizations will be performed at the following sites:

• NH-118-3	• 575-2
• 1817	• 5400
• AS-1011	• FC-280
• HP-250	• SBB-94
• TT-48	• TT-60

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It should be noted that discrepancies regarding the site names/numbers and UST contents were identified in comparison of Delivery Order No. 0020 to the UST closure documentation. The above-stated site names/numbers were confirmed by MCB Environmental Management Department (EMD) personnel as the correct site names.

2.0 PREVIOUS INVESTIGATIONS, REMEDIATION AND/ OR CLOSURES

Past documents reveal that UST closure activities were performed at the above-referenced sites. The following reports were reviewed for assistance in preparation of the Workplan and determining proposed well locations.

- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. TT-48, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. SBB-94, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 1817, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. TT-60, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 5400, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 118-1, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. HP-250, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 572-2, Camp Lejeune, NC, N62470-93-C-5310.
- Clean-East Associates, Inc., February 26, 1996, Tank Closure Report, Bldg. 280, Camp Lejeune, NC, N62470-93-C-5310.
- Engineering & Environmental Science Company, March 26, 1997, Tank Closure Report Non-Regulated 280-Gallon Heating Fuel Oil, MCAS Housing, Marine Corps Base, Marine Corps Air Station, NC, N6247-98-6.

3.0 SITE DESCRIPTION

3.1 Areas of Investigation

The sites are located throughout the MCB and New River Marine Corp Air Station (MCAS). The following is a brief discussion of each site. Figure 1.1 depicts the general location of each site.

- NH-118-3 - The site is the Naval Hospital Vehicle Maintenance shop. The former 250-gallon capacity UST contained waste oil.
- 575-2 - The site is a light armored vehicle maintenance facility. The former 6,000-gallon capacity UST contained diesel fuel. Two existing USTs remain in the tank pit.
- 1817 - The site is a warehouse. The former 300-gallon capacity UST contained waste oil.
- 5400 - The site is Berkley Manor Elementary School. The former 10,000-gallon capacity UST contained diesel fuel.
- AS-1011 - The site is located at the Officer Enlisted Married Housing area at New River MCAS. The former 280-gallon capacity UST contained heating oil.
- FC-280 - The site is a vehicle maintenance facility located in the French Creek area of the MCB. The former 550-gallon capacity UST contained diesel fuel.
- HP-250 - The site is a vehicle maintenance facility. Three USTs were removed and consisted of one 4,000-gallon capacity diesel and two 550-gallon capacity diesel. The USTs were replaced with a new 4,000-gallon capacity UST in the same tank basin.
- SBB-94 - The site is a sports complex in the Courthouse Bay area of the MCB. Two USTs were removed and consisted of one 4,000-gallon and one 6,000-gallon capacity gasoline tank.
- TT-48 - The site is the Tarawa Terrace II Elementary School. The former 8,000-gallon capacity UST contained heating oil.
- TT-60 - The site is the Tarawa Terrace I Primary School. The former 10,000-gallon UST contained heating oil.

3.2 Utility Survey

Site reconnaissance of the areas of investigation revealed overhead electric and telephone, and underground electric, telephone, sanitary sewer, steam, water, and storm drain lines. Caution will be exercised during subsurface investigations to prevent breaching encountered utilities (if any). Utility clearances will be obtained by the MCB Utilities Department prior to subsurface investigations.

4.0 SUBSURFACE INVESTIGATION METHODOLOGY

The following methods will be utilized to accomplish the proposed goals.

4.1 Soil Test Borings

To acquire data necessary to characterize the soil at each site location, a soil boring will be advanced using hollow-stem auger drilling techniques. Each soil boring will be installed to a depth of approximately five feet below the water table to provide a means to assess the site conditions with regard to soil contamination, if present, and collection of pertinent geologic data.

4.2 Monitoring Well Design, Installation, and Development

A total of 10 Type II monitoring wells (one at each site location) will be installed as part of the project. Each monitoring well will be installed to a depth of approximately five feet below the water table. The screened portion of the well will be positioned to intersect the water table. The purpose of the wells is to provide dissolved-phase contaminant data, free product thickness (if any), and to be a reproducible sampling point in the "suspected worst-case" location.

The assigned well identification (I.D.) numbers for this site are as follows:

<u>SITE</u>	<u>WELL I.D.</u>
NH-118-3	NH118MW01
575-2	575MW01
1817	1817MW01
5400	5400MW01
AS-1011	AS1011MW01
FC-280	FC280MW01
HP-250	HP250MW01
SBB-94	SBB94MW01

<u>SITE</u>	<u>WELL I.D.</u>
TT-48	TT48MW1
TT-60	TT60MW01

4.2.1 Soil Boring/Monitoring Well Locations
(Refer to Figures 4.1 through 4.10)

The locations of the soil borings/monitoring wells will be based on the information obtained from previous subsurface investigations, geologic and hydrologic information, site topography, and visual assessment of the site. The Type II wells will be located in suspected "worst case" location in the vicinity the UST basin. The proposed well locations are depicted in Figures 4.1 through 4.10. The final locations of the wells will be determined utility locations.

4.2.2 Monitoring Well Design and Construction

The Type II monitoring wells will be constructed of two inch diameter PVC well materials consisting of machine slotted well screens and Schedule 40 PVC riser pipe. Piping will be flush jointed and threaded, and wells will be constructed without the use of glue. Screen slot widths will be 0.010 inches. Sand packs will be constructed of washed silica Torpedo sand (ASTM C190).

All wells will be installed by a qualified driller registered in the State of North Carolina and well installation will be supervised in the field by an experienced staff or project level geologist or engineer specializing in subsurface investigation. No petroleum lubricants will be used on drill pipe joints. However, Teflon® tape, vegetable oil, or phosphate-free laboratory detergent such as Liquinox® will be used for lubrication, if required.

4.2.3 Detailed Monitoring Well Installation Procedures

The PVC screen and riser pipe used in well construction will be pre-cleaned and packaged by the manufacturer. All well casings and screens will be transported and stored at the site in original packaging. Personnel handling these items will not handle tools or drilling equipment while installing the well. Clean, new disposable latex rubber gloves will be worn when handling well screens or casings. Personnel who are handling the drilling equipment will not be allowed to handle the well screens or casings until a new "clean" pair of gloves are worn.

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The Type II monitoring wells will be installed as follows:

- Boreholes will typically be advanced with 4.25 inch inner diameter (I.D.) hollow stem augers to a depth of approximately 15 to 20 feet BLS, or less, to intersect the shallow water table, collect soil samples, and install the well.
- Soil samples for chemical analysis will be collected via split spoon sampling in accordance with procedures outlined in Section 5.1 of this Workplan.
- The desired sections of two inch diameter well screen and riser pipe will be assembled and lowered to the bottom of the augers.
- The lengths of all screen and riser casing sections and bottom plugs will be measured and recorded.
- Washed silica filter sand will be poured into the augers to construct a continuous filter pack within the augers which will extend from approximately one foot below the bottom of the well screen to a maximum of two feet above the slotted section. The depth to the sand pack will be frequently measured through the augers using a decontaminated, weighted, fiberglass measuring tape while pulling the augers without rotation to maintain the sand inside the augers as the filter pack is constructed.
- A two foot thick bentonite seal will be emplaced above the sand filter pack by pouring bentonite pellets into the augers in the manner described above. Distilled water will be added to the annular space at ten-minute intervals to aid in the hydration of the bentonite seal. The bentonite seal will be allowed to hydrate in accordance with bentonite manufacturer's recommendations.
- The annular space above the bentonite seal will be tremie grouted from the bottom to within approximately three feet of land surface with neat cement grout.
- After allowing the grout to set, the concrete pad and well head cover will be installed to complete the installation.
- A concrete apron constructed of 3,000 psi concrete and measuring 5.0 feet by 5.0 feet by 0.5 foot will be constructed

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around each well located in certain non-traffic areas (woods, tall vegetation). In these non-traffic areas, each well head with four three-inch I.D. protective steel pipes will be protected with four Schedule 40, protective steel pipes, three inch I.D., imbedded in a minimum of 2.5 feet of 3,000 psi concrete. A security pipe with a hinged locking cap, having an embedment depth of 2.5 feet into the concrete, will be installed over the well casing. The security pipes will extend 3.0 feet above the ground surface and will be filled with concrete and painted day-glow yellow or an equivalent color. All wells will be secured with a brass Master Lock padlock.

- In other traffic and non-traffic areas, a flush manhole cover will be built into a three foot square, concrete collar, which will be nine inches thick. If the well is installed through a paved surface, the annular space between the casing and the borehole will be grouted to a depth of at least 2.5 feet and finished with a concrete collar. If the well is not installed through a paved or concrete surface, then a concrete apron, measuring 3.0 feet by 3.0 feet by 0.5 foot will be constructed around each well. The collar and pad will be constructed of 3,000 psi concrete and will be crowned to meet the finished grade of surrounding pavement or ground surface, as required. All wells will be secured with a Master Lock padlock.

Upon completion, North Carolina Well Construction Records and as-built well diagrams will be prepared to provide site specific well construction information (refer to Appendix II).

4.2.4 Monitoring Well Development

Well development will be performed no sooner than 24 hours after grouting is completed for Type II wells. Wells will be developed by continuous low yield pumping or bailing. As the wells are developed, ground water turbidity will be monitored as an indicator parameter and be noted visually and recorded. Well development will continue until the turbidity stabilizes. Water generated during the well development activities will be handled according to the procedures specified in Section 4.3.

4.2.5 Depth To Water and Free Product Thickness Measurements

Measurements will be taken in monitoring wells at the site no sooner than 48 hours after completion of well development

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activities. Monitoring wells will be measured on the same day as ground water samples are collected.

Depth to water and free product thickness measurements will be performed using an electronic interface probe or steel tape with water/product finding pastes. The liquid levels will be measured by slowly lowering the instrument or tape into the well. When the probe reaches the water or free product surface, the circuit is completed and a buzzer is activated. A constant buzzing indicates free product while an intermittent buzzing indicates water. When the tape is inserted into the well, the liquid-specific pastes react with different fluids. The distance from the top of the well casing to the free product and/or depth to water is then measured and recorded. If free product is present, the thickness will be measured to the nearest 0.01 foot. Depth to water will also be measured to the nearest 0.01 foot. The measuring device will be decontaminated between wells by detergent wash and distilled water rinse.

4.3 Disposal of Borehole Cuttings and Wastewater

Borehole cuttings will be containerized in drums and/or a roll-off box at or near the project site and covered to prevent entry of rainwater and exposure to windblown particles. Ultimate disposal of the material at a permitted facility will be based on analytical results and/or regulatory consultation. Development and purge water will also be containerized and removed to an off-site permitted facility. All soil and ground water shall be placed in DOT-approved containers and properly labeled prior to any shipment. Manifests will be prepared for all wastes shipped from the site. Wastes generated as part of this investigation will be removed within 48 hours of obtaining the necessary clearances.

4.4 Surveying

A horizontal and vertical survey of the monitoring wells will not be performed. The locations of the wells will be determined by measuring the distance of the well from existing permanent structures using a tape.

5.0 SAMPLE COLLECTION METHODOLOGY

The following sections describe the methods that will be utilized to collect soil and ground water samples for this project. All samples will be collected by personnel who are trained and experienced in sample collection procedures.

5.1 Test Boring Soil Sample Collection and Field Screening Methodology

Field screening will be conducted during drilling of the monitoring well borings to determine if organic vapors are present in the unsaturated zone and to identify areas of suspected near-surface releases. Soil samples for general site characterization will be obtained from the borings at regular intervals starting at ground surface. The soil samples will be obtained using a split spoon sampler driven in accordance with ASTM D-1586. Soil samples will be described in the field by an engineer or geologist trained in using visual/manual techniques as described in ASTM D-2488-84. The soils will be classified in accordance with the Unified Soils Classification System (USCS) and a boring record of each borehole will be produced. Additional descriptive terms may be utilized to more adequately describe the soils. A sample boring log used for final presentation is provided in Appendix II.

Each sample will be removed from the split spoon, divided, and placed in two pre-labeled, airtight, plastic bags. One bag will be immediately placed on ice pending selection of the appropriate laboratory sample depth. The second bag will be left undisturbed for several minutes to allow the organic vapors to reach equilibrium. The gas contained in the headspace of the bag will be tested with a PID or an FID. The laboratory sample will be taken within five feet of the water table. One soil sample will be selected from each borehole for off-site laboratory analysis. No change in screening protocol or instrumentation will occur during the site investigation in order to enhance consistency of results unless the equipment is damaged and/or needs replacement.

All soil samples collected for laboratory analyses will be immediately placed on ice. Soil will be collected and placed into containers in accordance with the type of analyses scheduled for that sample as follows:

Analytical Method	Bottle Type and Size	Total Number of Bottles per Sample, On-Site/ Off-Site Lab	Preservative
Oil & Grease - EPA 9071	Glass/8 oz.	NA/1	<4°C
Halogenated & Aromatic Volatiles - EPA 8021	Glass/8 oz.	NA/1	<4°C
TCLP Metal - EPA 1311	Glass/8 oz.	NA/1	<4°C
TPH - EPA 5030/3550/8015	Glass/8 oz.	NA/1	<4°C
TPH - EPA 5030/8015	Glass/8 oz.	NA/1	<4°C

NA = Not Applicable

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See Section 6.0 for the specific type and quantity of analyses that will be conducted for this project.

5.2 Monitoring Well Ground Water Sample Collection

The ground water sampling program has been developed to determine the presence or absence of free product or dissolved-phase contamination that may be present as a result of a petroleum release at the project site. In the absence of free product, the sampling program will consist of purging the monitoring wells, and then collecting one ground water sample from each. The sampling program will include collection of samples for off-site laboratory analysis; static ground water level measurements, and product thickness measurements.

The RC&A Well Sampling Worksheet will be used to record all measurements made during well purging and sampling (see Appendix II). This form was designed to be used as a checklist and as documentation for all ground water sampling activities for each individual well.

Each well will be purged prior to sample collection to draw new water into the well in an effort to collect samples that are representative of the surrounding aquifer. Three standing well volumes of water will be removed from each well. Wells that can be purged to dryness while purging less than three well volumes will be sampled as soon as the well has recovered to yield sufficient water volume for a sample. All purge water removed from the wells will be disposed in accordance with procedures for disposal of development water as described in Section 4.3 of this Workplan.

Well purging will be accomplished using pre-cleaned, disposable, Teflon® bailers. New nylon rope will be used at each monitoring well location. Care will be taken to prevent contact between the rope and the ground during well purging and sample collection. Purging techniques will be performed in accordance with recommended practices described in the North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities (Solid Waste Section, 1987). The volume of water to be purged is calculated using the following equation:

$$V = (\pi r^2 h)^{7.48}$$

where:

$$\pi = 3.14159$$

r = Radius of well casing (ft)

h = Height of water column in well (ft) (total well depth - depth to ground water prior to purging)

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V = Volume of water in well gallons (standing well volume)

Minimum purge volume = $V \times 3$

Samples will be collected immediately upon purging of the well in accordance with the following procedures:

- Chemical preservatives, if applicable, will be added to sample bottles by the laboratory.
- Sample bottles will be labeled prior to sample collection.
- Sample bottles will be filled directly from the Teflon® bailer.
- Caps will be secured on bottles.
- Sample containers will be placed in plastic bags and the bags sealed.

All monitoring well ground water samples collected for laboratory analyses will be immediately placed on ice. Ground water will be collected and placed into containers in the following order based upon the type of laboratory analyses scheduled for that sample:

Analytical Method	Bottle Type and Size	Total Number of Bottles per Sample On-Site/ Off-Site Lab	Preservative
Purgeable Aromatics w/Xylenes - EPA 602	Glass/40 ml	NA/2	<4°C and $\text{Na}_2\text{S}_2\text{O}_3$
Base/Neutrals - EPA 625 (B/N) w/10 Peaks	Glass Jar/ 1 Liter	NA/2	<4°C and $\text{Na}_2\text{S}_2\text{O}_3$
Total Lead EPA 3030C/239.2	Plastic/500 ml	NA/1	<4°C and HNO_3
EPA 504.1	Glass/40 ml	NA/2	<4°C and $\text{Na}_2\text{S}_2\text{O}_3$
STD Method 6230D w/IPE + MTBE	Glass/40 ml	NA/2	<4°C and HCl
8 RCRA Metals	Plastic/500 ml	NA/1	<4°C and HNO_3

NA = Not Applicable

See Section 6.0 for the specific type and quantity of analyses that will be conducted for this project.

5.3 Sample Identification

Prior to collecting each soil and ground water sample, sample bottles will be labeled with the following information:

- Date and time of sample collection;
- Project identification number;
- Sample location number;
- Initials of person collecting sample;
- Type of preservative added to sample; and
- Parameter(s) or parameter group to be analyzed.

Additional specific information, such as sampling interval, may be added. The sample location number on the label will correspond to the sample location numbers assigned on the field site map.

5.4 Chain of Custody and Transportation Procedures

Chain of Custody (COC) procedures will be followed to establish documentation of sample possession from the time of collection until completion of analysis. As few people as possible will handle the sample(s). The sampler will be responsible for the care and custody of the samples until they are delivered to the on-site laboratory or dispatched for shipment to the off-site laboratory. An accurate record of sample collection, transport, and analysis will be maintained and documented. A sample COC record is provided in Appendix II.

The COC Record will be used by personnel responsible for ensuring the integrity of samples from the time of collection to shipment to the off-site laboratory. The laboratory will not proceed with sample analysis without a correctly prepared COC Record and Analytical Request Form. The laboratory will be responsible for maintaining COC of the sample(s) from time of receipt to disposal. COC procedures will be instituted and followed throughout the investigation.

The COC Record will be signed by each individual who has maintained custody of the samples. General preparation of the COC Record for samples to be delivered to the on-site and off-site laboratory will be as follows:

- Samples will be accompanied by a COC Record at all times.
- The COC Record will be initiated in the field by the person collecting the samples. Every sample will be assigned a unique

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identification number as described in Section 4.2 that is entered on the COC Record.

- The Record will be completed in the field identifying the project, sampler, RC&A assigned project number, etc.
- If the person collecting the sample does not transport the samples to the laboratory or deliver the sample containers for shipment, the first block for "Relinquished By _____" will be signed by the sampler.
- The person transporting the samples to the laboratory or delivering them for shipment will sign the Record as "Relinquished By _____."

5.4.1 Off-Site Laboratory

Collected soil and ground water samples will be transported on a daily basis by courier to GeoChem, Inc. in Morrisville, North Carolina. Prior to the start of the field investigation, necessary arrangements will be made with the laboratory to assure proper and prompt delivery and log in of the collected samples. Shipment and COC procedures are as follows:

- Samples will be packed properly for shipment so that bottles will not dislodge and/or break. The samples will be kept cool using either ice packs or ice in zip-lock bags.
- Samples will be transported each day via a GeoChem, Inc. courier.
- The COC record will be sealed in a watertight container and placed in the shipping container.
- The courier will double check the contents of the shipping container to assure that the samples are properly packed and the COC inventory is correct.

5.4.2 On-Site Laboratory

An on-site mobile laboratory will not be utilized for this investigation.

5.5 Equipment Decontamination

Equipment decontamination sites will be established by the MCB Environmental Management Department (EMD) personnel prior to the initiation of drilling activities.

5.5.1 Drilling Rig

The drilling rig will be cleaned in accordance with the following guidelines:

- Drilling rigs and all support equipment will be cleaned of excess grease, oils and caked-on soil prior to arrival at the site. Equipment which leaks fuel, coolant, or lubricants will not be used on site.
- Equipment such as pumps and pump lines will be flushed thoroughly with potable water prior to use.
- Hollow stem augers, rods, and other drilling equipment will be decontaminated between borings as follows:
 - High temperature and pressure water rinse.
 - If any noticeable petroleum hydrocarbon film is present, wash with phosphate-free detergent and tap water using a brush.
 - High temperature and pressure tap water rinse.
 - Allow to air dry.
 - Place on and cover with clean plastic until next use.

5.5.2 Soil and Ground Water Sample Collection Equipment

Disposable Teflon® bailers used for ground water sampling will be disposed of after the sampling of each well.

Split spoons, submersible well development pump equipment, and other sample collection equipment will be decontaminated between sample events as follows:

- Tap water rinse.

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- Wash with phosphate-free detergent and tap water using a brush to remove any particulate matter or surface film.
- Tap water rinse.
- Rinse thoroughly with distilled water.
- Rinse with isopropanol.
- Allow to air dry or rinse with distilled water.
- Wrap completely with aluminum foil and seal in airtight plastic bags or place on clean plastic if planned for immediate reuse.

6.0 SAMPLE ANALYSIS

All samples collected during the investigation will be analyzed by the off-site laboratory. The analytical methods for this project are outlined below and summarized in Table 6.1 for the off-site laboratory.

6.1 Off-Site Laboratory

Ground water and soil samples will be analyzed at GeoChem, Inc. in Morrisville, North Carolina. Analytical methods for soils include Oil & Grease (EPA Method 9071), Halogenated and Aromatic Volatiles Organics (EPA Method 8021), Total Petroleum Hydrocarbons (EPA Method 5030/8015), Total Petroleum Hydrocarbons (EPA Methods 5030/3550/8015 extraction), and TCLP Metals (EPA Method 1311). Ground water analyses include purgeable aromatic xylenes (EPA Method 602), base/neutral extractables (EPA Method 625) + 10 largest peaks, RCRA Metals (EPA 3030C), EPA Method 504.1, and Standard Method 6230D.

The number and type of samples to be analyzed and the type of analysis to be performed are summarized in Table 6.1.

6.2 On-Site Laboratory

The on-site laboratory will not be utilized for this investigation.

7.0 PROJECT SCHEDULE

A schedule for implementation of the Well Installation and Monitoring Workplan, along with appropriate milestones, is exhibited in Appendix III. Where possible, one drilling rig and Site Manager will be dedicated to the project.

August 5, 1997

8.0 REFERENCES

Federal Register Vol. 49, No. 209, 40 CFR Part 136, Test Procedures for the Analysis of Pollutants Under the Clean Water Act, October 26, 1984.

Groundwater Section, North Carolina Department of Environment, Health and Natural Resources, March 17, 1997, Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater.

Solid Waste Section, North Carolina Department of Environmental, Health and Natural Resources, North Carolina Water Quality Monitoring Guidance Document for Solid Waste Facilities, Document No. SW-1001-87, 1987.

United States Environmental Protection Agency (USEPA), 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Groundwater - Parts I & II, Environmental Research Laboratory, Office of Research and Development, Athens, Georgia.

United States Environmental Protection Agency, 1986. Test Methods for Evaluating Solid Wastes (SW-846), 3rd Edition, Vol. II, Office of Solid Waste, Washington, DC.

TABLE

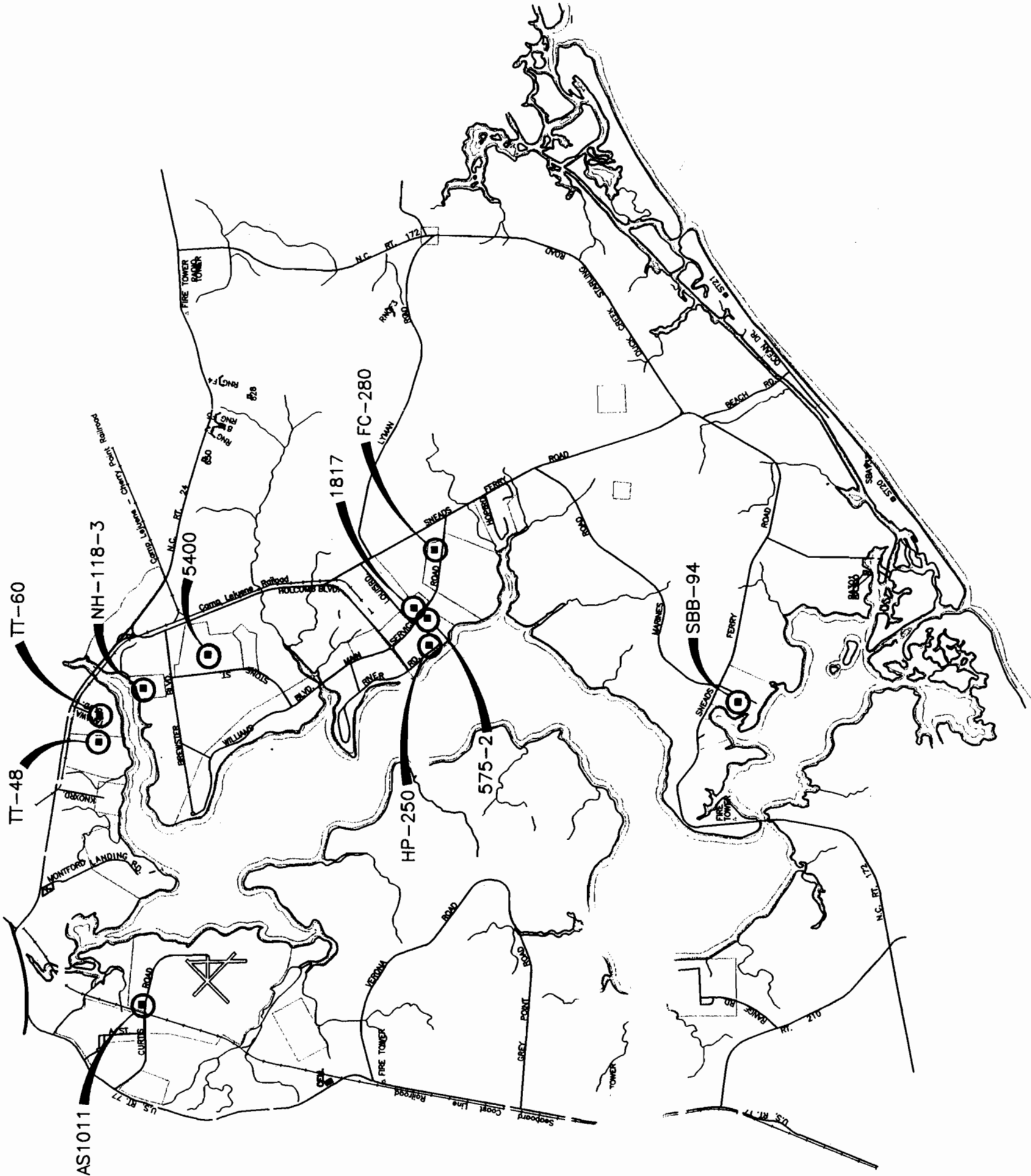
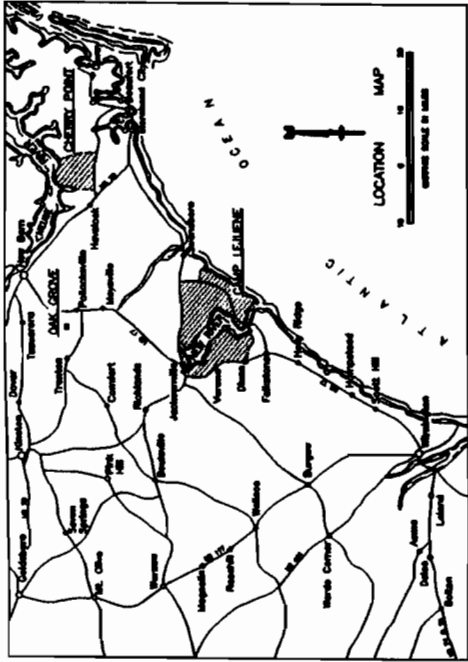
TABLE 6.1
SAMPLE ANALYSES SUMMARY TABLE
OFF-SITE LABORATORY

10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

SITE	NUMBER OF BORINGS/ WELLS*	TOTAL ANALYSIS QUANTITY										
		SOIL						WATER				
		TPH 3550/ 5030/ 8015	TPH 5030/ 8015	O&G 9071	8021	TCLP METALS	602 + Xylenes	625 B/ N	6230D	239.2/ 3030C	8 RCRA Metals/ 3030C	504.1
NH-118-3	1			1	1	1		1	1		1	
575-2	1	1					1	1				
1817	1			1	1	1		1	1		1	
5400	1	1					1	1				
AS-1011	1	1					1	1				
FC-280	1	1					1	1				
HP-250	1	1					1	1				
SBB-94	1		1						1	1		1
TT-48	1	1					1	1				
TT-60	1	1					1	1				
Duplicate		1	1				1	1	1	1		
Trip Blank							1	1				
Waste Soil		1		1	1	1						
Waste Water								1	1		1	1
TOTAL SAMPLES		9	2	3	3	3	9	12	5	2	3	2

*Assumes one soil sample per borehole.

FIGURES



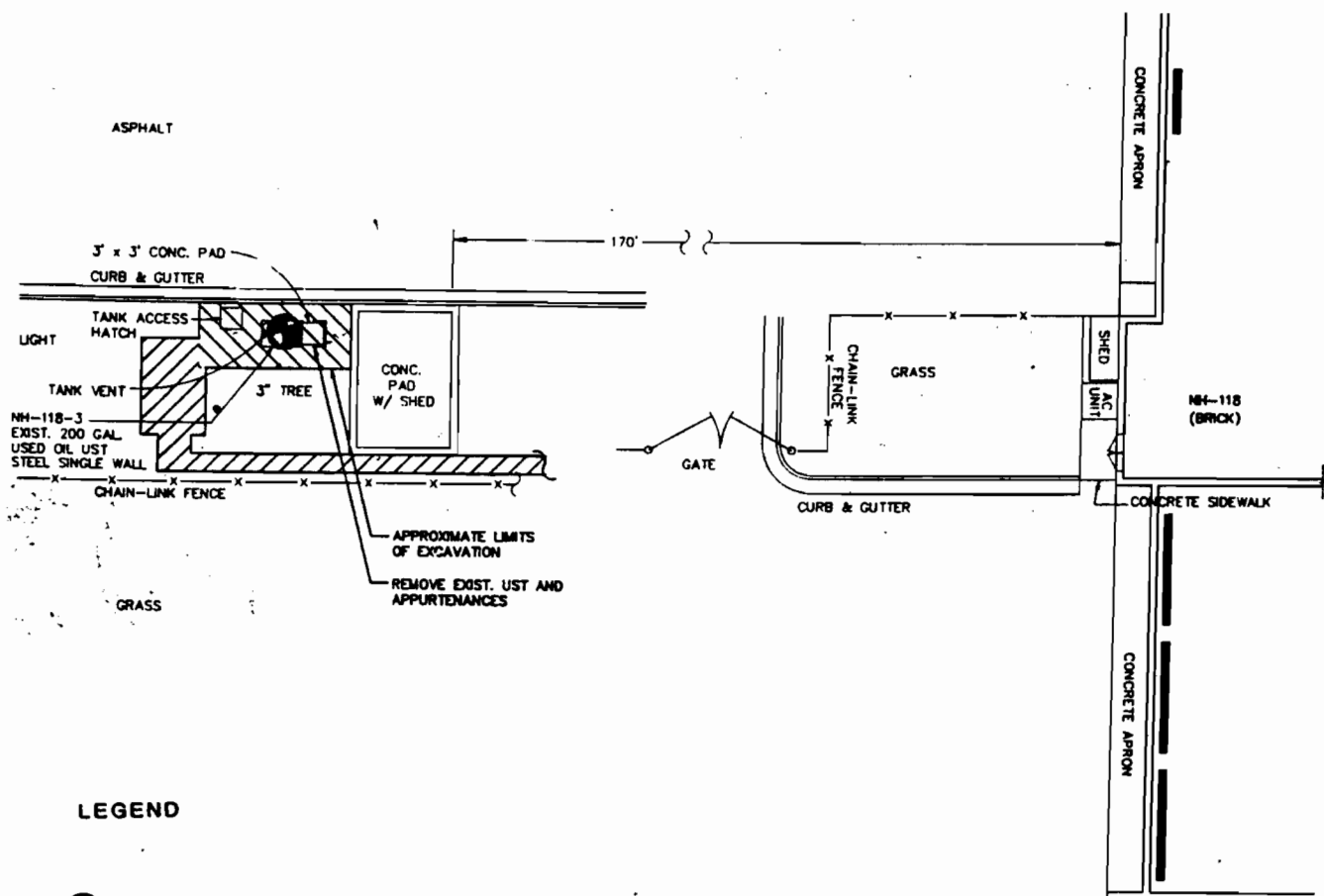
INDICATES PROJECT SITE LOCATION

5400



PROJECT	10 UST SITES MARINE CORPS BASE CAMP LEJEUNE, N.C.			TITLE		SITE LOCATIONS		FIGURE
	JOB NO. 97147	DATE AUG 1997	SCALE AS SHOWN	DRAWN BY: WHW	CHECKED BY: TMP	1.1		

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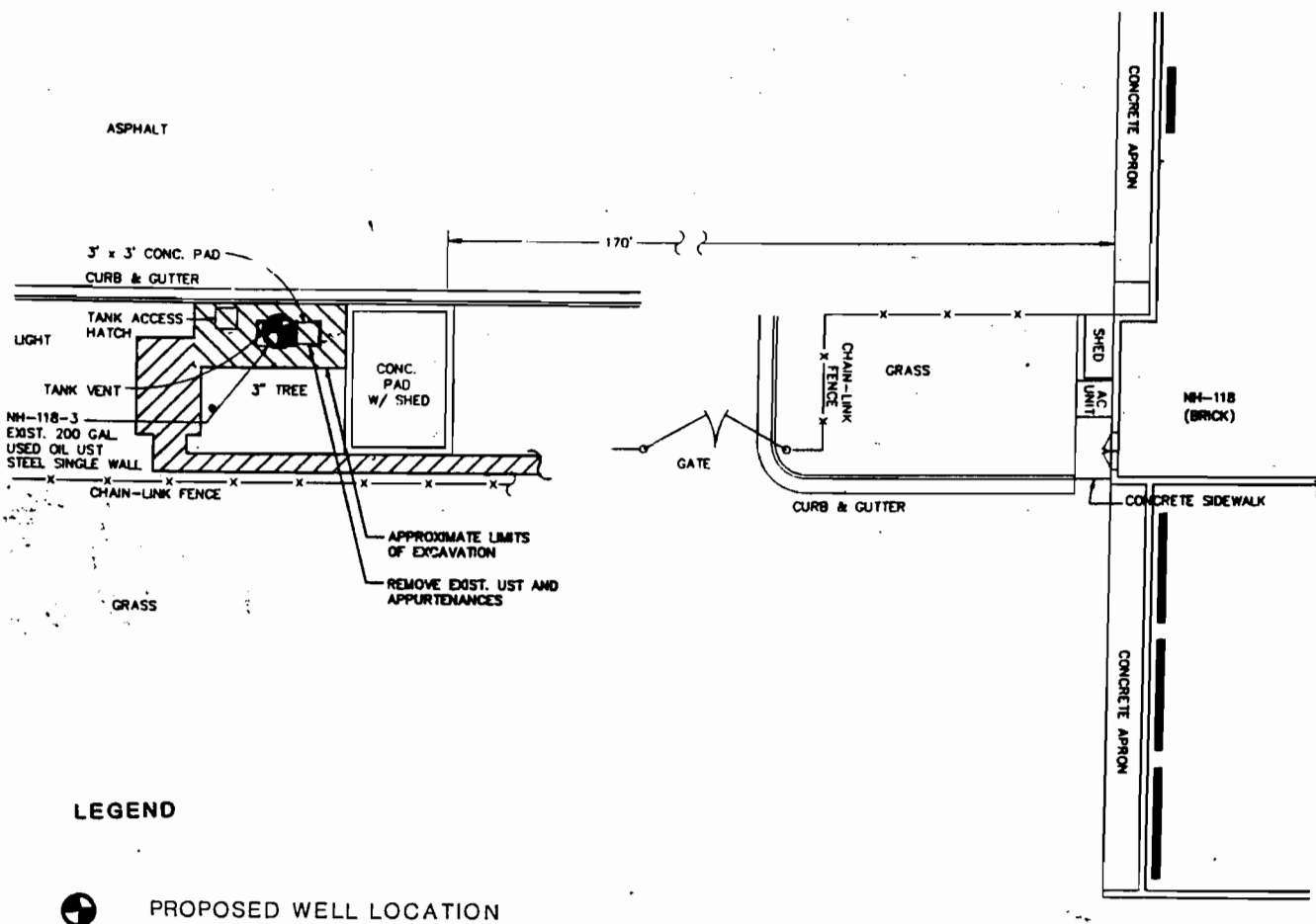


LEGEND

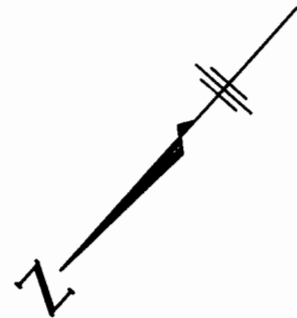


PROPOSED WELL LOCATION

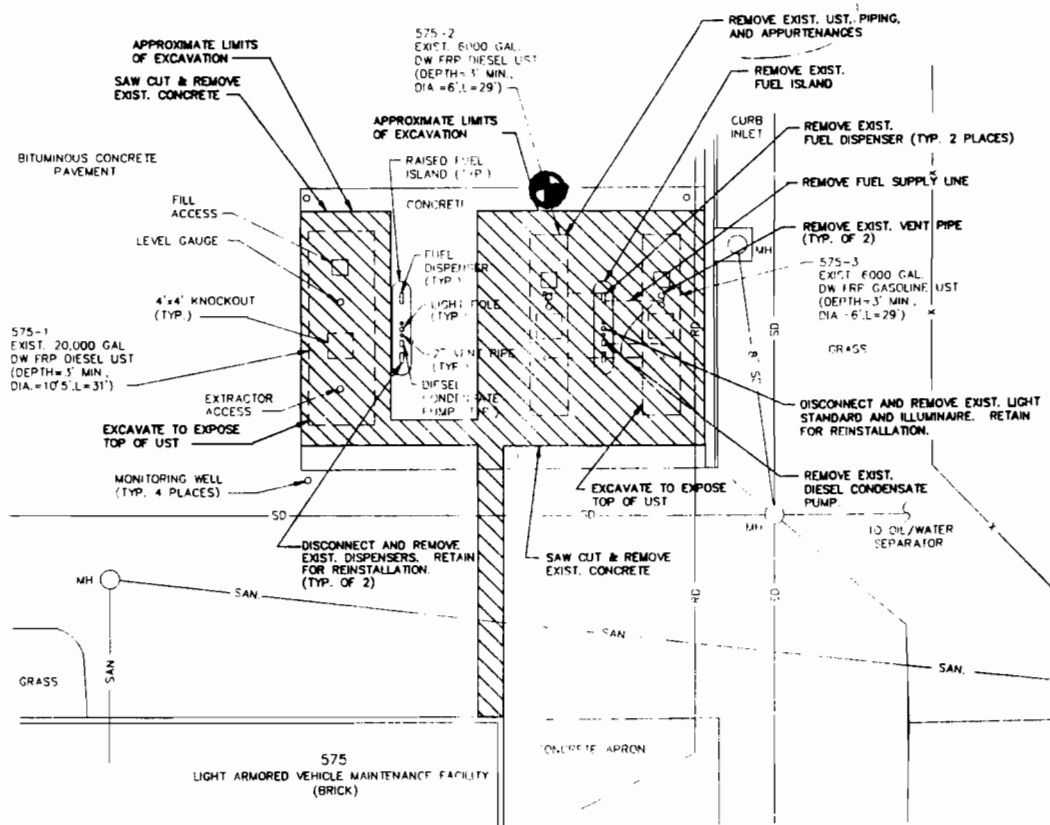
<i>Richard Catlin & Associates, Inc.</i> ENGINEERS AND SCIENTISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY		PROJECT	NH-118-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.		TITLE	PROPOSED WELL LOCATION- SITE NH-118-3		FIGURE
						4.1		
		JOB NO:	97147	DATE:	AUG 97		SCALE:	NTS
								EAC



Richard Catlin & Associates, Inc. ENGINEERS AND SCIENTISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY			PROJECT NH-118-3 MARINE CORPS BASE CAMP LEJEUNE, N.C.		TITLE PROPOSED WELL LOCATION- SITE NH-118-3			FIGURE 4.1		
RC&A			JOB NO: 97147 DATE: AUG 97		SCALE: NTS		DRAWN BY:		CHECKED BY: EAC	



NOTE: CONTRACTOR SHALL NOT DISTURB EXIST. MONITORING WELLS.



LEGEND



PROPOSED WELL LOCATION

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PROJECT
575-2
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

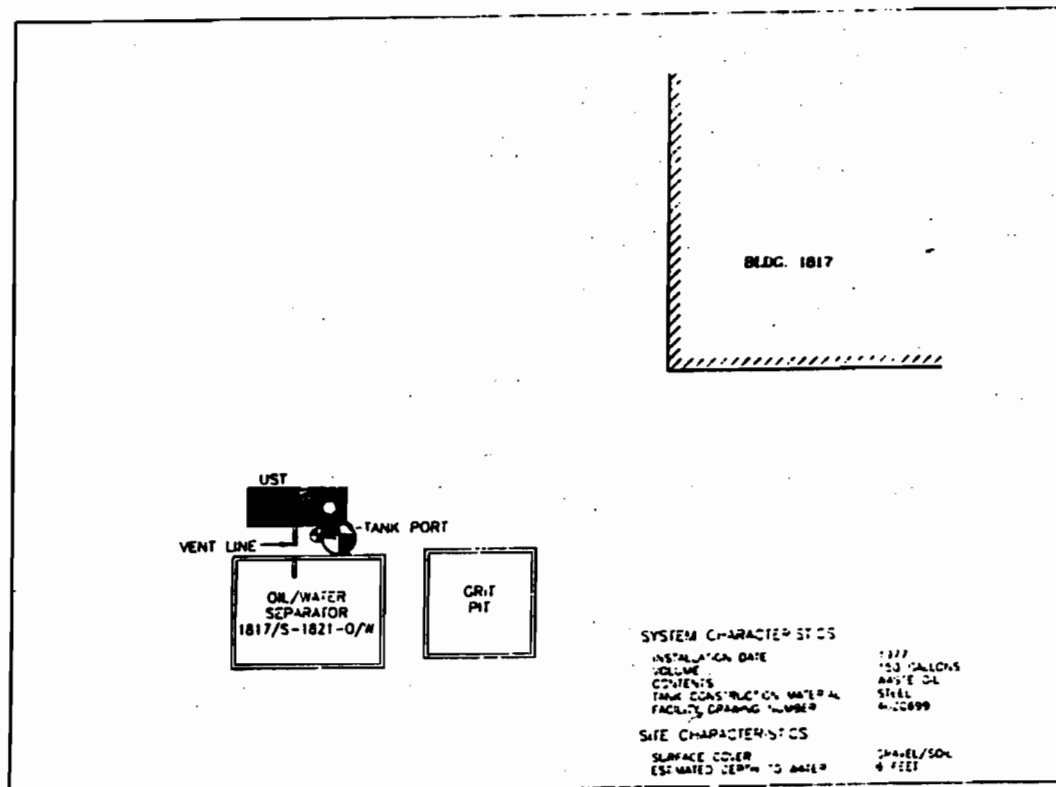
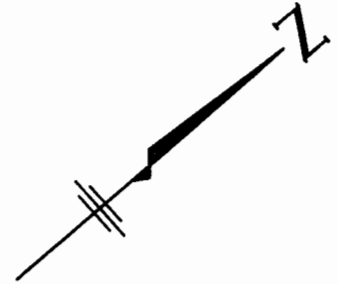
JOB NO: 97147 DATE: AUG 97

TITLE
PROPOSED WELL LOCATION-
SITE 575-2

SCALE: NTS DRAWN BY: CHECKED BY: EAC

FIGURE

4.2

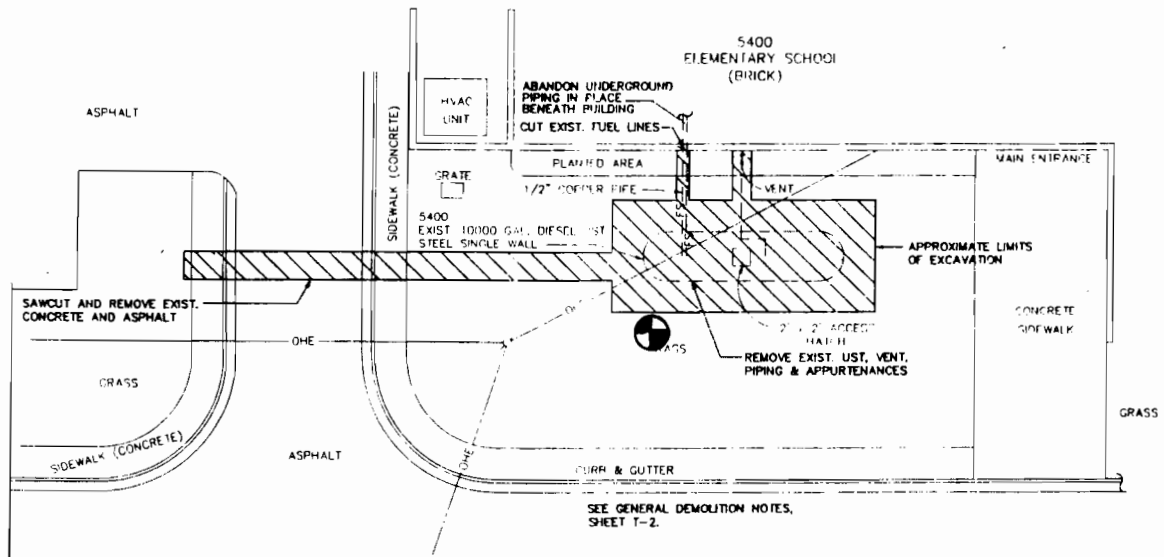
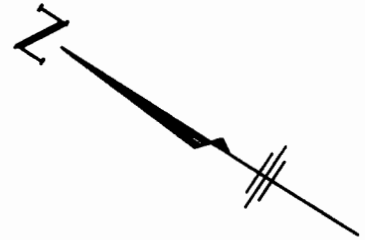


LEGEND



PROPOSED WELL LOCATION

Richard Catlin & Associates, Inc. ENGINEERS AND SCIENTISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY		PROJECT 1817 MARINE CORPS BASE CAMP LEJEUNE, N.C.		TITLE PROPOSED WELL LOCATION— SITE 1817		FIGURE 4.3
		JOB NO: 97147	DATE: AUG 97	SCALE: NTS	DRAWN BY:	CHECKED BY: EAC



LEGEND



PROPOSED WELL LOCATION

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PROJECT

5400
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

JOB NO: 97147

DATE: AUG 97

TITLE

PROPOSED WELL LOCATION-
SITE 5400

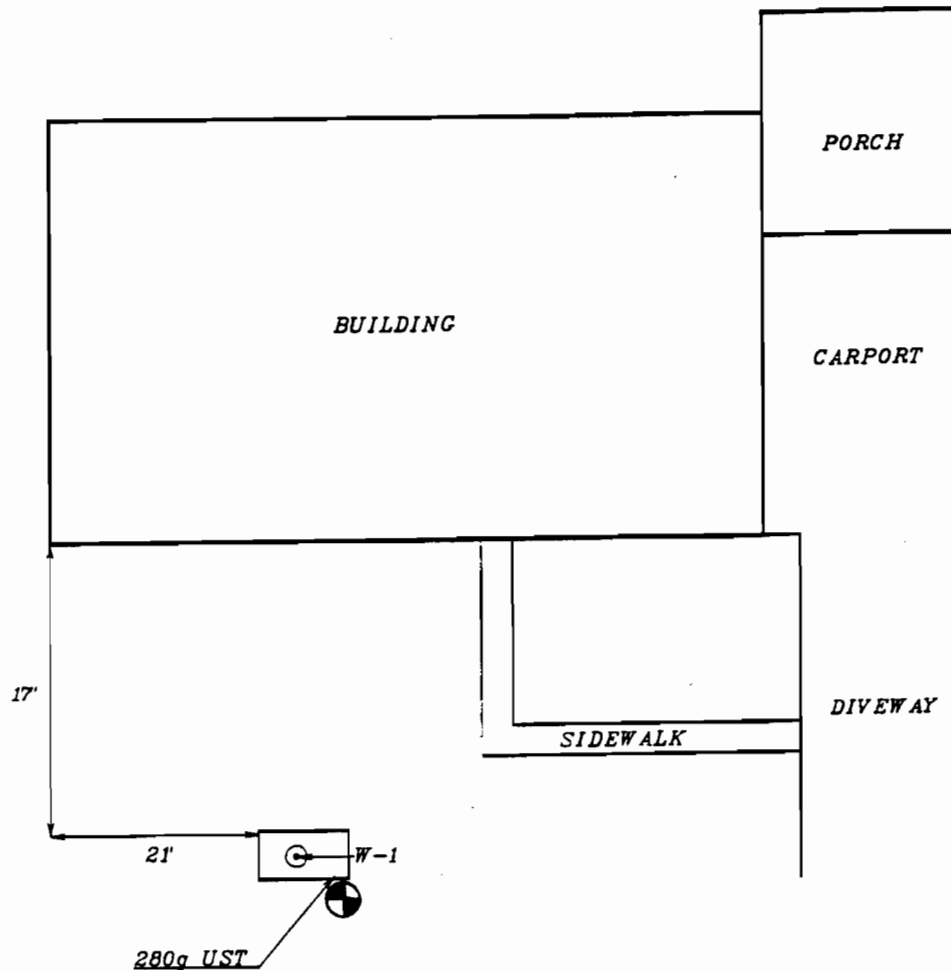
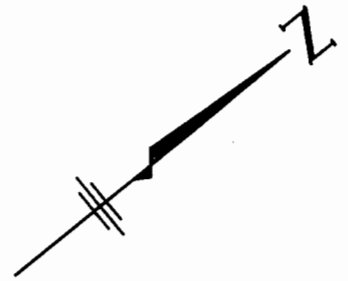
SCALE: NTS

DRAWN BY:

CHECKED BY: EAC

FIGURE

4.4

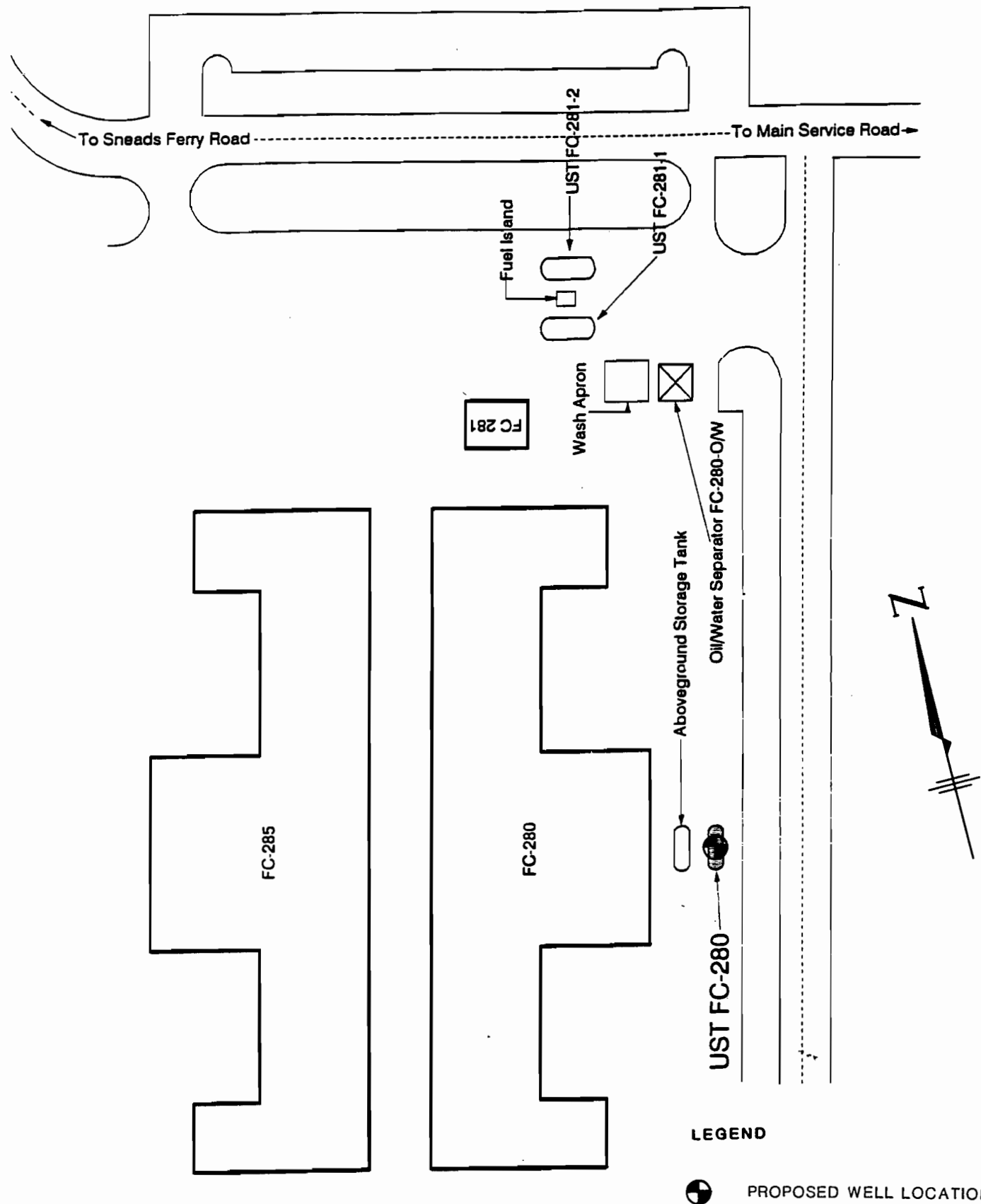


LEGEND

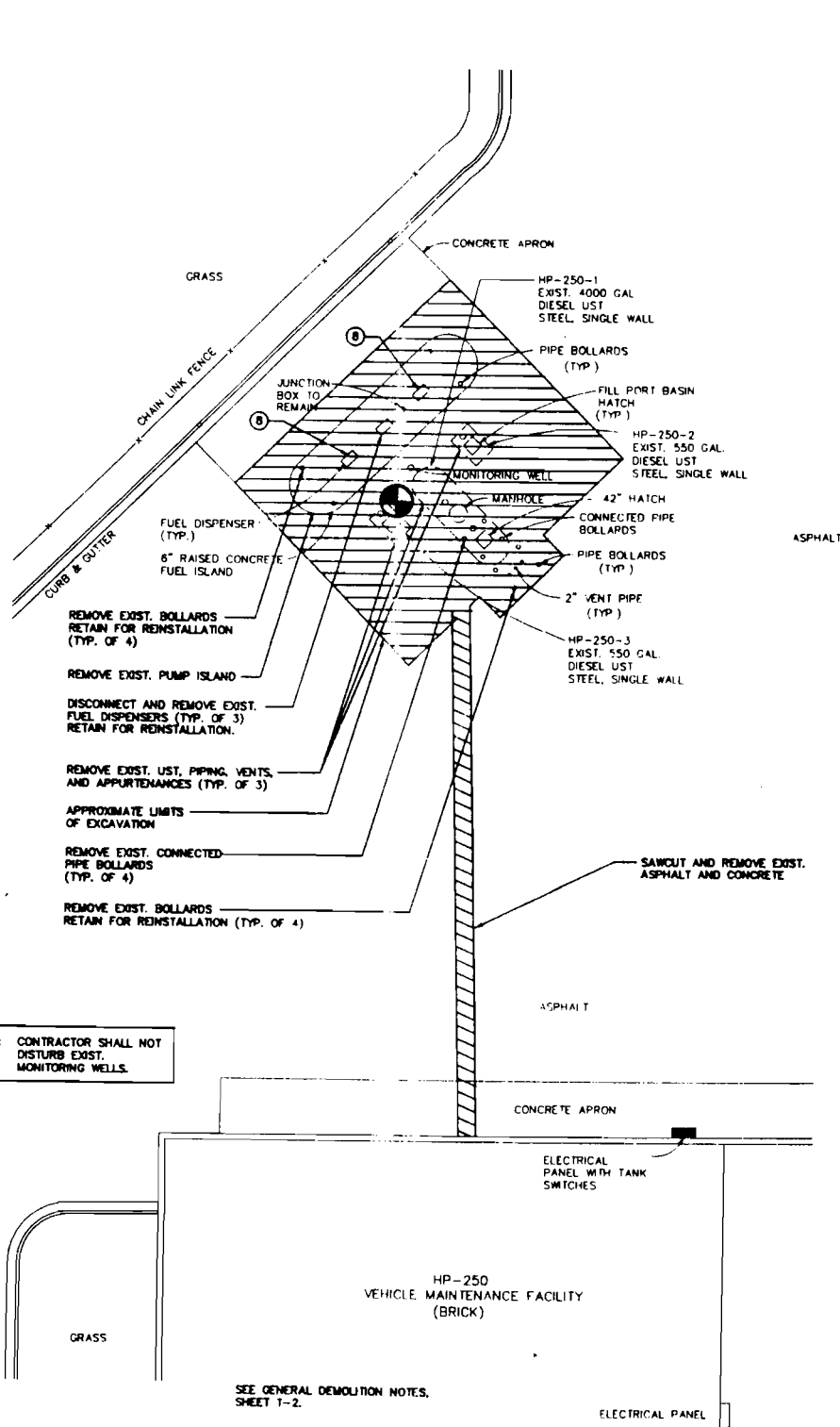


PROPOSED WELL LOCATION

Richard Catlin & Associates, Inc. ENGINEERS AND SCIENTISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY		PROJECT		TITLE		FIGURE
		AS-1011 MARINE CORPS BASE CAMP LEJEUNE, N.C.		PROPOSED WELL LOCATION- SITE AS-1011		4.5
RC&A JOB NO: 97147 DATE: AUG 97 SCALE: NTS DRAWN BY: CHECKED BY: EAC						



Richard Catlin & Associates, Inc. ENGINEERS AND SCIENTISTS WILMINGTON, NC CHARLOTTE, NC CHARLESTON, SC COLUMBIA, SC ATLANTA, GA AMERICUS, GA LEIPZIG, GERMANY			PROJECT		TITLE			FIGURE			
			FC-280 MARINE CORPS BASE CAMP LEJEUNE, N.C.		PROPOSED WELL LOCATION- SITE FC-280			4.6			
			JOB NO:	97147	DATE:	AUG 97	SCALE:	NTS	DRAWN BY:	CHECKED BY:	EAC



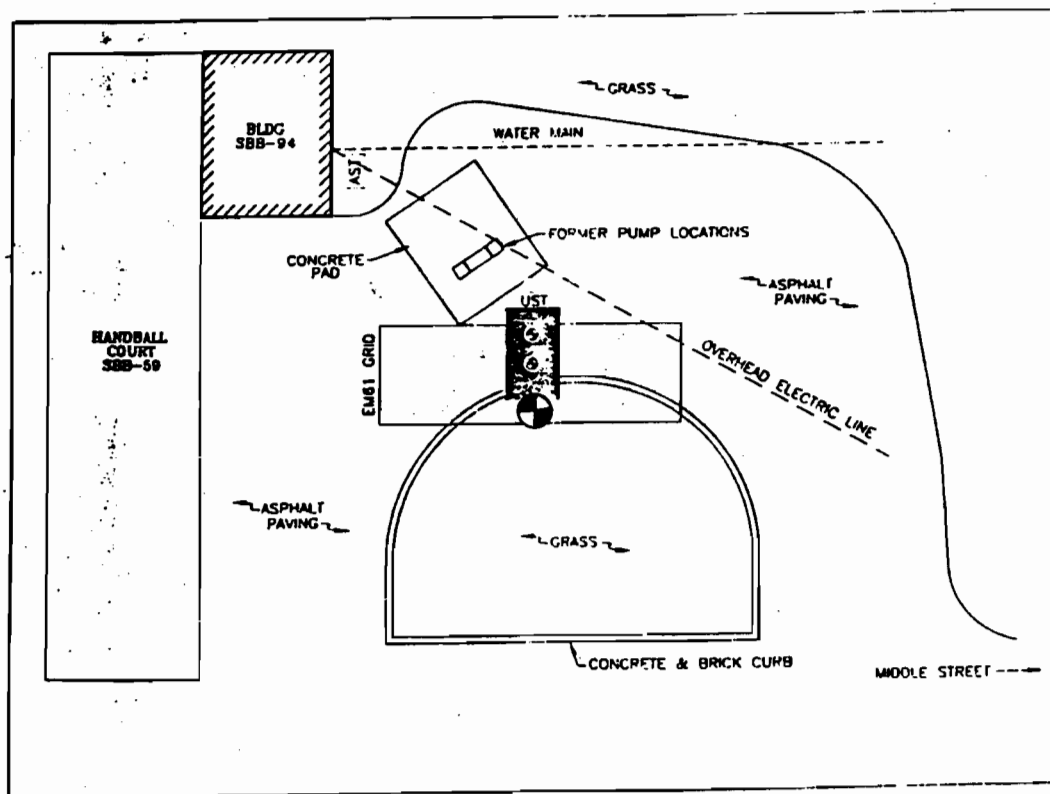
NOTE: CONTRACTOR SHALL NOT DISTURB EXIST. MONITORING WELLS.

LEGEND



PROPOSED WELL LOCATION

Richard Catlin & Associates, Inc. ENGINEERS AND SCIENTISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY	PROJECT HP-250 MARINE CORPS BASE CAMP LEJEUNE, N.C. JOB NO: 97147 DATE: AUG 97	TITLE PROPOSED WELL LOCATION- SITE HP-250 SCALE: NTS DRAWN BY: CHECKED BY: EAC	FIGURE 4.7

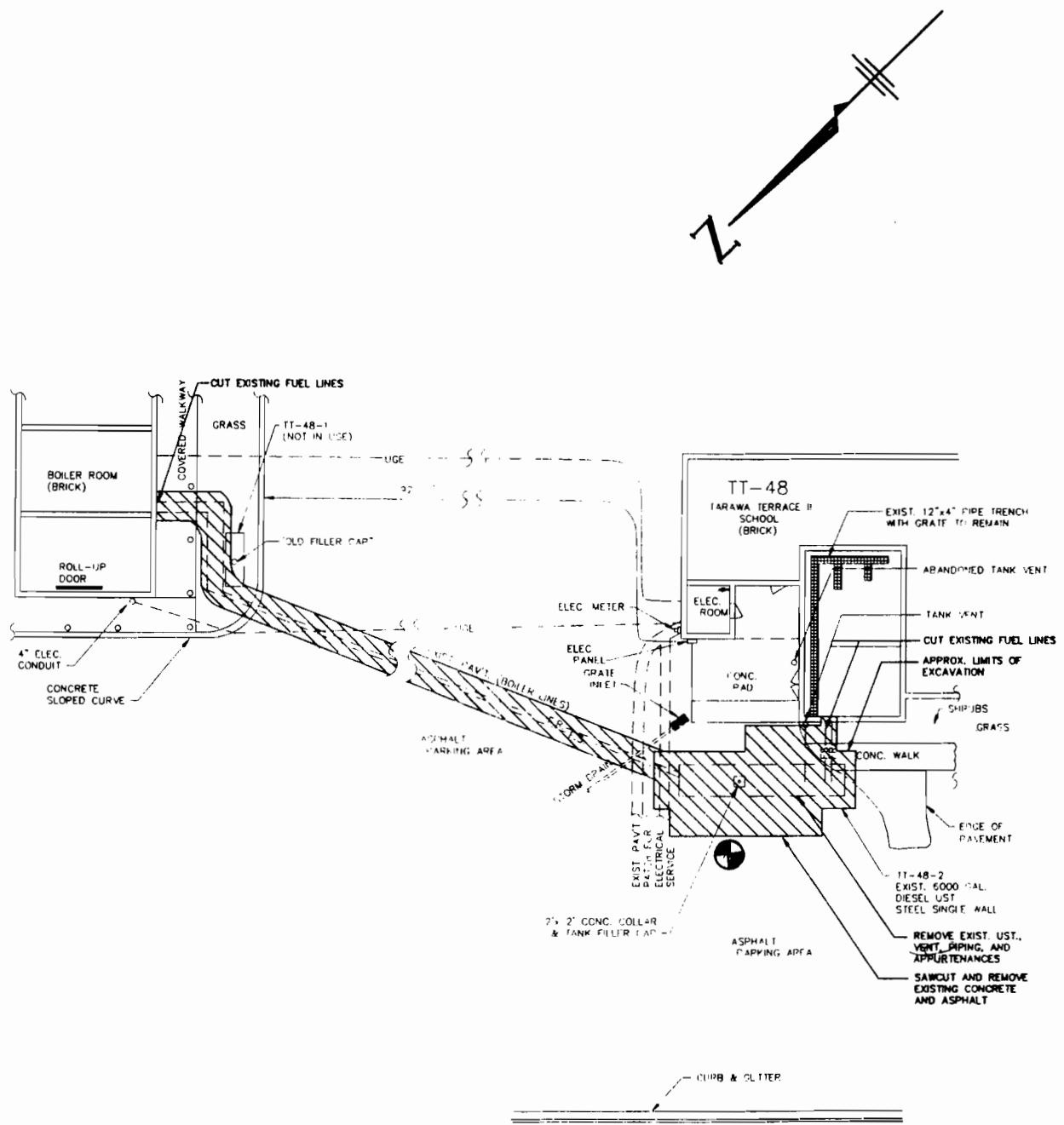


LEGEND



PROPOSED WELL LOCATION

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LEGEND

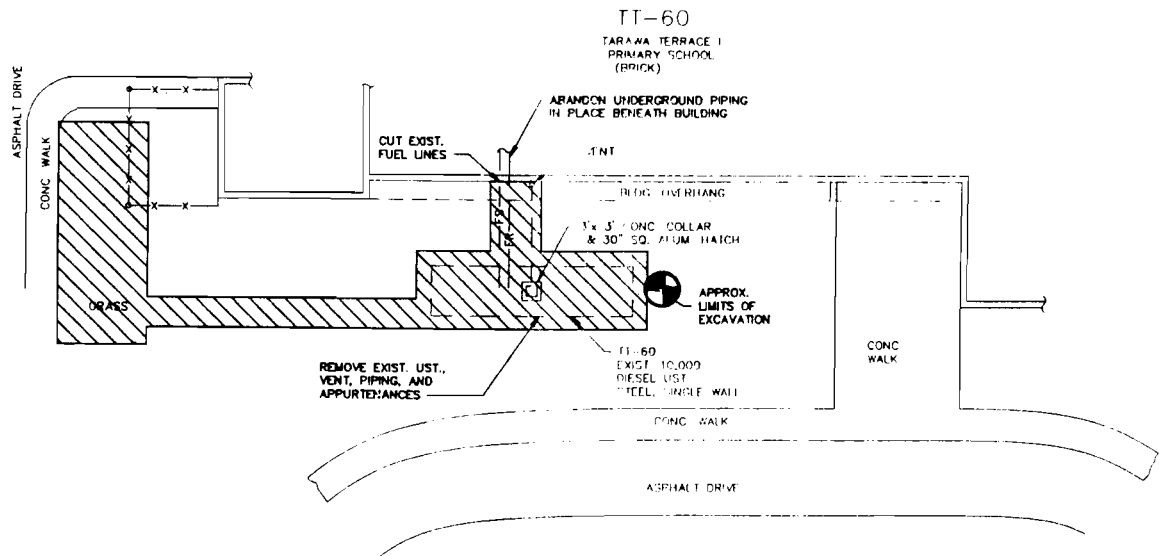
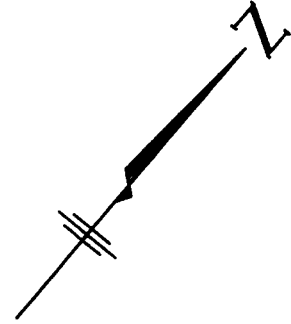
 PROPOSED WELL LOCATION

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 CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY

PROJECT
 TT-48
 MARINE CORPS BASE
 CAMP LEJEUNE, N.C.
 JOB NO: 97147 DATE: AUG 97

TITLE
 PROPOSED WELL LOCATION-
 SITE TT-48
 SCALE: NTS DRAWN BY: CHECKED BY: EAC

FIGURE
 4.9



LEGEND



PROPOSED WELL LOCATION

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CHARLOTTE, NC COLUMBIA, SC AMERICUS, GA LEIPZIG, GERMANY

PROJECT
TT-60
MARINE CORPS BASE
CAMP LEJEUNE, N.C.

TITLE
PROPOSED WELL LOCATION-
SITE TT-60

FIGURE

4.10

JOB NO: 97147 DATE: AUG 97

SCALE: NTS

DRAWN BY:

CHECKED BY: EAC

APPENDICES

APPENDIX I

SITE SPECIFIC HEALTH & SAFETY PLAN

PETROLEUM HYDROCARBON
HEALTH & SAFETY PLAN

PREPARED FOR:
10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

PREPARED BY:
RICHARD CATLIN & ASSOCIATES, INC.

PREPARATION DATE:
AUGUST 1, 1997
RC&A PROJECT NO.: 97147-A

COPIES TO: _____	DATE: _____
COPIES TO: _____	DATE: _____
COPIES TO: _____	DATE: _____
COPIES TO: _____	DATE: _____
COPIES TO: _____	DATE: _____
COPIES TO: _____	DATE: _____

The undersigned have read the Health and Safety Plan and are familiar with its provisions:

<u>Signature</u>	<u>Date</u>	<u>Signature</u>	<u>Date</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

AMENDMENTS/REVISIONS MUST BE APPROVED BY PLAN AUTHOR PRIOR TO IMPLEMENTATION OF EACH AMENDMENT.

AMENDMENT NUMBER	EFFECTIVE DATE	SUBJECT
_____	_____	_____
_____	_____	_____
_____	_____	_____

APPROVED: Teri M. Piver DATE: 8/01/97
Health & Safety Manager

PLAN AUTHOR: Teri M. Piver DATE: 8/01/97

**PETROLEUM HYDROCARBON
HEALTH & SAFETY PLAN**

**10 UST SITES
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

AUGUST 1, 1997

1.0 INTRODUCTION

This section of the Site Health and Safety Plan (HASP) document defines general applicability and general responsibilities with respect to compliance with Health and Safety programs.

1.1 Scope and Applicability of the Site Health & Safety Plan

The purpose of this Site Health and Safety Plan is to define the requirements and designate protocols to be followed at the Site during investigation and remediation activities. Applicability extends to all employees, contractors, and subcontractors.

All personnel on site, contractors and subcontractors included, shall be informed of the emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation. This HASP summarizes these hazards and defines protective measures planned for the site.

This plan must be reviewed and an agreement to comply with the requirements must be signed by all personnel prior to entering the exclusion zone or contamination reduction zone.

During development of this plan consideration was given to current safety standards as defined by Environmental Protection Agency/Occupational Safety and Health Administration/National Institute of Occupational Safety and Health (EPA/OSHA/NIOSH), health effects and standards for known contaminants, and procedures designed to account for the potential for exposure to unknown substances. Specifically, the following reference sources have been consulted:

- OSHA 29 CFR 1910.120 and EPA 40 CFR 311
- U.S. EPA, Office of Emergency and Remedial Response, Environmental Response Team (OERR ERT) Standard Operating Safety Guidelines
- NIOSH/OSHA/USCG/EPA Occ. Health and Safety Guidelines
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values
- U. S. EPA OERR ERT, Health and Safety Plan (HASP), version 3.0

2.0 PROJECT ORGANIZATION/ KEY PERSONNEL:

The following personnel are designated to carry out the stated job functions.
(Note: One person may carry out more than one job function.)

RC&A Program Manager:	Douglass Dixon
RC&A Safety Manager:	Teri Piver
RC&A Field Team Leader:	Elizabeth Candler
RC&A Field Team Members:	Elizabeth Candler, Douglass Dixon, Dave Edwards, Bobbie Fowler, Bill Miller, Teri Piver, Jack Roscup, Greg Schuster, Jeff Stewart, Melissa Wagenseller, Jeff Weisner

RC&A Public Information Manager: Douglass Dixon
Security Officer: Not applicable
Subcontractors: Waste Industries, High Rise Services, McGill Environmental Systems of NC, and GeoChem, Inc.

3.0 SITE CHARACTERIZATION:

3.1 Location: (Refer to Figure 1.1)

10 UST Sites (NH-118-3, 575-2, 1817, 5400, AS-1011, FC-280, HP-250, SBB-94, TT-48, and TT-60)
Marine Corps Base
Camp Lejeune, North Carolina

3.2 Type/Description of Site:

Various UST sites located throughout Camp Lejeune and the New River Marine Corps Air Station (MCAS).

3.3 Activities Performed on Site Prior to Investigation/Cleanup:

UST closure has been performed at 10 locations.

3.4 Unusual Features (Containers, Buildings, Dikes, Power Lines, Terrain, Bodies of Water, etc.):

Above and below ground utilities are present; vehicular traffic.

3.5 Results of Previous Surveys:

Review of the UST closure reports revealed limited data regarding site conditions and contamination.

3.6 Waste Types (Liquid, Solid, Gas Vapor):

Potential for petroleum impacted soil, ground water, vapors, and free product.

3.7 Characteristics:

Toxic X Flammable/Volatile X Reactive
Radioactive Corrosive Ignitable
Biological Agent Combustible

3.8 Hazard Evaluation:

3.8.1 Chemicals (known or suspected): (Refer to Appendix I-A)

CHEMICAL	PEL	STEL	IDLH
Oil & Grease	NE	NE	NE
Gasoline	300 ppm	NE	NE
Diesel	NE	NE	NE
Used Oil	NE	NE	NE
Benzene	1 ppm	5 ppm	CARC
Toluene	200 ppm	150 ppm	2000 ppm
Ethylbenzene	100 ppm	125 ppm	2000 ppm
Xylenes	100 ppm	150 ppm	1000 ppm

Notes:

PEL Permissible Exposure Limit
STEL Short Term Exposure Limit
IDLH Immediately Dangerous to Life and Health
NE No evidence that a standard has been established
ppm Parts per million

3.8.2 Task Specific Physical Hazards

Hazards at the site may be associated with several job tasks detailed in the site workplan. Listed below are summaries for the hazards associated with each of the tasks.

Task Site Reconnaissance/Surveying

Chemical

- Ingestion of contaminated material from hand to mouth contact.

Physical/Environmental

- Slips/trips/falls-sloped, uneven terrain.

- Skin irritation from contact with insects and vegetation.
- Interaction with native and potentially hostile animal life.
- Thermal stress.
- Vehicular/air traffic.

Task Soil Boring/DPT/Monitoring Well Installation

Chemical

- Potentially-contaminated mud, etc. in eyes and on skin.
- Contact with potentially contaminated material.
- Ingestion of potentially contaminated material from hand to mouth contact.
- Inhalation of volatile or semi-volatile contaminants.
- Inhalation of fumes (carbon monoxide) from drill rig.

Physical/Environmental

- Heavy objects landing on foot/toe or head.
- Elevated noise levels from heavy equipment operation.
- Slips/trips/falls-sloped, uneven terrain.
- Skin irritation from contact with insects and vegetation.
- Overhead hazards, moving parts, and high pressure hydraulic lines from drill rig operations.
- Underground/above ground utilities.
- Lifting hazards.
- Thermal stress.
- Vehicular/air traffic.

Task DPT/Monitoring Well Sampling/Monitoring

Chemical

- Skin contact with potentially contaminated water.
- Eye contact from splashing water.
- Ingestion of potentially contaminated materials from hand to mouth contact.
- Inhalation of volatile compounds emitting from the well opening.

Physical/Environmental

- Skin irritation from contact with insects and vegetation.
- Lifting hazards (bailers, pumps, generators).
- Cuts from using knives to cut bailer rope.
- Slips/trips/falls-sloped, uneven terrain.
- Thermal stress.
- Vehicular/air traffic.
- Electrical hazards associated with use of electrical equipment around water or wet surfaces.

3.8.3 General Physical Hazards

Confined Space Entry

It is not anticipated that there will be a need for a confined space entry procedure during the site activities. However, confined space entry procedures may have to be implemented if a "permit required confined space" (as defined by OSHA) has the following characteristics:

- Contains or has known potential to contain a hazardous atmosphere.
- Has limited or restricted means of entry.
- Is large enough that an employee can bodily enter and perform work,
- Contains material with potential for engulfment.
- Contains any other recognized serious safety or health hazard.

Before any operation is to be performed in a confined space, the Safety Manager must be contacted.

Explosion and Fire

In general, the following items present potential physical hazards and will be monitored closely.

- Explosion and fire resulting from:
 - Heavy equipment malfunction
 - Penetration into underground utilities
 - Ignition of trapped flammable vapors
 - Vehicular accidents

Noise

Excessive noise levels may be produced during equipment operation or as a result of air traffic. Depending on the length and duration of these activities, hearing protective devices may be required.

Radiation Hazards

Radiation hazards are not anticipated during site activities; therefore, radiation monitoring is not required.

Hazardous Flora

Contact by individuals with poisonous/thorny plants is possible. Bare skin should be covered as much as is practical when working in forested areas. Rashes and other injuries should be reported to the Safety Manager as soon as they are known.

Hazardous Fauna

All animal life should be treated with respect. Without proper training, individuals may not be able to differentiate between dangerous and non-dangerous species.

Insects such as mosquitoes and gnats pose a nuisance and physical hazard to field personnel. As a nuisance, they distract workers, leading to accidents. Perfumes and scented deodorants should be avoided. Donning light colored clothing is preferable.

There is potential to come into contact with other dangerous insects, such as, fire ants, chiggers, bees, wasps, hornets, mites, fleas, spiders, and ticks. All personnel should perform checks, periodically during and at the end of each work shift, to inspect for the presence of insects or insect bites.

Poisonous snakes such as copperheads, rattlesnakes, and water moccasin (pit vipers), are common to the southeast United States. When encountering a snake, avoid quick/jerky motions, loud noises, and retreat slowly. Do not provoke the snake.

4.0 SITE ORGANIZATION AND CONTROL:

4.1 Work Zones

Work Areas Identified

Areas identified in and around the former UST systems. Investigative perimeters will be established during initial site walk-over, prior to commencement of field activities.

Decontamination Areas Identified

Temporary decontamination area to be established prior to initiation of field activities. The decontamination area will be set up in an area mutually agreed upon by RC&A and MCB personnel.

Support Areas Established

Support areas will be located upwind from the work zone.

4.2 Site Access

Access areas will be established following the initial site walk-over, but prior to commencement of field activities.

4.3 Site Conditions

Anticipated weather conditions include moderately cold temperatures and rain.

5.0 JOB ACTIVITIES/ WORKPLANS:

Types of Activities to be Performed:

Install 10 Type II wells, develop monitoring wells, and collect soil and ground water samples.

6.0 EDUCATION AND TRAINING:

Training Requirements:

40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) and 8-hour HAZWOPER refresher in accordance with 29 CFR 1910.120 where required.

7.0 MEDICAL SURVEILLANCE:

Medical Monitoring Requirements:

RC&A medical monitoring program in accordance with 29 CFR 1910.120.

8.0 CLOTHING AND PROTECTIVE GEAR:

In general, most work will be performed in Level D protective gear unless conditions warrant more protective attire. Level D is the minimum protection clothing as established by OSHA. Typically Level D consists of steel-toe protective work boots, protective eyewear (goggles or glasses), hard hats, nitrile outer gloves, vinyl or latex inner gloves, and hearing protection. Should conditions warrant, full face respirators with proper cartridges, chemical-resistant coveralls (Tyvek), and splash suits shall be available.

- **Job Activity:** Site reconnaissance/Surveying

Level: D

Monitoring Protocol: None required

List of PPE: Steel toe impermeable safety boots, hard hat (if required), and hearing protection.

- **Job Activity:** Drilling/Well Installation/Hydropunch

Level: D unless conditions warrant, then Level C

Monitoring Protocol: Monitor breathing zone with PID/FID

List of PPE: Steel toe impermeable safety boots, hard hat with face shield or safety goggles, hearing protection, splash suit, outer gloves, inner gloves, tyvek coveralls, hearing protection, full face respirator with proper cartridges.

- *Job Activity:* Monitoring Well Development/Sampling/Monitoring

Level: D unless conditions warrant, then Level C.

Monitoring Protocol: Monitor breathing zone with PID/FID

List of PPE: Steel toe impermeable safety boots, hearing protection, hard hat with face shield or safety goggles, splash suit (optional), outer gloves, inner gloves, tyvek coveralls, hearing protection. Tyveks may be optional depending on the potential for skin contact with free product and/or contaminated soil, full-face respirator with proper cartridges.

9.0 SAFETY EQUIPMENT LIST:

First Aid: Small - medium industrial First Aid Kit

Fire Fighting: "No Smoking" signs, ABC type Fire Extinguisher

Communications (Radios/Signs): Barricade tape/traffic cones to keep people out of work area, if necessary.

Personal Protective Equipment: MSHA/NIOSH approved full face air purifying respirator with organic vapor cartridges, hard hats, face shields or safety goggles, gloves, hearing protection, steel toe impermeable boots, hearing protection, splash suit (optional), tyvek (optional).

Decontamination Equipment: Potable water, non-phosphate soap, isopropyl rinse, steam cleaner.

10.0 DECONTAMINATION PROCEDURES:

- *Work Activities:* Drilling/Hydropunch equipment

Level of Protection: D (tyvek and/or splash suit)

Decontamination Solutions: Steam cleaner or high pressure wash

Procedures (By Station): Steam wash or pressure wash off dirt and product residue from equipment. May require soapy water wash.

- **Work Activities:** Personal Decontamination

Level of Protection: D

Decontamination Solutions: Non-phosphate soap, potable water

Procedures (By Station): Wash boots and outer gloves; change product contaminated clothing immediately. Wash contaminated skin surfaces.

11.0 CONTINGENCY PLANS:

11.1 Local Sources of Assistance:

FACILITY	PHONE NUMBER	CONTACT
Police	911 or (910) 451-4555	MCB Police
Fire	911	MCB Fire Department
Ambulance (On-Base)	911	Naval Regional Medical Center
Ambulance (Off-Base)	(910) 455-9119	Onslow Memorial Hospital
Hospital (On-Base)	911 or (910) 451-4551	Naval Regional Medical Center
Hospital (Off-Base)	(910) 577-2240	Onslow Memorial Hospital
Emergency	911	MCB Dispatch
MCB EMD	(910) 451-5068	N. Neal Paul
RC&A	1-800-346-7360 (910) 452-5861	Douglass Dixon/Teri Piver

11.2 Special First Aid or Evacuation Procedures:

Provide basic first aid procedures as required and note time and circumstances of injuries. In the event of serious injury or emergency, the Naval Regional Medical Center on Brewster Boulevard will be used (see Figure 11.1). Minor injuries and non-emergency cases should be treated off-base at Onslow Memorial

Hospital located at 317 Western Boulevard in Jacksonville, North Carolina (see Figure 11.1).

In the event of potential or actual fire or explosion, evacuate the area immediately. Notify Mr. Neal Paul of MCB EMD and RC&A project manager immediately.

EMERGENCY PROCEDURES (Petroleum Products):

<i>Skin-</i>	Wash with soap and water, rinse well
<i>Inhalation-</i>	Move to fresh air at least 50 feet upwind from vapor source. Seek qualified medical attention
<i>Eyes-</i>	Flush for a minimum of ten minutes with clean water while holding eye open. Seek qualified medical attention.
<i>Ingestion-</i>	Do not induce vomiting. If conscious, give water or milk to drink. Seek qualified medical attention.

11.3 National or Regional Sources of Assistance:

• <i>Richard Catlin & Associates, Inc.</i>	1-910-452-5861 1-800-346-7360
• <i>EPA RCRA/Superfund Hotline</i>	1-800-424-9346
• <i>Chemtrec (24 Hours)</i>	1-800-424-9300
• <i>Bureau of Explosives (24 Hours)</i> <i>(Association of American Railroads)</i>	1-202-293-4048
• <i>Communicative Disease Center</i> <i>(Biological Agents)</i>	1-404-633-5313
• <i>National Response Center, NRC</i> <i>(Oil/Hazardous Substances)</i>	1-800-424-8802
• <i>US DOT, Office of Hazardous Operations</i> <i>US DOT, (Regulatory Matters)</i>	1-202-426-0656 1-202-426-9280
• <i>US Coast Guard (Major Incidents)</i>	1-800-424-8802
• <i>Poison Control Center</i>	1-800-672-1697
• <i>National Agricultural Chemical Association</i>	1-513-961-4300

12.0 AMENDMENTS TO SITE SPECIFIC HEALTH & SAFETY PLAN

- 12.1 This Site Specific Health & Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise. It is important that personnel protective measures be thoroughly assessed by the RC&A Field Team Leader prior to and during the planned activities. Unplanned activities and/or changes in the hazard status should initiate a review of and may initiate changes in this plan.
- 12.2 Changes in the hazard status or unplanned activities are to be submitted on "Amendments to Site Specific Health and Safety Plan" which is included.
- 12.3 Amendments must be approved by the Safety Manager prior to implementation of amendment.

AMENDMENTS TO SITE SPECIFIC HEALTH AND SAFETY PLAN

Changes in field activities of hazards:

Proposed Amendment:

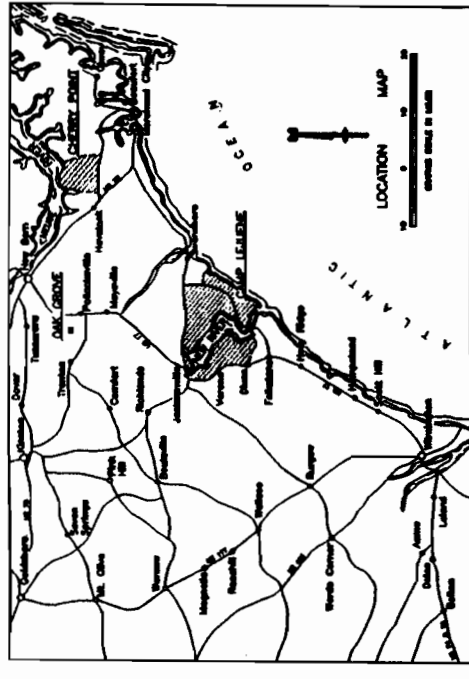
Proposed By: T. Piver
Date:

Approved By: T. Piver

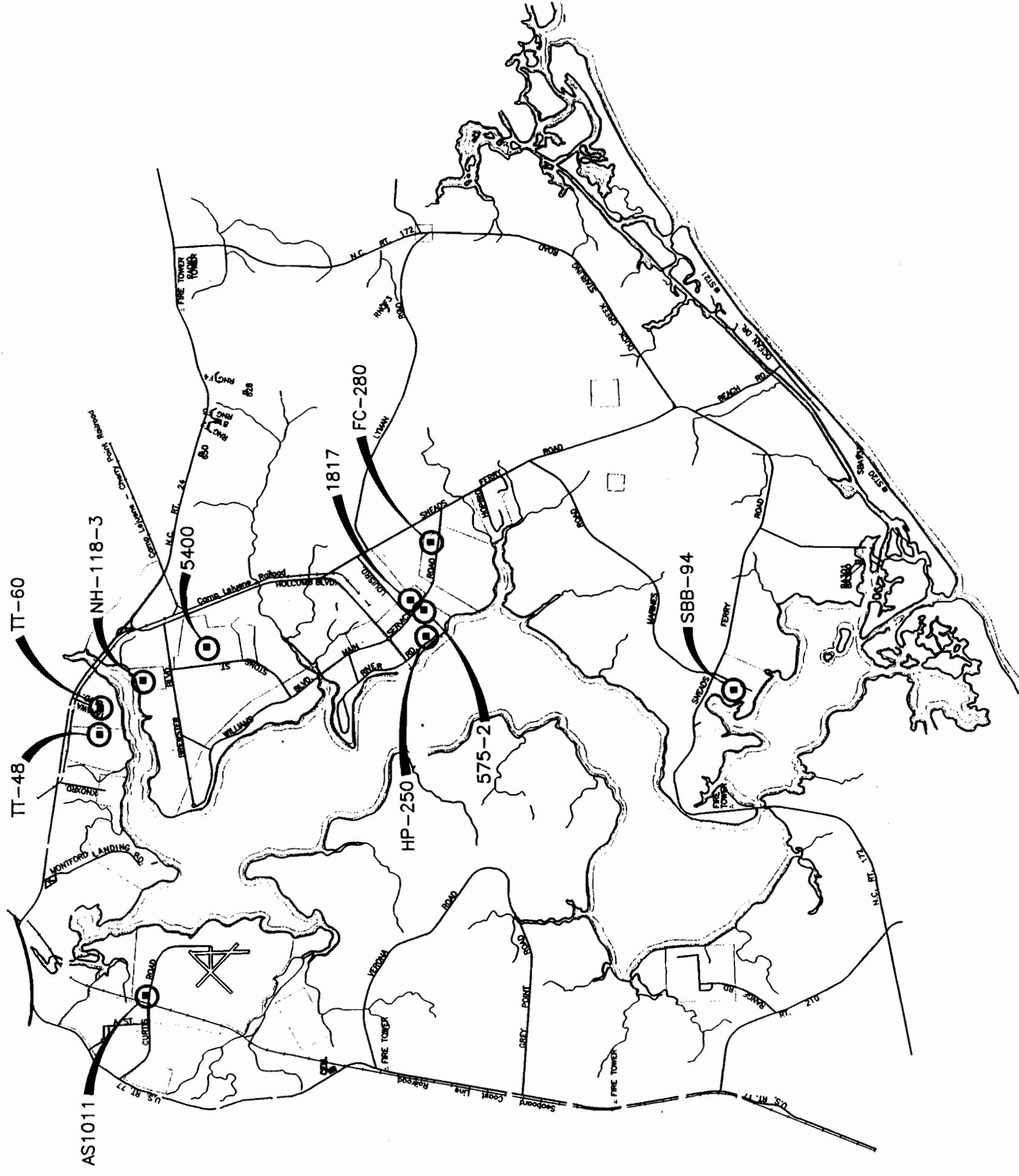
Accepted:
Declined:

Amendment Effective Date:

FIGURES



INDICATES PROJECT SITE LOCATION





11.1

APPENDIX I-A

PETROLEUM SUBSTANCES
SUBSTANCE INFORMATION FORMS
MATERIAL SAFETY DATA SHEETS

PETROLEUM SUBSTANCES

INTRODUCTION

During work involving petroleum products, workers may be exposed to petroleum hydrocarbon liquids, vapors or wastes. Petroleum substances in liquid or vapor form are a highly complex mixture of hydrocarbons and additives in varying concentrations. Gasoline for instance, is comprised of over 200 components. Due to the complexity of gasoline and diesel fuel, no firm standards for recommended occupational health and safety have been established. Never the less, health precautions should be taken to minimize exposure to the various petroleum forms.

TOXICITY CONSIDERATIONS

Tests have shown that prolonged or repeated exposures to petroleum substances, in liquid or vapor form, may cause serious illness including cancer in laboratory test animals. High concentrations of inhaled petroleum product components may cause a variety of symptoms including dizziness, intoxication, excitement or unconsciousness (API, 1987). Some petroleum product components may be toxic and care should be exercised to minimize exposure to these substances. When working with or around petroleum substances the ambient air quality should be monitored in the breathing zone by means of an organic vapor detector, oxygen meter, explosimeter and/or colorimetric tubes. However, other aromatic hydrocarbons may become contaminated with benzene during the distillation process and benzene-related health effects should be considered when exposure to any of these agents is suspected (NIOSH, 1985).

The following general health precautions are recommended:

1. Minimize skin contact and breathing of vapors;
2. Keep petroleum products away from eyes, skin and mouth; and
3. Keep work areas well ventilated.



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **GASOLINE**

CAS Number: 8006-61-9

DOT Number: UN 1203

RTK Substance number: 0957

Date: July 1986

HAZARD SUMMARY

- * Gasoline can affect you when breathed in and by passing through your skin.
- * Gasoline should be handled as a carcinogen--with extreme caution.
- * High exposures during pregnancy may damage the developing fetus.
- * It can cause you to feel dizzy, and irritate the nose and throat. Higher levels can cause irregular heartbeat, seizures, and even death.
- * *Exposure may damage the kidneys.
- * Exposure to Gasoline can expose you to toxic additives (such as Benzene, Tetraethyl Lead and Ethylene Dibromide).
- * Gasoline is a HIGHLY FLAMMABLE LIQUID and a DANGEROUS FIRE HAZARD.

- * Gasoline causes eye and throat irritation at 160-270 ppm. This irritation only serves as a warning of exposure. Not experiencing it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

ACGIH: The recommended airborne exposure limit is 300 ppm averaged over an 8-hour workshift and 500 ppm as a STEL (short term exposure limit).

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
- * Gasoline may be a CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

IDENTIFICATION

Gasoline is a clear liquid with a characteristic odor. It is used as a fuel for internal combustion engines, (cars, and planes), and as a solvent.

REASON FOR CITATION

- * Gasoline is on the Hazardous Substance List because it is cited by ACGIH, NFPA, and DOT.
- * This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Gasoline to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Gasoline:

- * Exposure can cause irritation of the nose and throat. Higher levels cause headaches, nausea, and poor coordination. Very high levels can cause seizures, coma, and even death.
- * Contact can cause eye and skin irritation.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Gasoline and can last for months or years:

Cancer Hazard

There is limited evidence that Gasoline causes cancer in animals. It may cause cancer of the kidney.

Reproductive Hazard

High exposure during pregnancy may damage the developing fetus.

Other Long-Term Effects

Repeated exposure may cause poor appetite, weakness, muscle weakness, cramps, and possible brain damage.

Repeated high exposure may damage the lungs.

Prolonged contact can cause a rash with drying and cracking of the skin. Gasoline may cause a skin allergy. If allergy develops, very low future exposures can cause itching and a skin rash.

Exposure may damage the kidneys.

Repeated exposure may cause permanent eye damage.

Since Gasoline often contains Lead and Benzene, these can also cause toxic effects.

CONSULT THE FACT SHEETS ON TETRAETHYL LEAD, BENZENE and ETHYLENE DIBROMIDE.

MEDICAL

Medical Testing

If symptoms develop or overexposure has occurred, the following may be useful:

- * Urinary Lead level.
- * Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy.
- * Liver function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- * Where possible, automatically pump liquid Gasoline from drums, barrels, or other storage containers to process containers.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

Workers whose clothing has been contaminated by Gasoline should change into clean clothing promptly.

- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Gasoline.
- * Wash any areas of the body that may have contacted Gasoline at the end of each work day, whether or not known skin contact has occurred.
- Do not eat, smoke, or drink where Gasoline is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Nothing

Avoid skin contact with Gasoline. Protective "barrier" creams are available to help lower skin absorption. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.

All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Protection

Wear splash-proof chemical goggles when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposures over 300 ppm, use a MSHA/NIOSH approved respirator with an organic vapor cartridge/canister. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
- * If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Gasoline, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters, to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- * Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

- * Prior to working with Gasoline you should be trained on its proper handling and storage.
- * Sources of ignition such as smoking and open flames are prohibited where Gasoline is handled, used, or stored.
- * Metal containers involving the transfer of 5 gallons or more of Gasoline should be grounded and bonded. Drums must be

equipped with self-closing valves, pressure vacuum bungs, and flame arresters.

* Use only non-sparking tools and equipment, especially when opening and closing containers of Gasoline.

* Whenever Gasoline is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

When are higher exposures more likely?

Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Is the risk of getting sick higher for workers than for community residents?

Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?

A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?

A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?

A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone do not cause cancer unless it is a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals which harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at high risk.

The New Jersey State Department of Health, Occupational Health Service offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-1863.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEPE is the New Jersey Department of Environmental Protection and Energy.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

I N F O R M A T I O N <<<<<<<<<<<<<<<<

Common Name: **GASOLINE**
DOT Number: UN 1203
DOT Emergency Guide code:
CAS Number: 8006-61-9

Hazard rating	NJ DOH	NFPA
FLAMMABILITY		3
REACTIVITY		0

FLAMMABLE LIQUID
CONTAINERS MAY EXPLODE IN FIRE
POISONOUS GAS IS PRODUCED IN FIRE

Hazard Rating Key: 0-minimal; 1-slight;
2-moderate; 3-serious; 4-severe

FIRE HAZARDS

- * Gasoline is a FLAMMABLE LIQUID.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * POISONOUS GAS IS PRODUCED IN FIRE.
- * Use dry chemical, CO₂, or foam extinguishers.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Gasoline is spilled or leaked, take the following steps:

- Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
Remove all ignition sources.
Ventilate area of spill or leak.
Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
It may be necessary to contain and dispose of Gasoline as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

R LARGE SPILLS AND FIRES immediately call
ur fire department. You can request emer-
ncy information from the following:

EMTREC: (800) 424-9300
DEPE HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

PHYSICAL DATA

Flash Point: -50°F

Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Gasoline

Other Names and Formulations:

Petrol

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program

CN 368, Trenton, NJ 08625-0368

(609) 984-2202



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **BENZENE**

CAS Number: 71-43-2

DOT Number: UN 1114

RTK Substance number: 0197

Date: 1/31/88 Revision: First

HAZARD SUMMARY

- * Benzene can affect you when breathed in and by passing through your skin.
- * Benzene is a **CARCINOGEN**--HANDLE WITH EXTREME CAUTION.
- * Exposure can cause you to become dizzy and lightheaded. Higher levels can cause convulsions and death.
- * Exposure can irritate the nose and throat and may cause an upset stomach and vomiting.
- * Benzene can cause an irregular heart beat that can lead to death.
- * Prolonged exposure can cause fatal damage to the blood (aplastic anemia).
- * Benzene is a **FLAMMABLE LIQUID** and a **FIRE HAZARD**.

IDENTIFICATION

Benzene is a colorless liquid with a pleasant odor. It is used mainly in making other chemicals, as a solvent, and is found in gasoline.

REASON FOR CITATION

- * Benzene is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, IARC, NTP, CAG, DEP, NFPA and EPA.
- * It is on the Special Health Hazard Substance List because it is a **CARCINOGEN**, a **MUTAGEN** and is **FLAMMABLE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD** = 12.0 ppm.

- * The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 1 ppm averaged over an 8-hour workshift, and 5 ppm which should not be exceeded in any 10 minute period.

ACGIH: The recommended airborne exposure limit is 10 ppm averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 1.0 ppm, which should not be exceeded during any 60 minute period.

- * Benzene is a **CANCER-CAUSING AGENT** in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- * The above exposure limits are for air levels only. Skin contact may also cause overexposure.

WAYS OF REDUCING EXPOSURE

- * A regulated, marked area should be established where Benzene is handled, used, or stored.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Benzene and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Benzene to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Benzene:

- * Exposure can cause symptoms of dizziness, lightheadedness, headaches, and vomiting. Convulsions and coma, or sudden death from irregular heart beat, may follow high exposures.
- * Exposure can also irritate the eyes, nose, and throat.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Benzene and can last for months or years:

Cancer Hazard

- * Benzene is a CARCINOGEN in humans. It has been shown to cause leukemia.
- * Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

- * There is limited evidence that Benzene is a teratogen in animals. Until further testing has been done, it should be treated as a possible teratogen in humans.

Other Long-Term Effects

- * Repeated exposure can damage the blood-forming organs causing a condition called aplastic anemia. This can cause death.
- * Long-term exposure may cause drying and scaling of the skin.

MEDICAL TESTING

Before beginning employment and at regular times after that, the following are recommended:

- * Complete blood count.
- * Urinary Phenol (a test to see if Benzene is in the body).

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid Benzene from drums or other storage containers to process containers.
- * Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria documents on Benzene # 74-137 and "Refined Petroleum Solvents" # 77-192.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by Benzene should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Benzene.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with Benzene, immediately wash or shower to remove the chemical.
- * Do not eat, smoke, or drink where Benzene is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Benzene. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
- * ACGIH recommends VITON gloves for short periods of protection.

Eye Protection

- * Eye protection is included in the recommended respiratory protection.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * At any exposure level, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

- * Prior to working with Benzene you should be trained on its proper handling and storage.
- * Benzene must be stored to avoid contact with OXIDIZERS (such as PERMANGANATES, NITRATES, PEROXIDES, CHLORATES, and PERCHLORATES), since violent reactions occur.
- * Store in tightly closed containers in a cool well-ventilated area away from HEAT.
- * Sources of ignition such as smoking and open flames are prohibited where Benzene is handled, used, or stored.
- * Metal containers involving the transfer of 5 gallons or more of Benzene should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- * Wherever Benzene is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?

A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Aren't pregnant women at the greatest risk from reproductive hazards?

A: Not necessarily. Pregnant women are at greatest risk from chemicals which harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health
Occupational Disease Prevention and
Information Program
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-5627.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

CAS Number: 71-43-2

Hazard Rating Key: 0-minimal; 1-slight;
2-moderate; 3-serious; 4-severe

- * Benzene is a FLAMMABLE LIQUID.
- * Use dry chemical, CO₂, or foam extinguishers. Water can be used to keep fire-exposed containers cool.
- * POISONOUS GAS IS PRODUCED IN FIRE.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * The vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

- * Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
- * Remove all ignition sources.
- * Ventilate area of spill or leak.
- * Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
- * Keep Benzene out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
- * It may be necessary to contain and dispose of Benzene as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

NEW JERSEY DEPARTMENT OF HEALTH
Right to Know Project
CN 368, Trenton, NJ 08625-0368
(609) 984-2202



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **TOLUENE**

CAS Number: 108-88-3

DOT Number: UN 1294

RTK Substance number: 1866

Date: May 1986

Revision: Dec. 1992

HAZARD SUMMARY

- * Toluene can affect you when breathed in and by passing through your skin.
- * Toluene may cause mutations. Handle with extreme caution.
- * It may damage the developing fetus.
- * Exposure can irritate the skin, nose, throat and eyes. Higher levels can cause you to feel dizzy, lightheaded, and to pass out. Death can occur.
- * Repeated exposures can damage bone marrow, causing low blood cell count. It can also damage the liver and kidneys.
- * Toluene can cause slowed reflexes, trouble concentrating, and headaches.
- * Prolonged contact can cause a skin rash.
- * Toluene is a **FLAMMABLE LIQUID** and a **FIRE HAZARD**.

IDENTIFICATION

Toluene is a colorless liquid with a sweet, strong odor. It is used as a solvent and in aviation gasoline, making other chemicals, perfumes, medicines, dyes, explosives, and detergents.

REASON FOR CITATION

- * Toluene is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEPE, NFPA, HHAG and EPA.
- * This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to rec-

ognize occupational diseases. Take this Fact Sheet with you.

- * **ODOR THRESHOLD** = 2.9 ppm.
- * The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 100 ppm averaged over an 8-hour workshift and 150 ppm not to be exceeded during any 15 minute work period. (Final Rule, January 1989).

NIOSH: The recommended airborne exposure limit is 100 ppm averaged over an 8-hour workshift and 200 ppm not to be exceeded during any 10 minute work period.

ACGIH: The recommended airborne exposure limit is 50 ppm averaged over an 8-hour workshift.

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
- * Toluene may cause mutations. All contact with this chemical should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Toluene and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Toluene to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Toluene:

- * Exposure can irritate the skin, nose, throat and eyes. Higher levels can cause you to feel dizzy, lightheaded, and to pass out. Death can occur.
- * Lower levels can cause trouble concentrating, headaches, slowed reflexes, loss of appetite and nausea.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Toluene and can last for months or years:

Cancer Hazard

- * Toluene may cause mutations (genetic changes).
- * According to the information presently available to the New Jersey Department of Health, Toluene has been tested and has not been shown to cause cancer in animals.

Reproductive Hazard

- * Toluene may damage the developing fetus.

Other Long-Term Effects

- * Repeated exposure can damage bone marrow, causing low blood cell count.
- * Prolonged contact can cause drying and cracking of the skin, and a rash.
- * Repeated Toluene exposure can cause liver and kidney damage, and may cause brain damage.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following is

recommended before beginning work and at regular times after that:

- * Urinary Hippuric acid excretion (at the end of shift) as an index of overexposure.

If symptoms develop or overexposure is suspected, the following may be useful:

- * Exam of the nervous system.
- * Liver and kidney function tests.
- * Complete blood count.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid Toluene from drums or other storage containers to process containers.
- * Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Occupational Exposure to Toluene* #73-11023.

- * Before entering a confined space where Toluene may be present, check to make sure that an explosive concentration does not exist.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by Toluene should change into clean clothing promptly.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Toluene.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with Toluene, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Toluene, whether or not known skin contact has occurred.
- Do not eat, smoke, or drink where Toluene is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Toluene. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean,

available each day, and put on before work.

- * ACGIH and safety equipment manufacturers recommend VITON and Polyvinyl Alcohol as protective materials.

Eye Protection

- * Wear splash-proof chemical goggles and face shield when working with liquid, unless full faciece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposures over 50 ppm, use a MSHA/NIOSH approved full faciece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full faciece powered air purifying respirators.
- * If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Toluene, or in the case of a full faciece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- * Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full faciece operated in the positive pressure mode or with a full faciece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full faciece operated in pressure-demand or other positive pressure mode.
- * Exposure to 2,000 ppm is immediately dangerous to life and health. If the possibility of exposure above 2,000 ppm exists, use a MSHA/NIOSH approved self-

contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

- * Prior to working with Toluene you should be trained on its proper handling and storage.
- * Toluene may react violently with mixtures of NITRIC and SULFURIC ACIDS.
- * Toluene is not compatible with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE).
- * Sources of ignition, such as smoking and open flames, are prohibited where Toluene is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
- * Metal containers involving the transfer of 5 gallons or more of Toluene should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of Toluene.

and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely? Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers),

The New Jersey State Department of Health, Occupational Health Service offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-1863.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEPE is the New Jersey Department of Environmental Protection and Energy.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that releases energy under certain conditions.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEPE HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 4)

FIRST AID

- In NJ, POISON INFORMATION 1-800-962-1253

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

- ## PHYSICAL DATA

Vapor Pressure: 22 mm Hg at 68°F (20°C)
Flash Point: 40°F (4°C)
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:

Benzene, Methyl-

Other Names:

Phenylmethane; Toluol; Methylbenzene

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program

CN 368, Trenton, NJ 08625-0368

(609) 984-2202



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ETHYL BENZENE**

CAS Number: 100-41-4
DOT Number: UN 1175

RTK Substance number: 0851
Date: March 1989

HAZARD SUMMARY

- * Ethyl Benzene can affect you when breathed in and by passing through your skin.
- * Exposure can irritate the eyes, nose and throat.
- * High concentration can cause you to become dizzy, lightheaded, or to pass out. Very high levels can cause paralysis, trouble breathing and death.
- * Contact can irritate the skin. Prolonged exposure can cause drying, scaling and even blistering.
- * High exposure may damage the liver.
- * Ethyl Benzene is a **FLAMMABLE LIQUID** and a **FIRE HAZARD**.

IDENTIFICATION

Ethyl Benzene is a colorless liquid with an aromatic odor. It is used in the production of styrene and synthetic polymers, as a solvent and as a component of automotive and aviation fuels.

REASON FOR CITATION

- * Ethyl Benzene is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, DEP and EPA, NFPA.
- * This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health

problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

- * **ODOR THRESHOLD** = 2.3 ppm.
- * The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 100 ppm averaged over an 8-hour workshift and 125 ppm not to be exceeded during any (15 minute) work period. (Final Rule January 1989).

ACGIH: The recommended airborne exposure limit is 100 ppm averaged over an 8-hour workshift and 125 ppm as a STEL (short term exposure limit).

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Ethyl Benzene and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Ethyl Benzene to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Ethyl Benzene:

- * Ethyl Benzene can irritate the eyes, nose and throat.
- * Exposure to high concentrations can cause you to become dizzy, lightheaded and to pass out. Very high levels can cause trouble breathing, paralysis and death.
- * Contact with Ethyl Benzene can irritate the skin.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Ethyl Benzene and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, Ethyl Benzene has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * There is limited evidence that Ethyl Benzene may damage the developing fetus.

Other Long-Term Effects

- * Repeated contact can cause drying and scaling of the skin. Prolonged contact can cause blistering.
- * High exposure may cause liver damage.
- * This chemical has not been adequately evaluated to determine whether brain or other nerve damage could occur with repeated exposure. However, many solvents and other petroleum-based chemicals have been shown to cause such damage. Effects may include reduced memory and concentration, personality

changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

MEDICAL TESTING

If symptoms develop or overexposure is suspected, the following may be useful:

- * Liver function tests.
- * Interview for brain effects, including recent memory, mood (irritability, withdrawal), concentration, headaches, malaise and altered sleep patterns. Consider cerebellar, autonomic and peripheral nervous system evaluation. Positive and borderline individuals should be referred for neuropsychological testing.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid Ethyl Benzene from drums or other storage containers to process containers.
- * Before entering a confined space where Ethyl Benzene may be present, check to make sure that an explosive concentration does not exist.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by Ethyl Benzene should change into clean clothing promptly.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Ethyl Benzene.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with Ethyl Benzene, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Ethyl Benzene, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where Ethyl Benzene is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Ethyl Benzene. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommenda-

tions on the most protective glove/clothing material for your operation.

- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposures over 100 ppm, use a MSHA/NIOSH approved respirator with an organic vapor cartridge/canister. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
- * If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Ethyl Benzene, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- * Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with

a full facepiece operated in pressure-demand or other positive pressure mode.

- * Exposure to 2,000 ppm is immediately dangerous to life and health. If the possibility of exposures above 2,000 ppm exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

- * Prior to working with Ethyl Benzene you should be trained on its proper handling and storage.
 - * Ethyl Benzene must be stored to avoid contact with STRONG OXIDIZERS since violent reactions occur.
 - * Sources of ignition, such as smoking and open flames, are prohibited where Ethyl Benzene is handled, used, or stored.
 - * Metal containers involving the transfer of 5 gallons or more of Ethyl Benzene should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- Use only non-sparking tools and equipment, especially when opening and closing containers of Ethyl Benzene.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

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DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

I N F O R M A T I O N <<<<<<<<<<<<<<<

HANDLING AND STORAGE (See page 4)

FIRST AID

IN NJ, POISON INFORMATION 1-800-962-1253

- ## Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

- ## Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

Vapor Pressure: 7.1 mmHg at 68°F (20°C)

Flash Point: 59°F (15°C)

Water Solubility: Slightly soluble

Chemical Name:

Benzene, Ethyl-

Other Names and Formulations:

Ethylbenzol; Phenylethane

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NEW JERSEY DEPARTMENT OF HEALTH

Right to Know Program

CN 368, Trenton, NJ 08625-0368

(609) 984-2202

NJ DEP HOTLINE: (609) 292-7172

CHEMTREC: (800) 424-9300



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **XYLENES**

CAS Number: 1330-20-7
DOT Number: UN 1307

RTK Substance number: 2014
Date: Jan. 1986 Revision: Mar. 1992

HAZARD SUMMARY

- * Xylenes can affect you when breathed in and by passing through your skin.
- * Xylenes may damage the developing fetus.
- * They can irritate the eyes, nose and throat. High levels can cause dizziness, passing out and death.
- * Repeated exposure can damage bone marrow, causing low blood cell count.
- * Exposure may damage the eyes.
- * Prolonged contact with Xylenes can cause dryness and cracking of the skin.
- * Xylenes can cause problems with memory and concentration.
- * Xylenes are **FLAMMABLE LIQUIDS** and **FIRE HAZARDS**.
- * This Hazardous Substance Fact Sheet applies to blends of o-Xylene, m-Xylene and p-Xylene.

IDENTIFICATION

Xylenes are similar chemicals which form a clear liquid with a strong odor. They are used as solvents, in making drugs, dyes, insecticides, lacquers and enamels, and in gasoline for airplanes.

REASON FOR CITATION

- * Xylenes are on the Hazardous Substance List because they are regulated by OSHA and cited by ACGIH, DOT, NIOSH, NFPA, DEPE and EPA.
- * These chemicals are on the Special Health Hazard Substance List because they are **FLAMMABLE**.
- * Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize

occupational diseases. Take this Fact Sheet with you.

- * **ODOR THRESHOLD** = 0.081 to 40 ppm.
- * The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WORKPLACE EXPOSURE LIMITS

- OSHA: The legal airborne permissible exposure limit (PEL) is 100 ppm averaged over an 8-hour workshift and 150 ppm not to be exceeded during any 15 minute work period. (Final Rule, January 1989).
- NIOSH: The recommended airborne exposure limit is 100 ppm averaged over a 10-hour workshift and 200 ppm not to be exceeded during any 10 minute work period.
- ACGIH: The recommended airborne exposure limit is 100 ppm averaged over an 8-hour workshift and 150 ppm as a STEL (short term exposure limit).

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Xylenes and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Xylenes to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Xylenes:

- * Exposure can irritate the eyes, nose and throat.
- * Xylenes can cause headaches, nausea and vomiting, tiredness and stomach upset.
- * Exposure to high levels can cause dizziness, lightheadedness, passing out and even death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Xylenes and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, Xylenes have been tested and have not been shown to cause cancer in animals.

Reproductive Hazard

- * Xylenes may damage the developing fetus.

Other Long-Term Effects

- * Repeated exposure can damage bone marrow, causing low blood cell count.
- * Xylenes can damage the liver and kidneys.
- * Prolonged contact can cause drying and cracking of the skin.
- * Repeated exposure to Xylenes can cause poor memory, difficulty in concentration and other brain effects. It can also cause damage to the surface of the eye.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following is recommended before beginning work and at regular times after that:

- * Exam of the eyes.

If symptoms develop or overexposure is suspected, the following may be useful:

- * Liver and kidney function tests.
- * Complete blood count.
- * Urine concentration of *m-Methylhippuric Acid* (at the end of the workshift) as an index of overexposure.
- * Exam of the nervous system.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by Xylenes.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when

significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically pump liquid Xylenes from drums or other storage containers to process containers.
- * Specific engineering controls are recommended for these chemicals by NIOSH. Refer to the NIOSH criteria document: *Occupational Exposure to Xylenes #75-168*.
- * Before entering a confined space where Xylenes may be present, check to make sure that an explosive concentration does not exist.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by Xylenes should change into clean clothing promptly.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Xylenes.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with Xylenes, immediately wash or shower to remove the chemicals. At the end of the workshift, wash any areas of the body that may have contacted Xylenes, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where Xylenes are handled, processed, or stored, since the chemicals can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Xylenes. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
- * ACGIH recommends the use of Polyvinyl Alcohol as a protective material.

Eye Protection

- * Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposures over 100 ppm, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered-air purifying respirators.
- * If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Xylenes, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- * Where the potential for high exposures exist, use a MSHA/NIOSH approved sup-

plied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode.

- * Exposure to 10,000 ppm is immediately dangerous to life and health. If the possibility of exposures above 10,000 ppm exists, use a MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

- * Prior to working with Xylenes you should be trained on their proper handling and storage.
- * Xylenes are not compatible with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE).
- * Sources of ignition, such as smoking and open flames, are prohibited where Xylenes are used, handled, or stored in a manner that could create a potential fire or explosion hazard.
- * Use only non-sparking tools and equipment, especially when opening and closing containers of Xylenes.
- * Protect storage containers from physical damage.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing opera-

tions (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

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DEPE is the New Jersey Department of Environmental Protection and Energy.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

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ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

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A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

Hazard rating	NJ DOH	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE		
CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0-minimal; 1-slight;
2-moderate; 3-serious; 4-severe

CHEMTREC: (800) 424-9300
NJDEPE HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 4)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 7 to 9 mm Hg at 68°F
(20°C)

Flash Point: 81 to 90°F (27° to 32°C)

Water Solubility: Insoluble

CHEMICAL NAME

Dimethylbenzenes

Xylenes is the common name for any combination of the following:

- 1,2-Dimethylbenzene (ortho-Xylene),
CAS #95-47-6
1,3-Dimethylbenzene (meta-Xylene),
CAS #108-38-3
1,4-Dimethylbenzene (para-Xylene),
CAS #106-42-3

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Material Safety Data Sheets Collection:

Sheet No. 470
Diesel Fuel Oil No. 2-D

Issued: 10/81

Revision: A, 11/90

Section 1. Material Identification

Diesel Fuel Oil No. 2-D Description: Diesel fuel is obtained from the middle distillate in petroleum separation; a distillate oil of low sulfur content. It is composed chiefly of unbranched paraffins. Diesel fuel is available in various grades, one of which is synonymous with fuel oil No. 2-D. This diesel fuel oil requires a minimum Cetane No. (efficiency rating for diesel fuel comparable to octane number ratings for gasoline) of 40 (ASTM D613). Used as a fuel for trucks, ships, and other automotive engines; as mosquito control (coating on breeding waters); and for drilling muds.

Other Designations: CAS No. 68334-30-5, diesel fuel.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*^(TM) for a suppliers list.

Cautions: Diesel fuel oil No. 2-D is a skin irritant and central nervous depressant with high mist concentrations. It is an environmental hazard and moderate fire risk.

33
NFPA
R 1
I -
S -2
K 2
HMIS
H 0
F 2
R 0
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Diesel fuel oil No. 2-D*

1989 OSHA PEL
None established

1990-91 ACGIH TLV

Mineral Oil Mist

TWA: 5 mg/m³†

STEL: 10 mg/m³

1988 NIOSH REL

None established

1985-86 Toxicity Data‡

Rat, oral, LD₅₀: 9 g/kg produces gastrointestinal (hypermotility, diarrhea) effects

* Diesel fuel No. 2-D tends to be low in aromatics and high in paraffinics. This fuel oil is complex mixture of: 1) >95% paraffinic, olefinic, naphthenic, and aromatic hydrocarbons, 2) sulfur (<0.5%), and 3) benzene (<100 ppm). [A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)]. Although low in the fuel itself, benzene concentrations are likely to be much higher in processing areas.

† As sampled by nonvapor-collecting method.

‡ Monitor NIOSH, RTECS (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point Range: 340 to 675 °F (171 to 358 °C)

Specific Gravity: <0.86

Viscosity: 1.9 to 4.1 centistoke at 104 °F (40 °C)

Water Solubility: Insoluble

Appearance and Odor: Brown, slightly viscous liquid.

Section 4. Fire and Explosion Data

Flash Point: 125 °F (52 °C) min.

Autoignition Temperature: >500 °F (932 °C)

LEL: 0.6% v/v

UEL: 7.5% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or foam to fight fire. Use a water spray to cool fire exposed containers. Do not use a forced water spray directly on burning oil since this will scatter the fire. Use a smothering technique for extinguishing fire.

Unusual Fire or Explosion Hazards: Diesel fuel oil No. 2-D is a OSHA Class II combustible liquid. Its volatility is similar to that of gas oil. Vapors may travel to a source of ignition and flash back.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire. Be aware of runoff from fire control methods. Do not release to sewers or waterways due to pollution and fire or explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Diesel fuel oil No. 2-D is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: It is incompatible with strong oxidizing agents; heating greatly increases the fire hazard.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of diesel fuel oil No. 2-D can produce various hydrocarbons and hydrocarbon derivatives, and other partial oxidation products such as carbon dioxide, carbon monoxide, and sulfur dioxide.

Section 6. Health Hazard Data

Carcinogenicity: Although the IARC has not assigned an overall evaluation to diesel fuels as a group, it has evaluated occupational exposures in petroleum refining as an IARC probable human carcinogen (Group 2A). It has evaluated distillate (light) diesel oils as not classifiable as human carcinogens (Group 3).

Summary of Risks: Although diesel fuel's toxicologic effects should resemble kerosene's, they are somewhat more pronounced due to additives and sulfurized esters. Excessive inhalation of aerosol or mist can cause respiratory tract irritation, headache, dizziness, nausea, vomiting, and loss of coordination, depending on concentration and exposure time. When removed from exposure area, affected persons usually recover completely. If vomiting occurs after ingestion and if oil is aspirated into the lungs, hemorrhaging and pulmonary edema, progressing to renal involvement and chemical pneumonitis, may result. A comparative ratio of oral to aspirated lethal doses may be 1 pt vs. 5 ml. Aspiration may also result in transient CNS depression or excitement. Secondary effects may include hypoxia (insufficient oxygen in body cells), infection, pneumatocele formation, and chronic lung dysfunction. Inhalation may result in euphoria, cardiac dysrhythmias, respiratory arrest, and CNS toxicity. Prolonged or repeated skin contact may irritate hair follicles and block sebaceous glands, producing a rash of acne pimples and spots, usually on arms and legs.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Central nervous system, skin, and mucous membranes.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects: Systemic effects from ingestion include gastrointestinal irritation, vomiting, diarrhea, and in severe cases central nervous system depression, progressing to coma or death. Inhalation of aerosols or mists may result in increased rate of respiration, tachycardia (excessively rapid heart beat), and cyanosis (dark purplish discoloration of the skin and mucous membranes caused by deficient blood oxygenation).

Chronic Effects: Repeated contact with the skin causes dermatitis.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. If large areas of the body have been exposed or if irritation persists, get medical help immediately. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, do not induce vomiting due to aspiration hazard.

Contact: A physician immediately. Position to avoid aspiration.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk. In cases of severe aspiration pneumonitis, consider monitoring arterial blood gases to ensure adequate ventilation. Observe the patient for 6 hr. If vital signs become abnormal or symptoms develop, obtain a chest x-ray.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. Use a noncombustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclamation or disposal. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 CFR 1910.120). Diesel fuel oil No. 2-D spills may be environmental hazards. Report large spills.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Designations

Hazardous Waste (40 CFR 261.21): Ignitable waste

HA Hazardous Substance (40 CFR 302.4): Not listed

Extremely Hazardous Substance (40 CFR 355): Not listed

ARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use a NIOSH-approved respirator with a mist filter and organic vapor cartridge. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.**

Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰⁷⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Use and storage conditions should be suitable for a OSHA Class II combustible liquid. Store in closed containers in a well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools and explosion-proof electrical equipment. No smoking in storage or use areas.

Engineering Controls: Avoid vapor or mist inhalation and prolonged skin contact. Wear protective rubber gloves and chemical safety glasses where contact with liquid or high mist concentration may occur. Additional suitable protective clothing may be required depending on working conditions. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures. Do not wear oil contaminated clothing. At least weekly laundering of work clothes is recommended. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Fuel oil

DOT Hazard Class: Combustible liquid

No.: NA1993

Label: None

Packaging Exceptions: 173.118a

Packaging Requirements: None

SDS Collection References: 1, 6, 7, 12, 73, 84, 101, 103, 126, 127, 132, 133, 136, 143, 146

Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: AC Darlington, MD; Edited by: JR Stuart, MS



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME:

NAPHTHALENE

CAS NUMBER:

91-20-3

DOT NUMBER:

UN 1334/UN 2304

HAZARD SUMMARY

- * Naphthalene can affect you when breathed in and by passing through your skin.
- * Exposure can irritate the eyes, nose and throat. Very high levels can cause headaches and nausea, damage the red blood cells, liver and kidneys and even cause death.
- * Repeated exposure can cause clouding of the eye lens and damage vision.

IDENTIFICATION

Naphthalene is either a white crystalline solid or a liquid with a strong odor like mothballs. It is used in making dyes, explosives, plastics, lubricants and as a moth repellent.

REASON FOR CITATION

- * Naphthalene is on the Workplace Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT and DEP.
- * Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 10 ppm averaged over an 8-hour work-shift.

ACGIH: The recommended airborne exposure limit is 10 ppm averaged over an 8-hour workshift and 15 ppm as a STEL (short term exposure limit).

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

**HOW TO DETERMINE IF YOU ARE
BEING EXPOSED**

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
- * ODOR THRESHOLD = 0.084 ppm.
- * The odor threshold only serves as a warning of exposure. Not smelling it does not mean you are not being exposed.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly immediately after exposure to Naphthalene and at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Naphthalene to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals may also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Naphthalene:

- * Exposure can irritate the eyes, nose and throat. Very high levels can cause headaches and nausea, damage the red blood cells causing hemolytic anemia (low blood count), and damage the liver and kidneys. Death can occur.
- * Very high exposure can damage the nerves of the eye.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Naphthalene and can last for months or years:

Cancer Hazard

- * According to the information presently available to the New Jersey Department of Health, Naphthalene has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * There is limited evidence that Naphthalene may damage the developing fetus.

Other Long-Term Effects

- * Repeated exposure can cause clouding of eye lens, which may damage vision.
- * Naphthalene can cause headaches, fatigue and nausea with repeated exposure.
- * Naphthalene may cause a skin allergy. If allergy develops, very low future exposures can cause itching and a skin rash.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following is recommended before beginning work and at regular times after that:

- * Exam of the eyes and vision.

If symptoms develop or overexposure is suspected, the following may be useful:

- * Liver and kidney function tests.
- * Complete blood count.
- * Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy.

Conditions Made Worse By Exposure

- * People with an inherited condition called "*G-6-P-D deficiency*" are more likely to develop blood cell damage from exposure to Naphthalene.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact

could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

- * Where possible, automatically pump molten Naphthalene from drums or other storage containers to process containers.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by Naphthalene should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Naphthalene.
- * Eye wash fountains should be provided in the immediate work area for emergency use.
- * On skin contact with Naphthalene, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Naphthalene, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where Naphthalene is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
- * Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Naphthalene. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

- * Wear dust-proof goggles and face shield when working with powders or dust, unless full facepiece respiratory protection is worn.
- * Wear gas-proof goggles and face shield, when working with molten Naphthalene, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposures over 10 ppm, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister and a dust prefilter. Increased protection is obtained from full facepiece powered air purifying respirators.
- * If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect Naphthalene, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.

- * Exposure to 500 ppm is immediately dangerous to life and health. If the possibility of exposures above 500 ppm exists use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

- * Prior to working with Naphthalene you should be trained on its proper handling and storage.
- * Naphthalene must be stored to avoid contact with CHROMIUM (III) OXIDE, DI-NITROGEN PENTOXIDE, and STRONG OXIDIZERS (such as CHLORINE, BROMINE, and FLUORINE) since violent reactions occur.
- * Store in tightly closed containers in a cool well-ventilated area.
- * Sources of ignition such as smoking and open flames are prohibited where Naphthalene is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
- * Metal containers involving the transfer of 5 gallons or more of Naphthalene should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
- * Liquid Naphthalene must avoid contact with WATER.

QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the

amount of material to which someone is exposed.

- Q: When are higher exposures more likely?
- A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).
- Q: Is the risk of getting sick higher for workers than for community residents?
- A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.
- Q: Who is at the greatest risk from reproductive hazards?
- A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of child-bearing age are at high risk.

The New Jersey State Department of Health, Occupational Disease Prevention and Information Program offers multiple services in occupational health. These include: Right to Know Information Resources, Public Presentations, General References, Industrial Hygiene Information, Surveys and Investigations, and Medical Evaluation. Consult another Fact Sheet for a more detailed description of these services or call (609) 984-1863.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

CAG is the Carcinogens Assessment Group of the federal EPA.

A carcinogen is a substance that causes cancer.

The CAS number is assigned by the Chemical Abstracts Service to identify a specific chemical.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

g/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: NAPHTHALENE

DOT Number: UN 1334/UN 2304

NFPA Flammability: 2

NFPA Reactivity: 0

WARNING

COMBUSTIBLE

POISONOUS GAS IS PRODUCED IN FIRE

CONTAINERS MAY EXPLODE IN FIRE

Health hazards on front page

FIRE HAZARDS

- * Naphthalene is a COMBUSTIBLE SOLID.
- * Use dry chemical, CO₂, water spray, or foam extinguishers.
- * POISONOUS GAS IS PRODUCED IN FIRE.
- * CONTAINERS MAY EXPLODE IN FIRE.
- * Naphthalene forms explosive mixtures with air.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Naphthalene is spilled or leaked, take the following steps:

- * Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
- * Remove all ignition sources.
- * Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- * Keep Naphthalene out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
- * It may be necessary to contain and dispose of Naphthalene as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172

CHEMTREC: (800) 424-9300

HANDLING AND STORAGE (See page 4)

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

- * Remove the person from exposure.
- * Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
- * Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 0.05 mm Hg at 68°F

Flash Point: 174°F

Water Solubility: Very slightly soluble

OTHER COMMONLY USED NAMES

Mothballs; Moth Flakes; Camphor Tar

Not intended to be copied and sold for commercial purposes.

New Jersey Department of Health

CN 368 Trenton, NJ 08625

(609) 984-2202

Date prepared: January 1986

Revision:

OES-16





New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME:

LEAD

CAS NUMBER:

7439-92-1

DOT NUMBER:

None

HAZARD SUMMARY

- * Lead can affect you when breathed in and if swallowed from food, drinks, or cigarettes.
- * Lead is a TERATOGEN--HANDLE WITH EXTREME CAUTION.
- * Repeated exposure causes Lead build-up in the body. Low levels may cause tiredness, mood changes, headaches, stomach problems and trouble sleeping.
- * Higher levels may cause aching, weakness, and concentration or memory problems.
- * Lead can also cause serious permanent kidney or brain damage at high levels.
- * Lead exposure increases risk of high blood pressure.

IDENTIFICATION

Lead is a heavy, soft gray metal. It has wide industrial use due to its properties of high density, softness, low melting point, resistance to corrosion and ability to stop gamma and x-rays.

REASON FOR CITATION

- * Lead is on the Workplace Hazardous Substance List because it is regulated by OSHA and cited by ACGIH and NIOSH.
- * This chemical is on the Special Health Hazard Substance List because it is a TERATOGEN.
- * Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

- * These exposure limits are recommended for *inorganic Lead dusts and fumes* measured as *Lead*.

OSHA: The legal airborne permissible exposure limit (PEL) is 0.05 mg/m³ averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is less than 0.10 mg/m³ averaged over an 10-hour workshift.

ACGIH: The recommended airborne exposure limit is 0.15 mg/m³ averaged over an 8-hour workshift.

Lead is a TERATOGEN. All contact with this chemical should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WAYS OF REDUCING EXPOSURE

- * Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- * Wear protective work clothing.
- * Wash thoroughly at the end of the workshift.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Lead to potentially exposed workers.

This Fact Sheet is a summary source of information for workers, employers, and community residents. Health professionals also find it useful. If this substance is part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to Lead:

- * Extremely high exposures could cause seizures, but usually symptoms from Lead occur after weeks to months of exposure.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to Lead and can last for months or years:

Cancer Hazard

According to the information presently available to the New Jersey Department of Health, Lead has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

- * Lead is a PROBABLE TERATOGEN in humans.
- * Lead may decrease fertility in males and females.

Other Long-Term Effects

- * Repeated exposure to Lead causes Lead to build up in the body. The earliest symptoms may be tiredness, trouble sleeping, stomach problems, constipation, headaches and moodiness (mostly irritability and depression).

Higher levels may cause aching and weakness in your arms and legs, trouble concentrating and remembering things, and may cause a low blood count (anemia).

Lead can cause serious, permanent kidney and brain damage at high enough levels.

Lead exposure increases risk of high blood pressure.

MEDICAL

Medical Testing

Before first exposure and every six months thereafter, OSHA (1910.1025) requires your employer to provide:

- * Blood Lead test.
- * ZPP test (a special test for the effect of Lead on blood cells).

Before first exposure, and yearly for exposed person with blood Lead over 40 micrograms per 100 g of whole blood, OSHA also requires a complete medical history and exam with the above tests, and:

- * Complete blood count.
- * Kidney function tests.

OSHA defines "exposure" for these tests as air levels averages 30 micrograms of Lead or more in a cubic meter of air. OSHA requires your employer to send the doctor a copy of the Lead standard and provide one for you.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Body exposures to Lead from hobbies using Lead solder or pigments; target practice; and drinking moonshine made in Leaded containers will increase Lead levels. Repeated breathing or handling Leaded gasoline may also add somewhat to body Lead levels.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is

less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Avoid heating above 900°F.
- * Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA standard 1910.1025 available from OSHA or your employer.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * When vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, not a standard shop vacuum.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Lead.
- * Work clothing should be HEPA vacuumed before removal.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Wash any areas of the body that may have contacted Lead at the end of each workday, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where Lead is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
- * Use a HEPA vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace con-

trols are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Lead dust and fume. Wear protective gloves, full body and hat clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
- * Work clothing should be HEPA vacuumed before removal.

Eye Protection

- * Wear dust-proof goggles when working with powders or dust, unless full face-piece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

- * Where the potential exists for exposures not higher than 0.5 mg/m³, use a half-mask, air purifying respirator equipped with high efficiency filters.
- * Where the potential exists for exposures not higher than 2.5 mg/m³, use a full facepiece, air purifying respirator with high efficiency filters.
- * OSHA requires the employer to provide a powered-air purifying respirator, instead of one of the above, whenever the employee asks to use this type of respirator.
- * OSHA prohibits the employer from requiring an employee to wear one of the above negative pressure respirators longer than 4.4 hours per day in battery manufacturing and primary and secondary Lead production.
- * Where the potential exists for exposures not higher than 50 mg/m³, use any

powered-air purifying respirator with high efficiency filters or half-mask supplied-air respirator operated in positive pressure mode.

- * If while wearing a filter, cartridge or canister respirator, you can smell, taste or otherwise detect Lead, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge or canister. If the seal is no longer good, you may need a new respirator.
- * Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
- * Where the potential exists, for exposures not higher than 100 mg/m^3 , use supplied-air respirators with full facepiece, hood, helmet or suit, operated in positive pressure mode.
- * Where the potential exists, for exposures greater than 100 mg/m^3 , use full facepiece, self-contained breathing apparatus operated in positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

What are my chances of getting sick when I have been exposed to chemicals? The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes which release mist, vapor or fume (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

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A carcinogen is a substance that causes cancer.

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A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A miscible substance is a liquid or gas that will evenly dissolve in another.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A reactive substance is a solid, liquid or gas that can cause an explosion under certain conditions or on contact with other specific substances.

A teratogen is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The vapor pressure is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

EMERGENCY INFORMATION

Common Name: LEAD

WARNING

DOT Number: None

NFPA Flammability: No Citation

NFPA Reactivity: No Citation

DO NOT USE WATER

POISONOUS GAS IS PRODUCED IN FIRE

Health hazards on front page

FIRE HAZARDS

- * Lead Powder is FLAMMABLE when exposed to heat or flame.
- * POISONOUS GAS IS PRODUCED IN FIRE.
- * Use dry chemicals appropriate for extinguishing metal fires. DO NOT USE WATER.
- * If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If Lead is spilled, take the following steps:

- * Restrict persons not wearing protective equipment from area of spill until clean-up is complete.
- * Ventilate the area of spill.
- * Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- * It may be necessary to contain and dispose of Lead as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR LARGE SPILLS AND FIRES immediately call your local fire department. You can also request emergency information from the following:

DEP HOTLINE: (609) 292-7172

CHEMTREC: (800) 424-9300

HANDLING AND STORAGE

- * Prior to working with Lead you should be trained on its proper handling and storage.

- * Lead must be stored to avoid contact with OXIDIZERS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES) and CHEMICALLY ACTIVE METALS (such as POTASSIUM, SODIUM, MAGNESIUM and ZINC) since violent reactions occur.
- * Lead is regulated by an OSHA Standard 1910.1025. All requirements of the standard must be followed.

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact

- * Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

- * Remove contaminated clothing. Wash contaminated skin with soap and water.

Antidotes and Special Procedures

- * Persons with significant Lead poisoning are sometimes treated with EDTA while hospitalized. Since this drug causes a rush of Lead from body organs into the blood and kidneys and thus has its own hazards, it must be done only by experienced medical persons under careful observation. It or other "chelating" drugs should never be used to prevent poisoning while exposures continues or without strict exposure control as severe kidney damage can result.

PHYSICAL DATA

Vapor Pressure: -1.77 mm Hg at 1832°F
Water Solubility: Slightly soluble

CHEMICAL NAME

Lead

Not intended to be copied and sold for commercial purposes.



New Jersey Department of Health

CN 368 Trenton, NJ 08625

(609) 884-2202

Date prepared: May 1986

Revision:

OES-16

APPENDIX II

**BORING LOG
AS-BUILT WELL DETAILS
NC WELL CONSTRUCTION RECORD
WELL SAMPLING WORKSHEET
CHAIN OF CUSTODY RECORD**

BORING LOG

BORING NUMBER _____
TOTAL DEPTH _____

SITE LOCATION _____

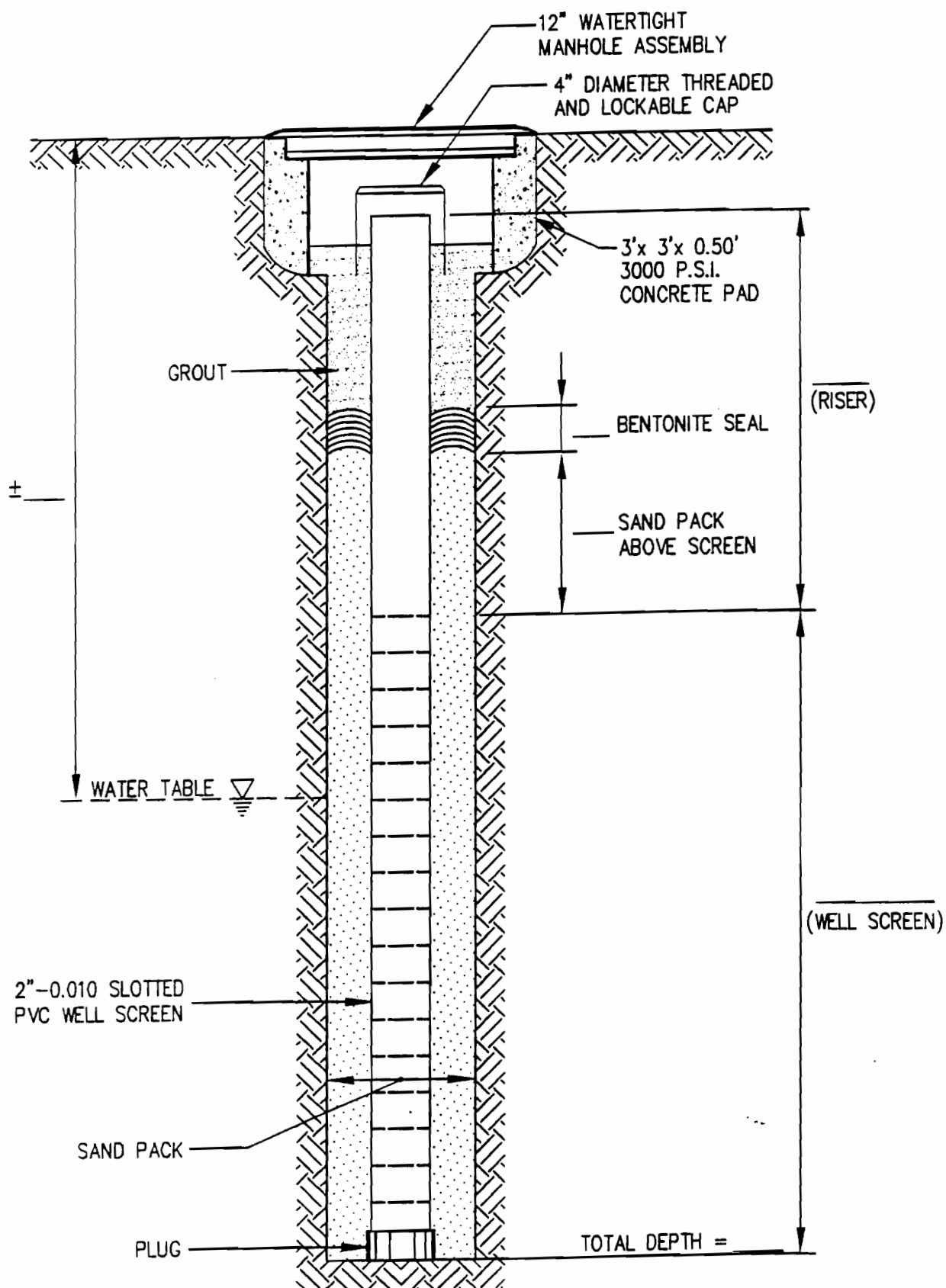
DRILLED BY _____
LOGGED BY _____

DRILLING DATE_____

[illegible]

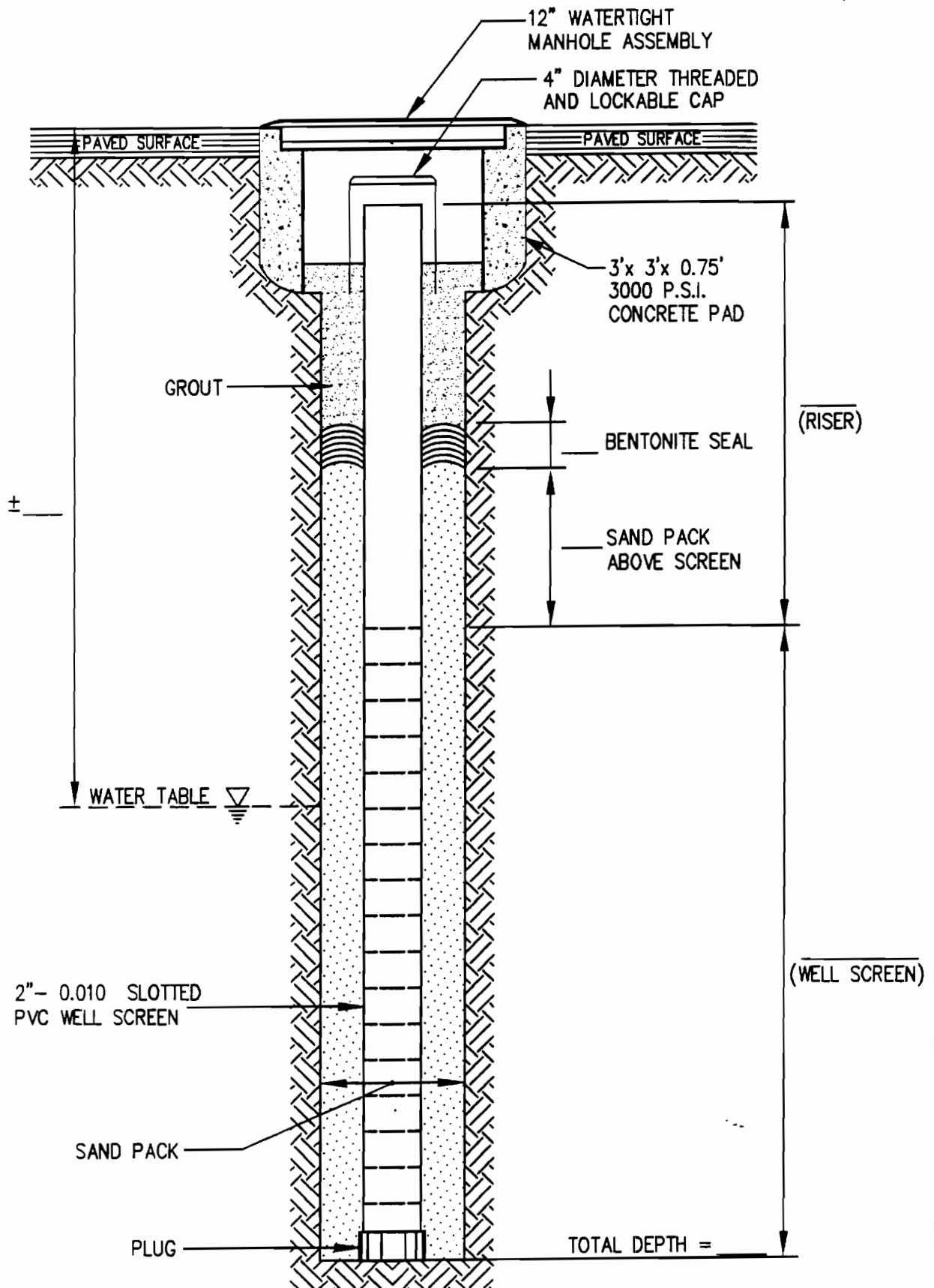
REMARKS _____

PAGE__ OF__



Richard Catlin & Associates, Inc. ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC	PROJECT	TITLE		FIGURE
	JOB NO.	DATE	SCALE	DRAWN BY: CHECKED BY:

FLUSH TYPE II MONITORING WELL DETAIL



Richard Catlin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS

RC&A

WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

PROJECT

JOB NO.

TITLE

PAVED SURFACE TYPE II
 MONITORING WELL DETAIL

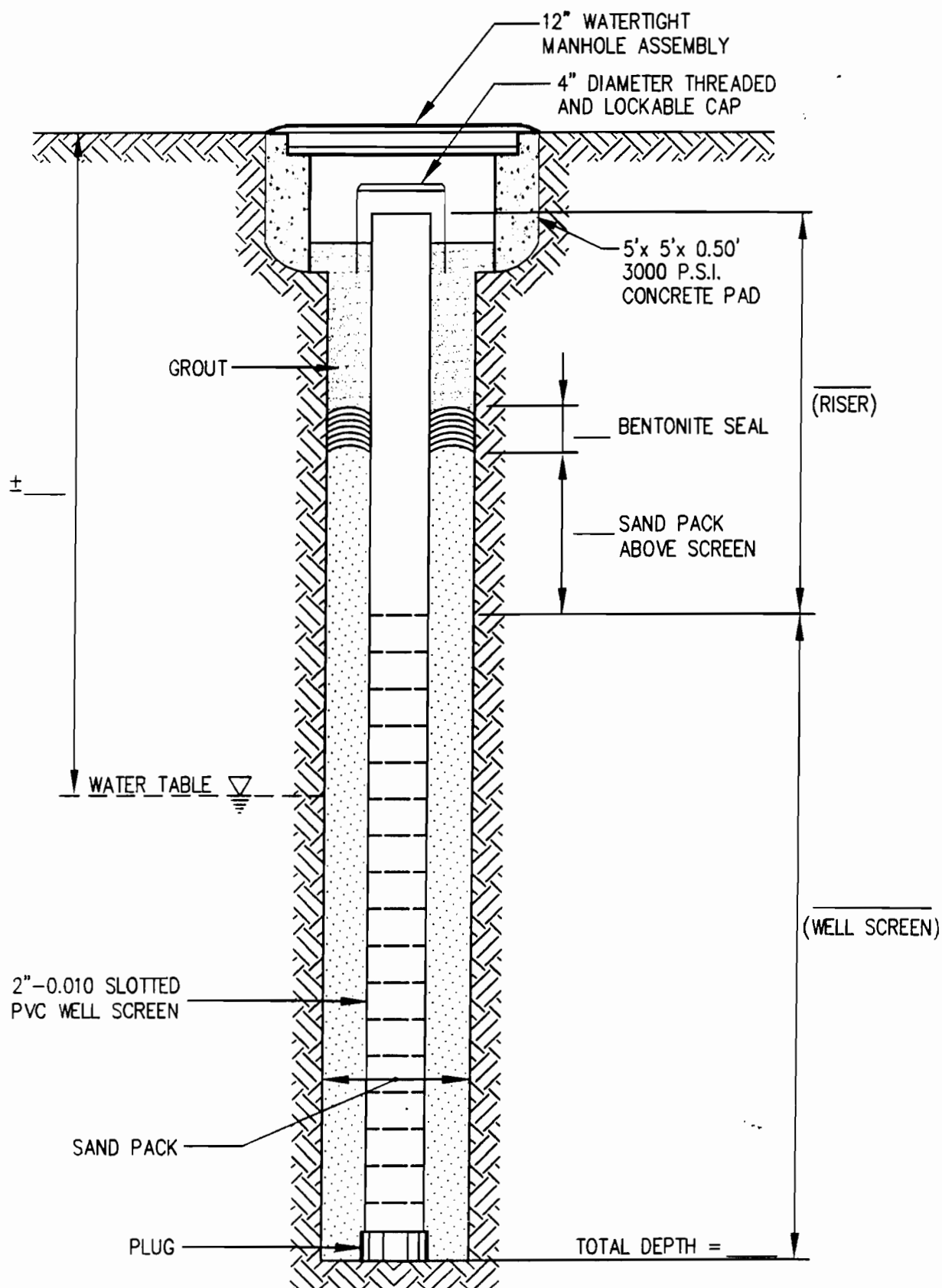
DATE

SCALE

DRAWN BY

CHECKED BY

FIGURE



Richard Catlin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS

PROJECT

TITLE

UNPAVED SURFACE TYPE II
 MONITORING WELL DETAIL

FIGURE

WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

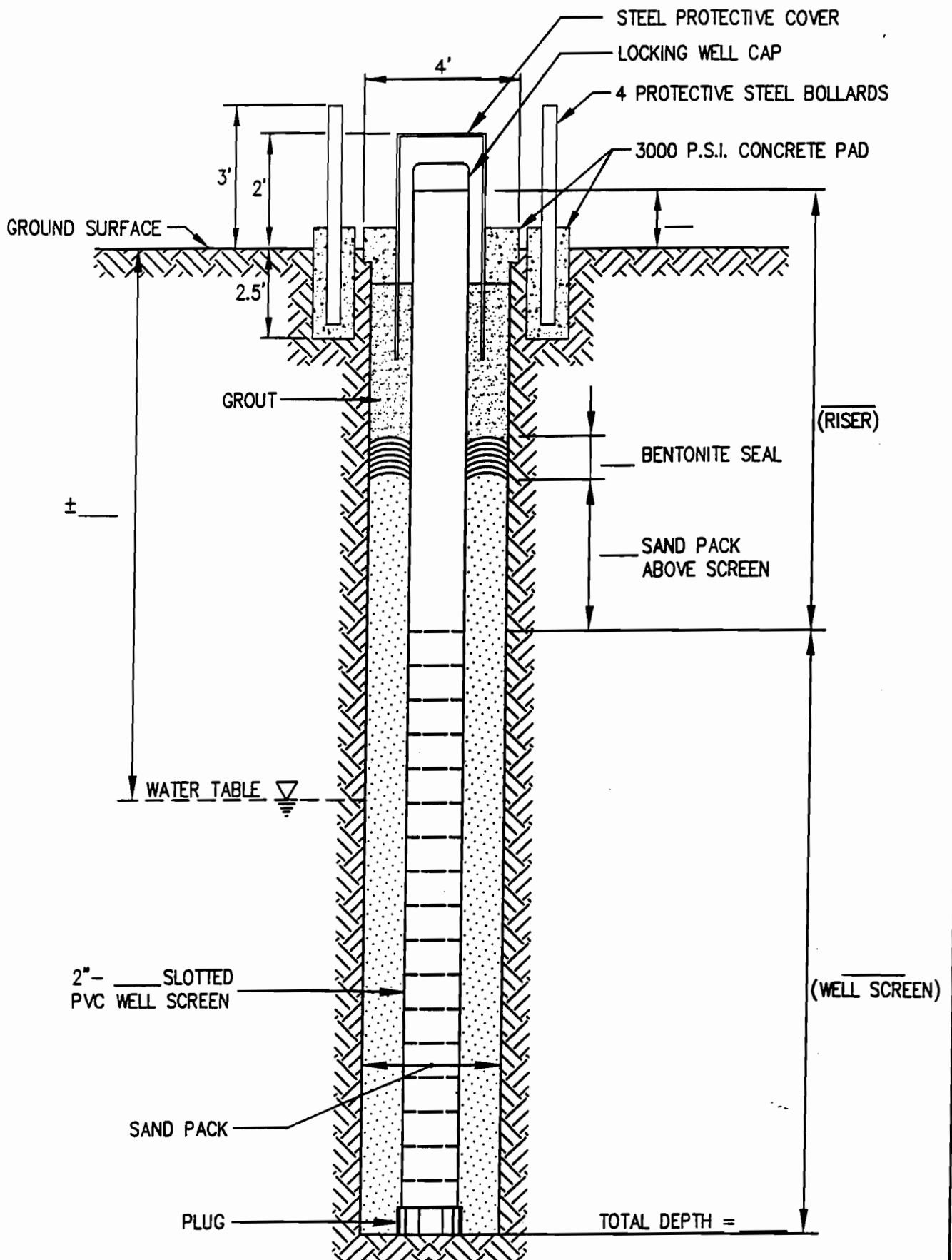
JOB NO:

DATE:

SCALE:

DRAWN BY:

CHECKED BY:



Richard Catlin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS

PROJECT

TITLE

FIGURE

ABOVE GROUND TYPE II
 MONITORING WELL DETAIL

WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

JOB NO.

DATE

SCALE

DRAWN BY

CHECKED BY

CAMP LEVINE ONLY

PROJECT: _____
PROJECT NO.: _____
DATE: _____
SAMPLED BY: _____

[illegible]

1-1/4" WELL = 0.064 GAL/FT
2" WELL = 0.163 GAL/FT
4" WELL = 0.66 GAL/FT
6" WELL = 1.42 GAL/FT
3' x 1.5" BAILER = 0.24 GAL/BAIL
4' x 1.5" BAILER = 0.37 GAL/BAIL

Report To:

Bill To:

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Chain of Custody Record

PROJECT SITE NUMBER		PO#		ANALYSES		GEOCHEM PROJECT #	
SITE NAME						DATE DUE	
COLLECTED BY (Signature)				NO. OF CONTAINERS PER LOCATION		VERBAL/FAX/HARDCOPY	
FIELD SAMPLE ID	TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED			REMARKS	LAB ID NO. (for lab use only)
REMARKS				RELINQUISHED BY:		DATE	TIME
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RELINQUISHED BY:	DATE

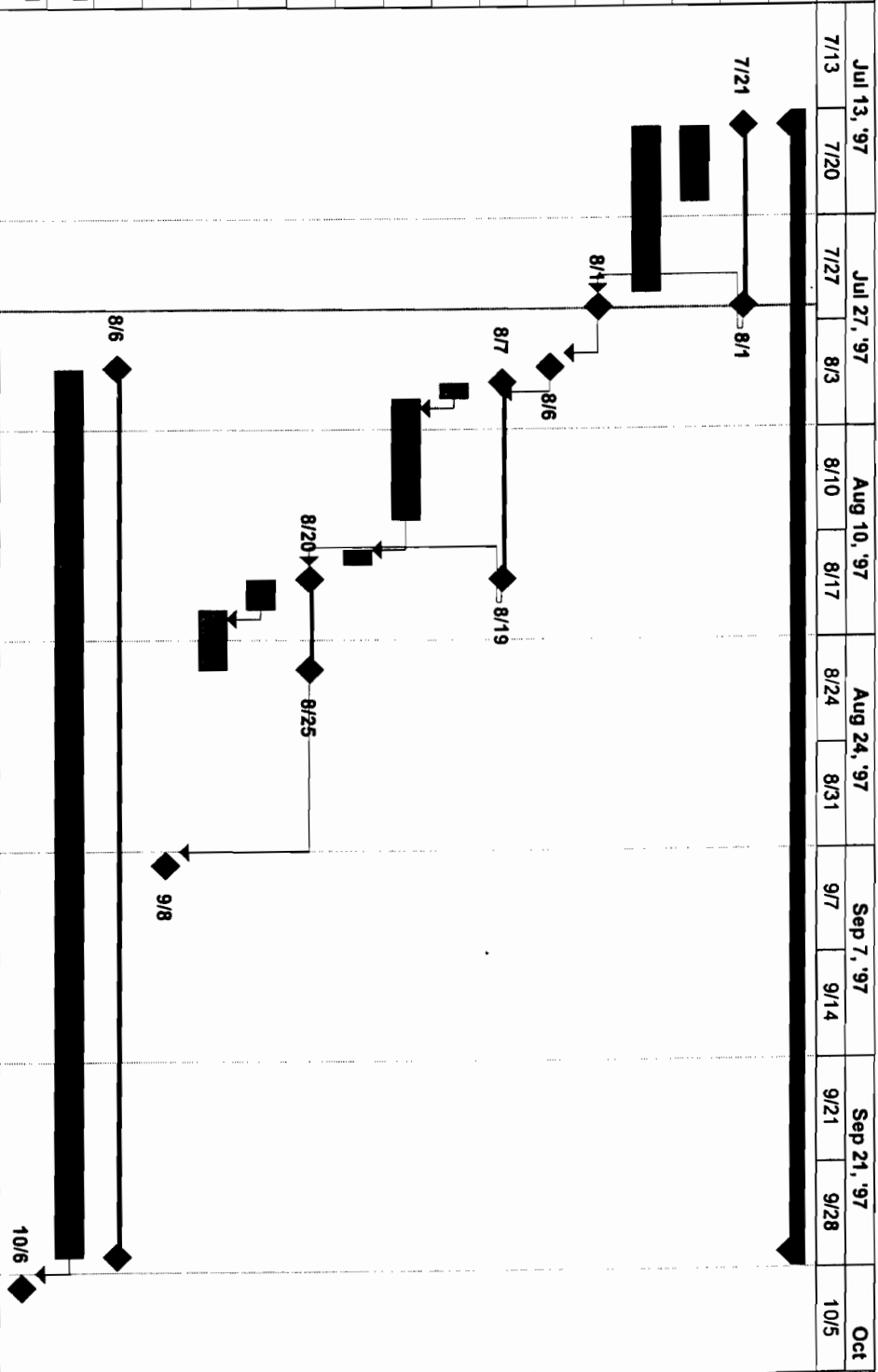
APPENDIX III
PROJECT SCHEDULE

SCHEDULE OF EVENTS

10 SITES

CAMP LEJEUNE, NORTH CAROLINA

ID	Task Name	Duration	Jul 13, '97		Jul 27, '97		Aug 10, '97		Aug 24, '97		Sep 7, '97		Sep 21, '97		Oct
			7/13	7/20	7/27	8/3	8/10	8/17	8/24	8/31	9/7	9/14	9/21	9/28	10/5
1	10 SITES	55d													
2	WORKPLAN	10d													
3	Site Walkover	5d													
4	Document Preparation	9d													
5	Workplan Submittal	0d													
6	Workplan Approval	0d													
7	DRILLING	9d													
8	Utilities Clearance	1d													
9	Type II Well Installation	6d													
10	Well Development	1d													
11	SAMPLE/SURVEY	4d													
12	Well Sampling	2d													
13	Well/Site Survey	2d													
14	VERBAL REPORT	0d													
15	DRAFT WELL REPOR	43d													
16	Report Preparation	43d													
17	Report Submittal	0d													



Project: 10 SITES
RC&A Project No. 97147-A
Date: Sat 8/2/97

Project Duration: [Bar]
Task Duration: [Bar]
Sub-Task Duration: [Bar]
Milestone: [Diamond]

**LEAKING UNDERGROUND STORAGE TANK
WELL INSTALLATION AND MONITORING**

LIMITED SITE ASSESSMENTS

10 UST SITES

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

DECEMBER 31, 1997

VOLUME II

**Contract No. N62470-95-D-6009
Delivery Order No. 0020
CATLIN Engineers and Scientists Project No. 97147-A**



Prepared by:

**CATLIN Engineers and Scientists
Wilmington, North Carolina
(910) 452-5861**

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1.9	SITE LOCATION - AS-1011
1.10	SITE LOCATION - 1817
5.1	SITE PLAN- TT-60
5.2	SITE PLAN - SBB-94
5.3	SITE PLAN - HP-250
5.4	SITE PLAN - FC-280
5.5	SITE PLAN - 575-2
5.6	SITE PLAN - TT-48

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- 5.7 SITE PLAN - NH-118-3**
- 5.8 SITE PLAN - AS-1011**
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APPENDIX (INCLUDED IN VOLUME I)

- A WORKPLAN**

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- B UST CLOSURE REPORTS**
- C BORING LOGS**
- D AS-BUILT WELL DETAILS, NORTH CAROLINA WELL
CONSTRUCTION RECORDS, AND WELL ABANDONMENT RECORDS**
- E SAMPLING FIELD DATA WORKSHEETS**
- F LABORATORY ANALYTICAL REPORTS**

APPENDIX B
UST CLOSURE REPORTS



CLEAN-EAST
Associates, Inc.

July 29, 1997

Mr. Greg Fitzpatrick
Commanding General

Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. 280 *FC-280*
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

The one (1) steel 550 gallon diesel tank was removed on April 8, 1996. The tank was in fair condition. Analytical results indicated a release. However, approximately 55.84 tons of material (pea gravel) were excavated and scheduled to be returned to the tank excavation due to low OVM readings. The closure sample collected 1-2' beneath the USTs (PS-1) had diesel content of 84 ppm by EPA 3550.

A UST Death Certificate is included in Appendix C from North American Resources, but a final destination or disposal manifest was not provided to CEA.

The GW/UST-2 form in Appendix B should be signed by Government personnel.

The closure sample was above the NC Reportable Concentration of 40 ppm for diesel. Additional evaluation work appears warranted.

P.O. Box 189

Kinston,

North Carolina

28501

24 Hour Phones:

(919) 939-1600

1-800-425-6097

Fax:

(919) 527-1086

24 Hour

Hazmat Response,

UST Removal

and Closure,

Site Assessment,

Soil and

Groundwater

Remediation,

Corrective Action

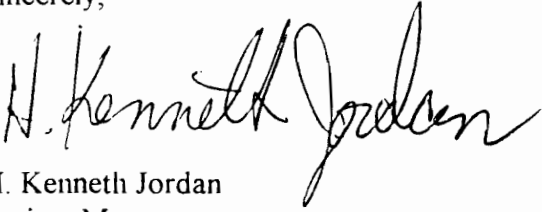
Systems,

Environmental

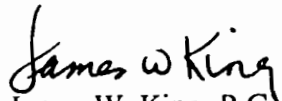
Audits.

We appreciate serving Camp Lejeune on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,

A handwritten signature in cursive script, reading "H. Kenneth Jordan".

H. Kenneth Jordan
Project Manager

A handwritten signature in cursive script, reading "James W. King".
James W. King, P.G.
Manager

HKJ/ckw

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

045M-280

A. Ownership of UST(s)

1. Name of UST Owner: United States Marine Corps.
2. Owner address and telephone number: Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. Facility Name: Bldg. 280
2. Facility ID#: 0-002740
3. Facility address, telephone number and county: Marine Corps Base
Camp Lejeune-Onslow County
(919) 451-5063

C. Contacts

1. Name, address, telephone number and job title of primary contact person:
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. Name, address and telephone number of closure contractor:
North American Resources
6145 West Sundust Road
Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. Name, address and telephone number of primary consultant:
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600

4. Name, address, telephone number, and state certification number of laboratory: GeoChem, Inc.
 2500 Gateway Centre Blvd., Suite 300
 Morrisville, NC 27560 (919) 460-8093 Nos. #37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1989	550	46" x 74"	Diesel	Diesel

E. Site Characteristics

1. Describe any past releases at this site: Unknown

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active

3. Describe surrounding property use (for example, residential, commercial, farming, etc.). The UST is located at a vehicle maintenance facility on the Marine Corps Base. The surrounding area is primarily commercial.

4. Describe site geology/hydrogeology: The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject site is Baymeade-Urban (Bmb) with slopes generally 0 to 6 percent. Infiltration is rapid and runoff is slow. The seasonal high water table is to 4 to 5 feet. Soils exposed in the excavation consisted of the following:

0-6'11" Pea gravel

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be generally to the west.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks.

WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: UST Permanent Closure or Change in Service" form (GW/UST-3). Base authorities were notified. Dry ice was placed in UST to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): The tank was empty.

C. Describe the storage, sampling and disposal of the residual material: N/A**D. Excavation**

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the backhoe. Pea gravel had slight petroleum odor but no petroleum staining. The OVM readings were low (5.0 ppm) during excavation. The piping and UST had been removed prior to CEA personnel arrival on site. No line sample or dispenser samples could be collected. Tank pit dimensions were 15'3" x 11'4" x 6'11" deep.

2. Note the depth of tank burial(s) (from land surface to top of tank): Top of the tank, 3'1" below ground surface.**3. Quantity of soil removed:** 55.84 tons**4. Describe soil type(s):** Excavated materials in the tank excavation consisted of pea gravel.**5. Type and source of backfill used:** Excavated pea gravel was going to be returned to the hole due to low (5.0 ppm) OVM readings and lack of visual petroleum staining.**E. Contaminated Soil**

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

The OVM detected only minor contamination (5 ppm) so soils were only excavated enough to sufficiently remove the tank.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic and were scheduled to be returned to the excavation area. The stockpile was not sampled because the OVM did not detect any significant contamination.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Pea gravel excavated appeared to have only slight petroleum odor and the OVM detected only minor apparent contamination in the soils (5 ppm). The TEI 580B Organic Vapor Meter was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

One closure sample (PS-1) was taken 1-2' beneath the tank.

The sample was analyzed for Total Petroleum Hydrocarbon content as gasoline (5030) and diesel (3550). The sample was collected out of the backhoe bucket. Drawing No. 2 shows the location of the sample.

C. Describe groundwater or surface water sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

No groundwater was encountered.

D. Quality control measures

New surgical gloves were also used for each sampling event. The sample was properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC, along with proper chain-of-custody documentation. The closure sample was collected at 1403 on April 8, 1996 and was delivered to the laboratory at 1655 on April 9, 1996.

E. Investigation results

During excavation of the tank, the excavated materials exhibited low OVM readings (5 ppm). Laboratory analyses by TPH 5030 indicated diesel content of 84 ppm for the closure sample (PS-1).

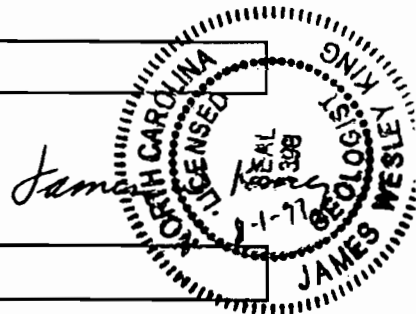
IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

The probable source of contamination is from spill or overfill of UST or the UST itself. The closure sample exceeded the NC Reportable Concentration of 40 ppm for TPH as diesel (3550). Further evaluation and remediation work appears warranted.

V. Signature of Professional Engineer or Licensed Geologist

Licensed Geologist License #: 1398

**VI. Enclosures****A. Drawings**

Area Map (No.1)

Site Map (No. 2)

B. Tables

Soil Analyses Results

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

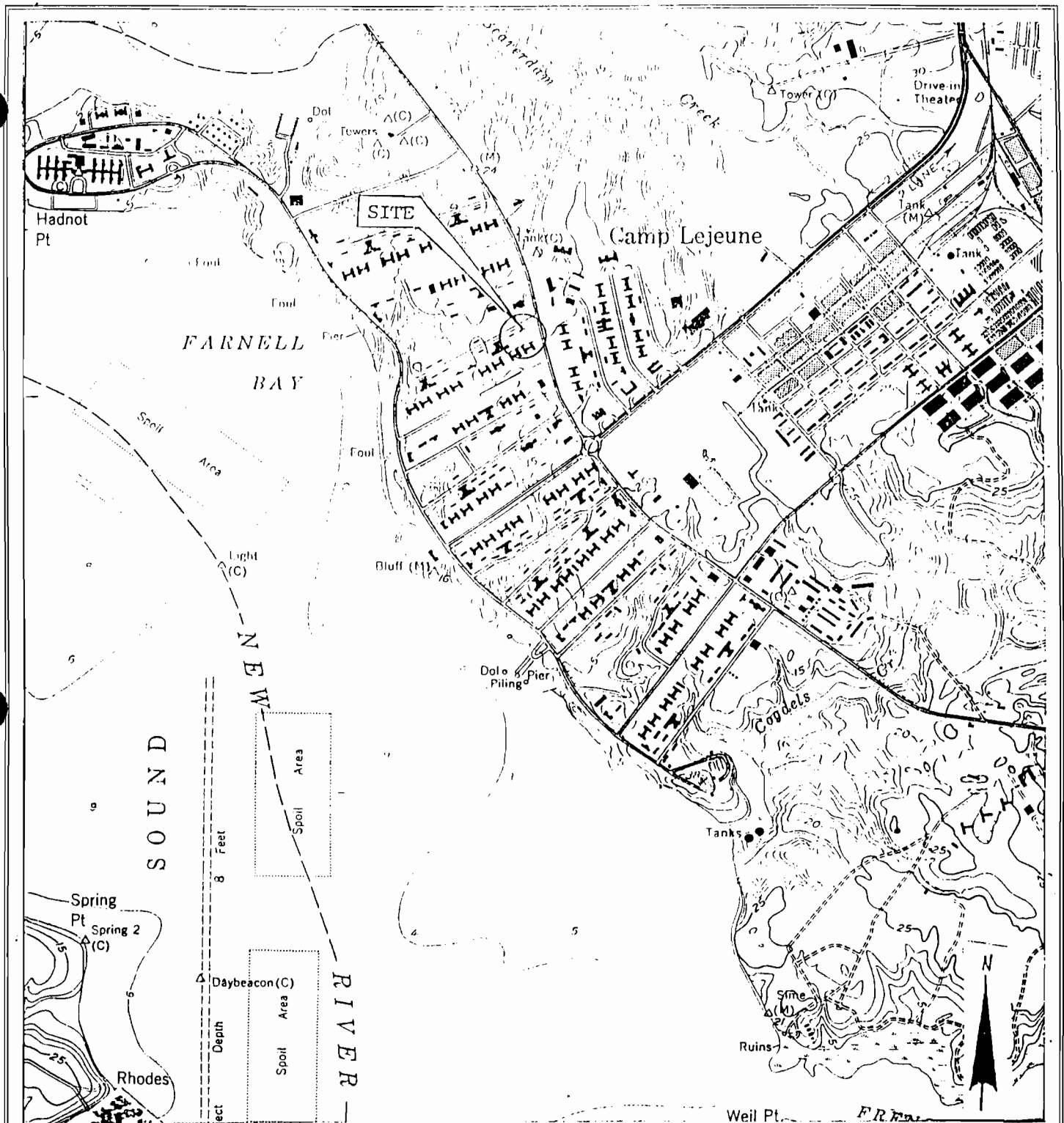
Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

Appendix C: Certificate of Tank Disposal

Appendix D: Product Disposal Manifest - N/A

Appendix E: Complete Chain-of-Custody Records and Analytical Results

Appendix F: Photographs



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-8191
1-800-849-1145
24 Hour Phone: (919) 523-9090

USGS TOPOGRAPHIC MAP

Site #280
Camp Lejeune, NC
Jacksonville, NC

SCALE:

1:24000

DRAWN BY:

HKJ

CHECKED BY:

HKJ

DATE:

1983

PROJECT NO.

96-045M

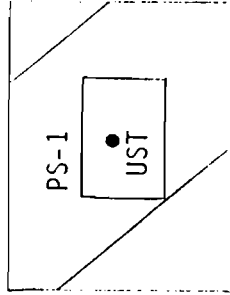
DRAWING NO.

1

"D" STREET

Assumed
Groundwater
Flow

UST Excavation



N

Building #280

Drawing Label SITE MAP

Camp Lejeune, NC
Site #280
Jacksonville, NC

Scale:

1" = 10'

Date:

5-2-96

Drawn by:

HKJ

Checked by:

JWK

Drawing No.

2

Project No:
96045M

CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28502
Fax: (919) 524-4191
1-800-848-1145
24 Hour Phone: (919) 524-9090

Table 1
Sample Analyses Results-Soil (ppm)

Sample ID	Location	Depth	Date	EPA Method 5030	EPA Method 3550	Field Screenings OVM
PS-1	1'-2' beneath tank	8'2"	4-8-96	BDL	84*	5.0 ppm
NC Reportable Concentration (RC)				10	40	—

“ppm” denotes parts per million

“BDL” denotes below detection limit

“*” exceeds NC Reportable Concentration

Appendix A

Notification of Intent to Close (GW/UST-3)
(CEA was not sent a copy of this form)

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004

County: Onslow

City: Camp Lejeune State: NC Zip Code: 28542-0004

Telephone Number: (910) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: #280

(or Company)

Facility ID # (if available): 0-002740

Street Address

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542

Telephone Number: ()

(Area Code)

III. Contact Person

Name: Mr. Greeg Fitzpatrick

Job Title: Commanding General

Tel. No.: (910) 451-5063

Closure Contractor: North American Resource Address: 6145 W. Sundust Rd. P.O. 5073, Chandler, NC Tel. No.: (520) 796-4054

Primary Consultant: CEA

Address: P.O. Box 189, Kinston, NC 28501

Tel. No.: (919) 939-1600

Lab: GeoChem Inc., Address: 2500 Gateway Blvd., Morrisville, NC 27560 Tel. No.: (919) 460-8093

IV. U.S.T. Information

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	V. Excavation Condition					
				Water In Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	550	46" x 74"	Diesel		X		X	X	

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- ☒ Contact local fire marshal.
- ☒ Notify DWQ Regional Office before abandonment.
- ☒ Drain & flush piping into tank.
- ☒ Remove all product and residuals from tank.
- ☒ Excavate down to tank.
- ☒ Clean and inspect tank.
- ☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- ☒ Cap or plug all lines except the vent and fill lines.
- ☒ Purge tank of all product & flammable vapors.
- ☒ Cut one or more large holes in the tanks.
- ☒ Backfill the area.

Date Tank(s) Permanently closed: 4/8/96

Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
- ☐ Plug or cap all openings.
- ☐ Disconnect and cap or remove vent line.
- ☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
 - ☒ Label tank.
 - ☒ Dispose of tank in approved manner.
- Final tank destination: Carolina Welding & Salvage
7250 Hwy. 70 E., NweBern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate of Tank Disposal

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E

Disposal Document

PROJECT NO: B62470-93-C-5310 DATE: 5-2-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #280

ADDRESS: Hadnot Point-Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 550 gallon PRODUCT: Diesel

UST MATERIAL: Steel

DEFUEL DATE: 4-7-96 TIME: _____

PURGE DATE: 4-8-96 TIME: _____

REMOVAL DATE: 4-8-96 TIME: _____

DATE OF DEATH (DISPOSAL): _____ *8/1/97*

RESPECTFULLY,

*Linda Long Hico, Notary
Linston, NC.
My Commission Expires: Nov. 21, 2001*

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

Appendix D

Product Disposal Manifest - N/A

Appendix E

1. Chain-of-Custody
2. Analytical Results

LEA

Morrisville, NC 27560

Bill to:
 Clear-East Area
 PC Box 189
 Kingston RI
 02881

Page 1 of 1

This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC #37745, NC #336, NC #461, EPA ID #155

Client Project Manager

fr. Ken Jordan

Site Name:

(Camp Lejeune) #280

16-045M

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Wednesday, April 17, 1996

PO #

Date Received in lab:

Wednesday, April 10, 1996

GCI Project #: 9604-024

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number PS-1

Lab ID 1446

Sample Type: 1

Date Analyzed: 4/13/96

for 3550

Date Sampled 4/8/96

at 14:03

Field Number PS-1

Lab ID 1446

Sample Type: 1

Date Analyzed: 4/12/96

for 5030

Date Sampled 4/8/96

at 14:03

Dena J. Barrett

Here by certify that I have Reviewed and approve this data set

GeoChem Incorporated Certified Analytical Laboratory

NC #37745, NC #336, NC #461, EPA ID #155

Wednesday, April 17, 1996

GCI Project 9604-024

Name:

Camp Lejeune #280

Conc. in mg/kg

PQL in mg/kg

Field ID PS-1

Lab ID 1446

Date Analyzed: 4/13/96

Dry Wt %: 0.95

Diesel

84

5.3

Gasoline

BDL

5.3

GeoChem Incorporated Quality Control Results

NC #37745, NC #336, NC #461, EPA ID #155

Wednesday, April 17, 1996

GCI Project # 9604-024

<i>Date Analyzed:</i>	<i>Dry Wt %:</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
4/13/96	0.87			
	Diesel	98.3	0	2.43

<i>Date Analyzed:</i>	<i>Dry Wt %:</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
4/11/96	0.95			
	Gasoline	108.5	0	2.43

Appendix F

Photographs



Excavated pea gravel at site #280 Camp Lejeune, NC.

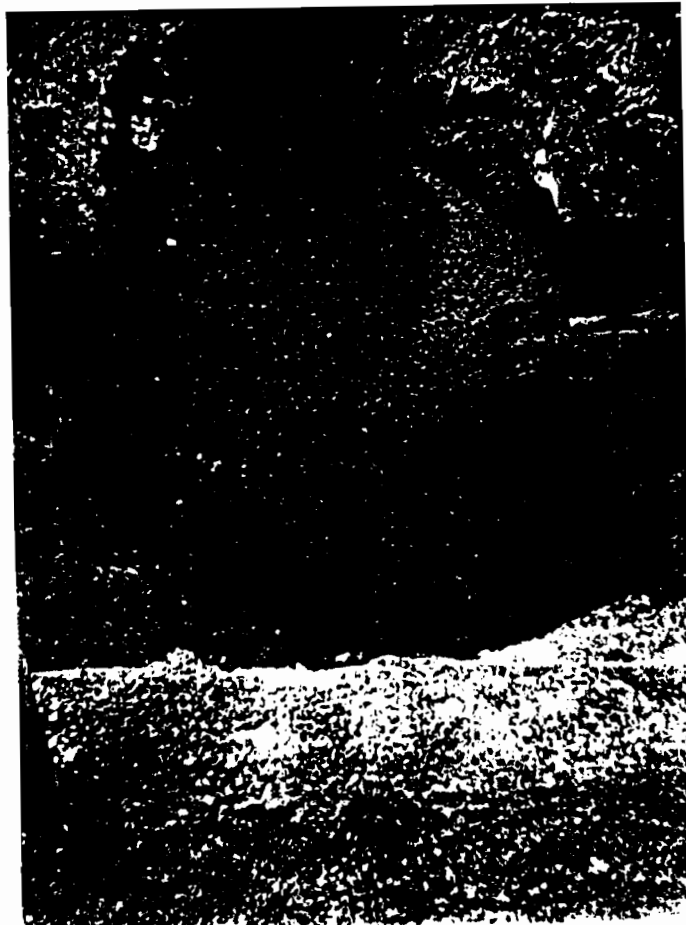
Tank pit of 550 gallon diesel tank at site #280.





Excavated pea gravel at site #280 Camp Lejeune, NC.

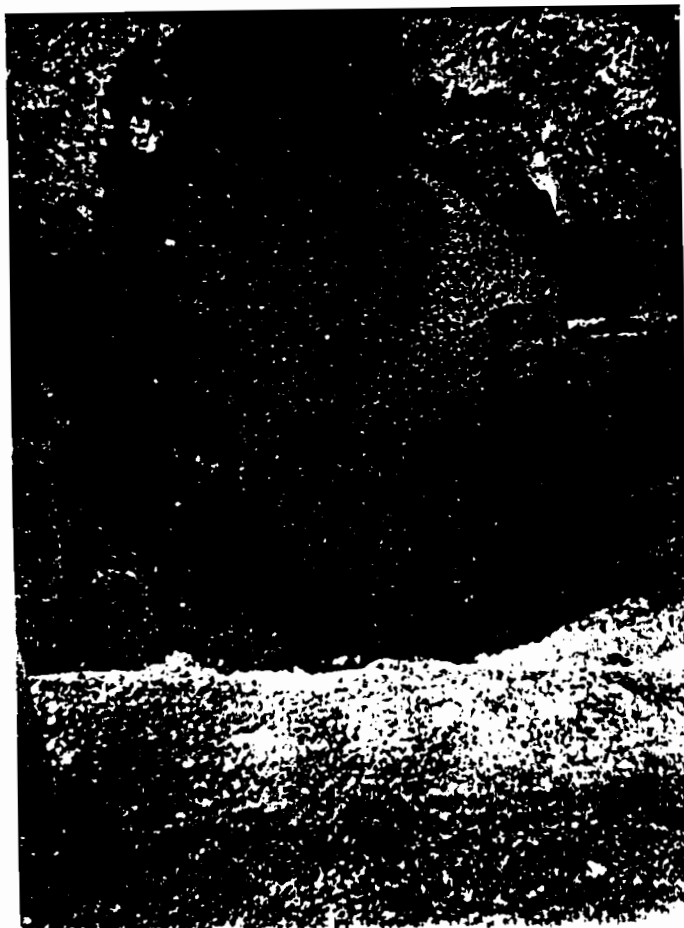
Tank pit of 550 gallon diesel tank at site #280.





Excavated pea gravel at site #280 Camp Lejeune, NC.

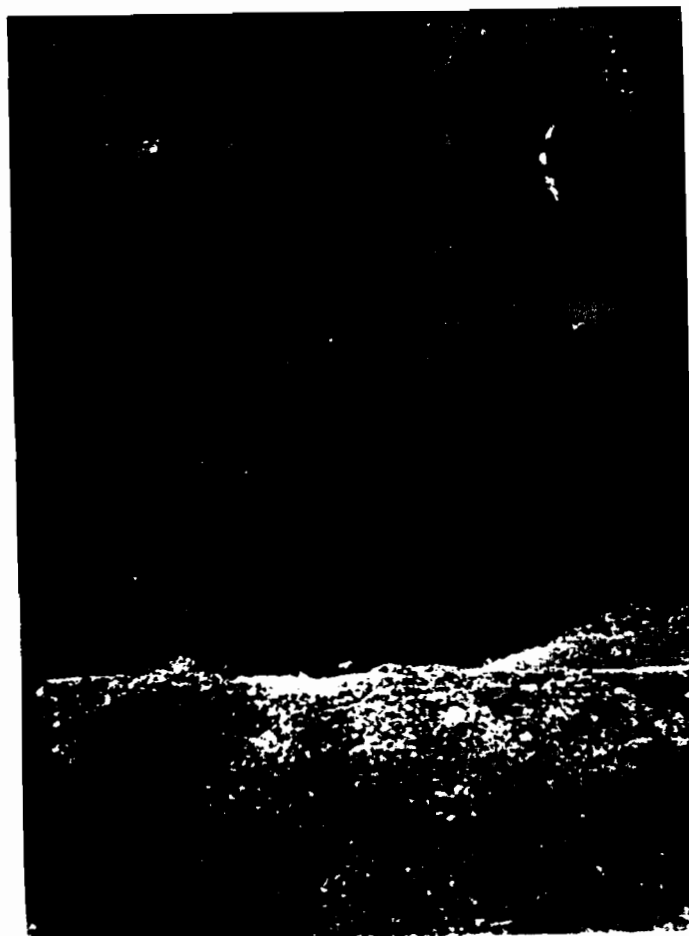
Tank pit of 550 gallon diesel tank at site #280.





Excavated pea gravel at site #280 Camp Lejeune, NC.

Tank pit of 550 gallon diesel tank at site #280.





E2S

ENGINEERING & ENVIRONMENTAL SCIENCE COMPANY

3008 ANDERSON DRIVE, SUITE 102

RALEIGH, NC 27609

(919) 781-7798

March 26, 1997

Mr. Ed Jones
Onslow Environmental Contractors
4571 Gum Branch Road
Jacksonville, NC 27540

RE: Tank Closure Report
Non-Regulated 280-gallon heating fuel oil
MCAS Housing
Marine Corps Base
Marine Corps Station, NC
N6247-98-6

Dear Mr. Jones:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the appropriate Regional Office. Following is a brief summary of this form. The GW/UST-12 form was used per contract requirements.

The one (1) metal 280-gallon heating fuel oil tank and the associated product lines were removed on November 20, 1996. The tank was in poor condition and had several holes. Organic Vapor Meter (OVM) readings from the exposed soils ranged from 21 parts per million (ppm) to 55 ppm. Inside of the tank, the OVM reading exceeded 2000 ppm. Groundwater was encountered in the excavation and a slight sheen was noted on the water.

Approximately one month after the tank removal (December 18, 1996), a hand auger was conducted and a groundwater sample was collected. Benzene, ethylbenzene and lead were detected in the water sample. Benzene concentration of 0.00124 ppm exceeded the groundwater standard of 0.001 ppm per Class GA Groundwater Standards (15A NCAC 2L .202). Ethylbenzene was below the Class GA Groundwater Standards. Lead was found at 0.047 ppm and exceeded the Class GA Groundwater standard of 0.015 ppm. The lead concentration is more than likely a result of lead released from the soil under reduced (no oxygen) subsurface conditions. The observed release appears to be considerably aged or decomposed.

The site appears to be within 1500 feet of some of the base water supply wells and is considered an A category site per the March 17, 1997, "Groundwater Section Guidelines for the Investigation and Remediation of Soil and Groundwater." Due to the shallow groundwater conditions and site category, a site sensitivity evaluation was not conducted.

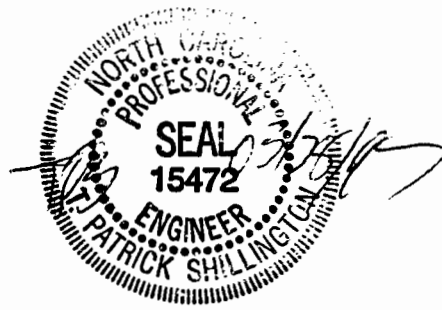
An SSE will be completed & forwarded
to EMD upon receipt.
BWR

Since this site had groundwater with benzene and lead concentrations exceeding the Class GA Groundwater Standards, further evaluation work appears warranted.

We appreciate serving Onslow Environmental Contractors on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,

T. Patrick Shillington
T. Patrick Shillington, P. E.
President



UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

A. Ownership of UST(s)

1. **Name of UST owner:** United States Marine Corps

2. **Owner address and telephone number:**

Office in Charge of Construction

Jacksonville, NC area

Room 20

1005 Michael Rd.

Camp Lejune, NC 28547-2521

(910) 451-2587

B. Facility Information:

1. **Facility name:** Residential Dwelling at 1011 Baxter

2. **Facility ID #:** Unregulated Tank

3. **Facility address, telephone number and county:**

1011 Baxter

Camp Lejune, NC

Onslow County

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**

Office in Charge of Construction

Jacksonville, NC area

Room 20

1005 Michael Rd.

Camp Lejune, NC 28547-2521

(910) 451-2587

2. **Name, address and telephone number of closure contractor:**

Onslow Environmental Contractors, Inc.

4571 Gum Branch Road

Jacksonville, NC 28540

(910) 347-9010

3. Name, address and telephone number of primary consultant:

E²S
3008 Anderson Drive, Suite 102
Raleigh, NC 27609
(919) 781-7798

4. Name, address, telephone number, and State certification number of laboratory:

Hydrologic, Inc.
2500 Gateway Centre, Suite 900
Morrisville, NC 27560
(919) 380-9699
State Nos. 47, 399 & 345

D. UST Information

Tank no.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	unknown	280	42" x 46"	No. 2 Fuel	N/A

E. Site Characteristics

1. Describe any past releases at this site:

Not available. Tanks were previously filled with sand.

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active

3. Describe surrounding property use (for example, residential, commercial, farming, etc.)

The surrounding area is predominantly residential.

4. Describe site geology/hydrogeology

The site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. Subsurface materials exposed in the excavation consisted of the following:

0.0'-1.5' Topsoil
1.5'-5.5' Brown and light gray clayey, silty, fine silty SAND (SM/SC)

Groundwater was present at about 2.5 feet below ground surface. Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be in a eastern direction.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks.

Base authorities were notified. SAND was present in the tank from past closure activities. The sand was removed from the tank prior to the tank removal.

B. Note the amount of residual material pumped from the tank(s): N/A

C. Describe the storage, sampling and disposal of the residual material:

The sand from within the tank was stockpiled until sufficient quantity derived from other heating fuel oil tanks that had been removed. One composite sample of the accumulated sand was collected for analyses before transport to Carlisle in Autryville, North Carolina.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:
Excavation was only conducted to sufficiently remove the tank.

2. Note the depth of tank burial(s) (from land surface to top of tank):
Top of the tank, 2 feet below ground surface.

3. Quantity of soil removed:
About 2.5 tons of sand was removed from the inside of the tank.

4. Describe soil type(s):
Soils exposed in the tank excavation primarily consisted of a silty clayey SAND (SM/SC).

5. Type and source of backfill used:
Material for backfill was from Morton Trucking's Mine in Jacksonville, North Carolina.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

The tank excavation was conducted sufficiently for removal of the tank.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

The sand within this tank and other tanks were stockpiled at a central location. One composite sample was collected for Total Petroleum Hydrocarbon content as gasoline (5030) and as diesel (3550).

III. Site investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s):

Soils exposed in the excavation had OVM readings ranging from 21 ppm to 55 ppm. The environment in the tank with the sand had an OVM reading in excess of 2000 ppm.

The AIM 250 Logic Gas Detector was calibrated with gas, containing carbon monoxide pentane oxygen and nitrogen.

B. Describe soil sampling points and sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

Groundwater was encountered in the excavation and no soil samples were taken. One composite soil sample was taken from inside of the tank.

C. Describe groundwater or surface water sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

A slight petroleum sheen was noted on the groundwater table during the tank removal on November 26, 1996. On December 18, 1996, one handauger boring was conducted in the former

tank location and a groundwater sample was collected for EPA 602, EPA 625, and EPA 3030C (lead only analyses). The samples were collected using a dispensable bailer.

D. Quality control measures.

The samples were properly labelled, packed and placed on ice, and delivered to Hydrologic, Inc. in Morrisville, NC, along with proper chain-of-custody documentation. Once at Hydrologic, the samples were distributed to the various other Hydrologic offices in Asheville, NC; Lexington, KY; and Nashville, TN. The laboratory analytical testing generally indicated a very degraded petroleum release.

E. Investigation results.

The one (1) metal 280-gallon heating fuel oil tank and the associated product line was removed on November 26, 1996. The tank was in poor condition and had several holes.

Organic Vapor Meter (OVM) readings ranged from 21 parts per million (ppm) to 55 ppm. Inside of the tank, the OVM reading exceeded 2000 ppm. Groundwater was encountered in the excavation and a slight sheen was noted on the water.

Approximately one month after the tank removal (December 18, 1996), a hand auger was conducted and a groundwater sample was collected. Benzene, ethylbenzene and lead were detected in the water sample. Benzene concentration of 0.00124 ppm exceeded the groundwater standard of 0.001 ppm per Class GA Groundwater Standards (15A NCAC 2L .202). Ethylbenzene was below the Class GA Groundwater Standards. Lead was found at 0.097 ppm and exceeded the Class GA Groundwater standard of 0.015 ppm. The lead concentration is more than likely a result of lead released from the soil under reduced (no oxygen) subsurface conditions. The observed release appears to be considerably aged or decomposed.

The site appears to be within 1500 feet of some of the base water supply wells and is considered an A category site per the March 17, 1997, "Groundwater Section Guidelines for

the Investigation and Remediation of Soil and Groundwater." Due to the shallow groundwater conditions and site category, a site sensitivity evaluation was not conducted.

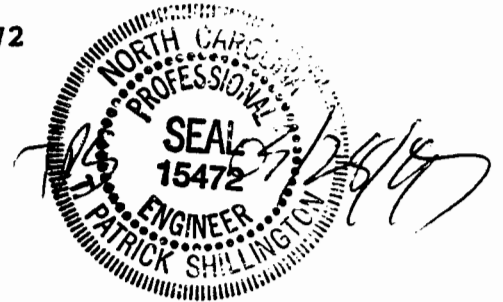
IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

Since this site had groundwater with benzene and lead concentrations exceeding the Class GA Groundwater Standards, further evaluation work appears warranted.

V. Signature of Professional Engineer or Licensed Geologist

T. Patrick Shilling
Professional Engineer Registration #:15472
Licensed Geologist License #:



VI. Enclosures

A. Figures

Vicinity Map (No.1)
Sample Location (No. 2)

B. Tables

Organic Vapor Meter (OVM) Readings (No. 1)
Soil Analytical Test Results (No. 2)
Groundwater Analytical Test Results (No. 3)

C. Appendices

Appendix A: Notification of intent to close (GW/UST-3)(not used)

Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)(not used)

Appendix C: Certificate of tank disposal

Appendix D: Soil, water, sludge disposal manifests

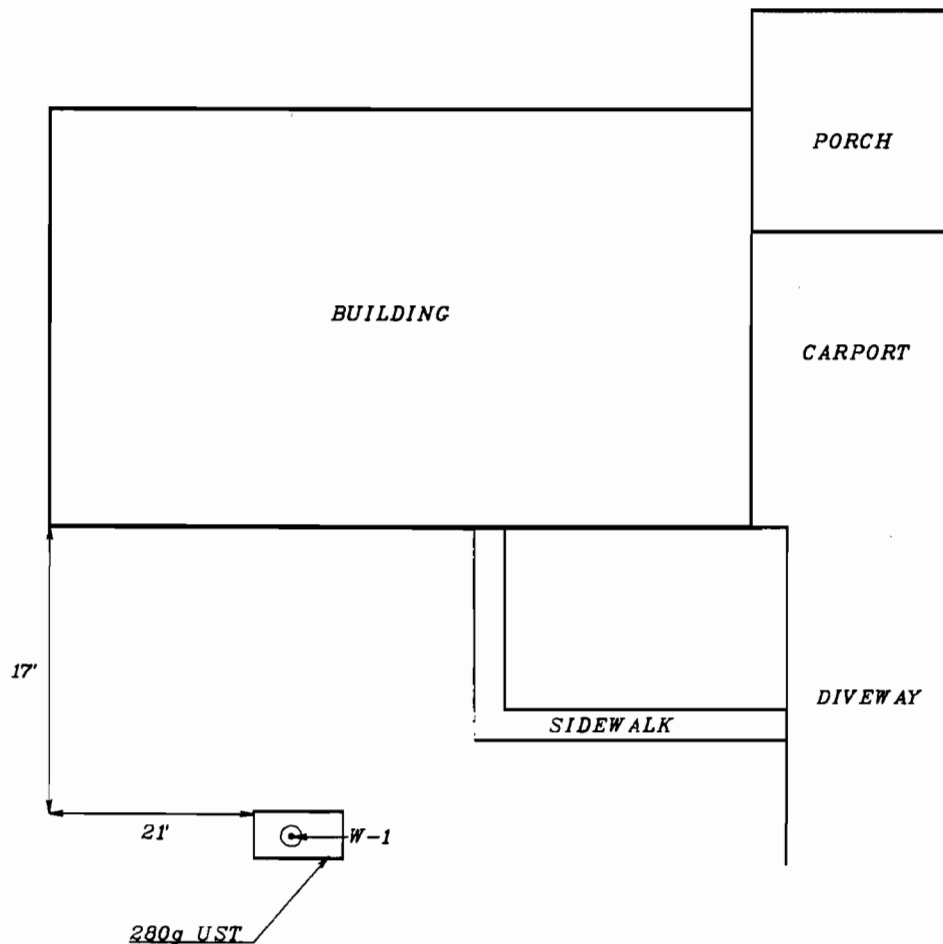
Appendix E: Complete chain-of-custody records

Appendix F: Copy of all laboratory analytical records

Appendix G: Site Sensitivity Evaluation (SSE) (not used)

Appendix H: Photographs of Closure Activities

Appendix I: Geologic logs for excavation(s) (not used)



NOT-TO-SCALE

 ENGINEERING & ENVIRONMENTAL SCIENCE COMPANY 3008 ANDERSON DR., SUITE 102 RALEIGH, NORTH CAROLINA 27609 (919) 781-7798		DATE:
		03/26/97
SAMPLE LOCATION MCAS HOUSING 1011 BAXTER ST. MARINE CORPS BASE MARINE CORPS AIR STATION		FIGURE NO. 2

TABLE NO. 1: ORGANIC VAPOR METER (OVM) READINGS

Location	Reading, ppm
1.5' deep, west side of excavation	55
2.5' deep south side of excavation	21
Inside tank	43

**TABLE NO. 2: SOIL ANALYTICAL TEST RESULTS
(Sampled 12/18/96-1230)**

Sample	Location	TPH, ppm	
		as gasoline	as diesel
CS-1	Composite of 153 tons from contents of USTs	BDL	556

**TABLE NO. 3: GROUNDWATER ANALYTICAL TEST RESULTS
(Sampled 12/18/96-0921)**

EPA 502

Compound	Concentration, ppm W-1 (tank location)	⁽¹⁾ Standard, ppm
Benzene	0.00124	0.001
Xylene	0.00104	0.53

EPA 625

Compound	Concentration, ppm W-1 (tank location)	⁽¹⁾ Standard, ppm
No Compounds Detected	⁽²⁾ BDL	-----

TABLE NO. 3: GROUNDWATER ANALYTICAL TEST RESULTS (cont'd)
(Sampled 12/18/96-0921)

Library Search (10 Largest Peaks)

Compound	Concentration, ppm W-1 (tank location)	⁽¹⁾ Standard, ppm
No Compounds Detected	⁽²⁾ BDL	-----

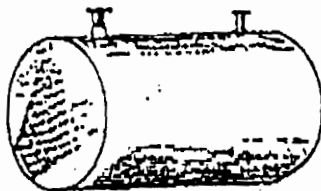
EPA 3030C (Lead Only)

Compound	Concentration, ppm W-1 (tank location)	⁽¹⁾ Standard, ppm
Lead	0.097	0.015

⁽¹⁾Class GA Groundwater Standard per 15A NCAC 2L .0202

⁽²⁾Below Detectable Limits

APPENDIX C



CERTIFICATE OF TANK DISPOSAL

Customer

Date _____

12-06-46

US Marine Corps

NR 4-5

4405

Transported by:

OFC

Tank Disposal Number	Size	Weight	Product	Residue Amount	Origin
1011	280	155	Sand Water	None	Steel
Total Residue				None	

Tanks were disposed in accordance with API 1604, 1987 Removal and Disposal of Used Underground Petroleum Storage Tanks. Residue was disposed in accordance with U.S. EPA Regulations by licensed subcontractor. Lead free scrap steel was recycled by: CAROLINE METAL on 12/06/92

E. J. [Signature]

APPENDIX D

CARLISLE CONTRACTORS, INC.
1555 HOLLAND ROAD
AUTRYVILLE, NC 28318

Phone: 910/567-6138 & 910/485-3207

Fax: 910/567-2891

NC LICENSE PERMIT NO. SR0600035

DATE: 12-31-96

SUBJECT: TREATMENT OF PETROLEUM CONTAMINATED SOIL

Dear Client:

This letter is to verify that on 12-31-96 Carlisle Contractors, Inc. had disposed of 153.00 Tons of contaminated soil to our land farming facility in Autryville, NC under permit #SR0600035. We are handling your soil in compliance with our state permit conditions. Upon obtaining lab results on your soil, you the client, will be notified that the soil has been remediated. Once again, you are no longer responsible for the soil that we have accepted upon receipt of invoice.

It has been a pleasure serving you on this environmental matter, and we look forward to serving you in the future.

Yours very truly,

Glen D. Carroll

Glen Carroll
Soil Remediation Supervisor

№ 17944

72600

Cachile

72600
30 000

GENERATOR	b.			Tons =	21.30
	c.				
	d.				
	D. Additional Descriptions for Materials Listed Above		E. Handling Codes for Wastes Listed Above		
TRANSPORTER	15. Special Handling Instructions and Additional Information I certify the above weight to be true and exact. <u>Allen D. Carroll</u> Sworn to before me this the 31st day of December, 1996. <u>Joyce E. Spill</u> Notary Public My commission expires 9 13 99				
	16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.				
	Printed/Typed Name <u>Rip Collins</u>	Signature <u>Rip Collins</u>	Month <u>12</u>	Day <u>13</u>	Year <u>96</u>
	17. Transporter 1 Acknowledgement of Receipt of Materials				
FACILITY	Printed/Typed Name <u>Allen Sumner</u>	Signature <u>Allen Sumner</u>	Month <u>12</u>	Day <u>13</u>	Year <u>96</u>
	18. Transporter 2 Acknowledgement of Receipt of Materials				
	Printed/Typed Name	Signature	Month	Day	Year
	19. Discrepancy Indication Space				
20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.					
Printed/Typed Name <u>GLEN G. CARROLL</u>		Signature <u>Allen D. Carroll</u>	Month <u>12</u>	Day <u>13</u>	Year <u>96</u>

ONSLOW ENVIRONMENTAL CONTRACTORS, INC.

4571 Gum Branch Road
Jacksonville, NC 28540

Telephone 910-347-9010
Fax 910-347-4677

January 6, 1997

Department of the Navy
Office in Charge of Construction
1005 Michael Road
Camp LeJeune, N.C. 28547

Gentlemen:

On November 21, 1996, P & W Waste Oil Service, Inc, Leland, N.C. 28541, picked up 725 gallons of waste water from Contract #4405, New River Air Station. To this date, a certified disposal manifest has not been received.

I contacted their office on December 9, 1996 and requested a manifest. I was informed that payment must be received prior to certifications being received. We complied and sent a check on December 10, 1996, for disposal waste at New River Air Station.

I contacted their office on December 23, 1996, and requested a manifest. I was informed payment as been received, but they are not going to issue a manifest. I was informed, the contaminated water has not been properly disposed of yet.

The bottom line, Gentlemen, is that I do not believe we will receive a certified manifest on the contaminated water form P & W.

I suggest, that the government get involved, due to the fact that the government is responsible for the contaminated water, until they receive a proper disposal manifest.

Debbie Mayo, of the State Environment Office, Wilmington, N.C., was notified on December 31, 1996, about the refusal to provide a disposal manifest.

Thank You!


Trish Jones/owner
SOS SUS

APPENDIX E

APPENDIX F

HYDROLOGIC, INC.

December 30, 1996

26-3936

REPORTING:

Onslow Env
3109 Gumbranch Road
Jacksonville, NC 28540

INVOICING:

Onslow Env
3109 Gumbranch Road
Jacksonville, NC 28540

PROJECT NUMBER: FL9620525M

DATE COMPLETED: December 30, 1996

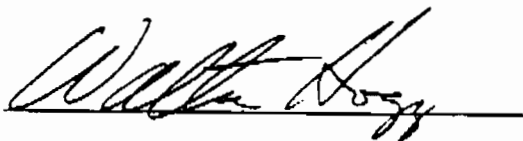
DATE RECEIVED: December 21, 1996

PROJECT DESCRIPTION:

ONSLow--1 water and 1 soil sample were received and analyzed for the following tests: 1 602/1 625+tic/1 3550/5030.

Enclosed is the laboratory report for the project described above. If you have any questions or if we can be of further assistance, please feel free to contact Jack Hale Jr. at 1-800-728-2251. We appreciate your business and look forward to serving you again soon.

Respectfully,



Walter Hogg
QA/QC Officer

HYDROLOGIC, INC.

COMPANY NAME: Onslow Env
COMPANY PROJECT NUMBER: ONSLOW

HYDROLOGIC PROJECT NUMBER: FL9620525M
HYDROLOGIC SAMPLE NUMBER: 9620525
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: W-1
DATE SAMPLED: 12/18/96
DATE EXTRACTED: N/A
DATE/TIME ANALYZED: 12/24/96

METHOD 602

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Benzene	71-43-2	1.0	1.24
Chlorobenzene	108-90-7	1.0	BDL
1,2-Dichlorobenzene	95-50-1	1.0	BDL
1,3-Dichlorobenzene	541-73-1	1.0	BDL
1,4-Dichlorobenzene	106-46-7	1.0	BDL
Ethylbenzene	100-41-4	1.0	BDL
Toluene	108-88-3	1.0	BDL
Xylene (Total)	1330-20-7	1.0	1.04
Surrogate Recovery: Bromofluorobenzene			91%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

Page 2 continued

COMPANY NAME: Onslow Env
COMPANY PROJECT NUMBER: ONSLOW

HYDROLOGIC PROJECT NUMBER: FL9620525M
HYDROLOGIC SAMPLE NUMBER: 9620525
SAMPLE IDENTIFICATION: W-1
DATE SAMPLED: 12/18/96

METHOD EPA 625

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
4-Nitrophenol	100-02-7	25.0	BDL
2,4-Dinitrotoluene	121-14-2	5.0	BDL
2,6-Dinitrotoluene	606-20-2	5.0	BDL
Diethylphthalate	84-66-2	5.0	BDL
4-Chlorophenyl-phenylether	7005-72-3	5.0	BDL
Fluorene	86-73-7	5.0	BDL
4,6-Dinitro-2-methylphenol	534-52-1	25.0	BDL
4-Bromophenyl-phenylether	101-55-3	5.0	BDL
Hexachlorobenzene	118-74-1	5.0	BDL
Pentachlorophenol	87-86-5	25.0	BDL
Phenanthrene	85-01-8	5.0	BDL
Anthracene	120-12-7	5.0	BDL
Di-n-butylphthalate	84-74-2	5.0	BDL
Fluoranthene	206-44-0	5.0	BDL
Pyrene	129-00-0	5.0	BDL
Butylbenzylphthalate	85-68-7	5.0	BDL
3,3'-Dichlorobenzidine	91-94-1	10.0	BDL
Benzo(a)anthracene	56-55-3	5.0	BDL
bis(2-Ethylhexyl)phthalate	117-81-7	5.0	BDL
Chrysene	218-01-9	5.0	BDL
Di-n-octylphthalate	117-84-0	5.0	BDL
Benzo(b)fluoranthene	205-99-2	5.0	BDL
Benzo(k)fluoranthene	207-08-9	5.0	BDL
Benzo(a)pyrene	50-32-8	5.0	BDL

HYDROLOGIC, INC.

COMPANY NAME: Onslow Env
COMPANY PROJECT NUMBER: ONSLOW

HYDROLOGIC PROJECT NUMBER: FL9620525M
HYDROLOGIC SAMPLE NUMBER: 9620525
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: W-1
DATE SAMPLED: 12/18/96
DATE EXTRACTED: 12/23/96
DATE/TIME ANALYZED: 12/28/96

METHOD EPA 625

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Phenol	108-95-2	5.0	BDL
bis(2-Chloroethyl) ether	111-44-4	5.0	BDL
2-Chlorophenol	95-57-8	5.0	BDL
1,3-Dichlorobenzene	541-73-1	5.0	BDL
1,4-Dichlorobenzene	106-46-7	5.0	BDL
1,2-Dichlorobenzene	95-50-1	5.0	BDL
bis(2-Chloroisopropyl) ether	39638-32-9	5.0	BDL
N-Nitroso-di-n-propylamine	621-64-7	5.0	BDL
Hexachloroethane	67-72-1	5.0	BDL
Nitrobenzene	98-95-3	5.0	BDL
Isophorone	78-59-1	5.0	BDL
2-Nitrophenol	88-75-5	5.0	BDL
2,4-Dimethylphenol	105-67-9	5.0	BDL
bis(2-Chloroethoxy) methane	111-91-1	5.0	BDL
2,4-Dichlorophenol	120-83-2	5.0	BDL
1,2,4-Trichlorobenzene	120-82-1	5.0	BDL
Naphthalene	91-20-3	5.0	BDL
Hexachlorobutadiene	87-68-3	5.0	BDL
4-Chloro-3-methylphenol	59-50-7	5.0	BDL
2,4,6-Trichlorophenol	88-06-2	5.0	BDL
2-Chloronaphthalene	91-58-7	5.0	BDL
Dimethylphthalate	131-11-3	5.0	BDL
Acenaphthylene	208-96-8	5.0	BDL
Acenaphthene	83-32-9	5.0	BDL
2,4-Dinitrophenol	51-28-5	25.0	BDL

HYDROLOGIC, INC.

Page 3 continued

COMPANY NAME: Onslow Env
COMPANY PROJECT NUMBER: ONSLOW

HYDROLOGIC PROJECT NUMBER: FL9620525M
HYDROLOGIC SAMPLE NUMBER: 9620525
SAMPLE IDENTIFICATION: W-1
DATE SAMPLED: 12/18/96

METHOD EPA 625

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (ug/l)	<u>RESULT</u> (ug/l)
Indeno(1,2,3-cd)pyrene	193-39-5	5.0	BDL
Dibenz(a,h)anthracene	53-70-3	5.0	BDL
Benzo(g,h,i)perylene	191-24-2	5.0	BDL
Hexachlorocyclopentadiene	77-47-4	10.0	BDL
N-Nitrosodiphenylamine	86-30-6	10.0	BDL
 Benzidine	 92-87-5	 80.0	 BDL
N-Nitrosodimethylamine	62-75-9	10.0	BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

COMPANY NAME: Onslow Env
COMPANY PROJECT NUMBER: ONSLOW

HYDROLOGIC PROJECT NUMBER: FL9620525M
HYDROLOGIC SAMPLE NUMBER: 9620525
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: W-1
DATE SAMPLED: 12/18/96
DATE EXTRACTED: 12/23/96
DATE/TIME ANALYZED: 12/30/96

TENTATIVELY IDENTIFIED COMPOUNDS (water samples)

COMPOUND NAME

ESTIMATED CONCENTRATION (ug/l)

NO COMPOUNDS DETECTED

BDL

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

COMPANY NAME: Onslow Env
COMPANY PROJECT NUMBER: ONSLOW

HYDROLOGIC PROJECT NUMBER: FL9620525M
HYDROLOGIC SAMPLE NUMBER: 9620526
HYDROLOGIC LAB ID #: 399
SAMPLE IDENTIFICATION: CS-1
DATE SAMPLED: 12/18/96
DATE EXTRACTED: 12/24/96
DATE/TIME ANALYZED: 12/28/96 12/27/96

METHOD TPH 3550/5030

<u>ANALYSIS</u>	<u>CAS NO.</u>	<u>SDL</u> (mg/kg)	<u>RESULT</u> (mg/kg)
Diesel		10.0	556
Surrogate Recoveries:			
Nonane			50%
Pentacosane			84%
Gasoline		2.0	BDL
Surrogate Recovery:			
BFB			73%

BDL = Below Sample Detection Limit
SDL = Sample Detection Limit

COMMENTS: _____

HYDROLOGIC, INC.

FINAL REPORT OF ANALYSES

HYDROLOGIC MORRISVILLE
2500 GATEWAY CENTRE BOULV
SUITE 900
MORRISVILLE, NC 27560-
Attn: LISA SNIPES

PROJECT NAME: ONSLOW
REPORT DATE: 12/27/96

SAMPLE NUMBER- 96351 SAMPLE ID- W 1
DATE SAMPLED- 12/18/96
DATE RECEIVED- 12/21/96 SAMPLER- CLIENT
TIME RECEIVED- 1100 DELIVERED BY- FED EX

SAMPLE MATRIX- WW
TIME SAMPLED- 0931
RECEIVED BY- BDL

Page 1 of 1

ANALYSIS	METHOD	SAMPLE PREP ANALYSIS			RESULT UNITS	DET. LIMIT
		DATE	BY	DATE		
LEAD, TOTAL	3030C DIGESTION	200.7	12/22/96 BDL	12/27/96 LJP	0.097 mg/l	0.010

LABORATORY DIRECTOR

B. David Lutz, DHT

APPENDIX H





CLEAN-EAST
Associates, Inc.

P.O. Box 189
Kinston,
North Carolina
28501
24 Hour Phones:
(919) 939-1600
1-800-425-6097

Fax:
(919) 527-1086

24 Hour
Hazmat Response,
UST Removal
and Closure,
Site Assessment,
Soil and
Groundwater
Remediation,
Corrective Action
Systems,
Environmental
Audits.

July 24, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. TT-48
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

The one (1) steel 8,000 gallon heating oil tank was removed on January 27, 1996. The tank was in relatively fair condition with minor pitting noted. Organic Vapor Meter (OVM) readings indicated a release. Approximately 388.19 tons of material (silty sand) were excavated from the tank excavation. 87.0 tons of the 388.19 tons of material excavated had a range of Total Petroleum Hydrocarbon content as diesel of 40 parts per million (ppm) to 69 ppm. The contaminated soil was transported to Clean East Environmental Services licensed landfarm in Kinston, NC for remediation.

The sludge disposal manifest included in Appendix D was for this site and another site. P&W Oil Services consolidated this site and another site into one manifest.

The GW/UST-2 form in Appendix B should be signed by government personnel.

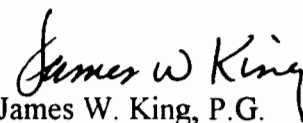
The contaminated soil was slightly above NC Reportable Concentration of 40 ppm. Additional evaluation work at this site may be warranted, depending on recommendations of the WiRO of the NCDEHNR-DWQ.

We appreciate serving Camp Lejeune on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,


H. Kenneth Jordan
Project Manager

HKJ/ckw


James W. King, P.G.
Manager

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

045D TT-48

A. Ownership of UST(s)

1. **Name of UST Owner:** United States Marine Corps.
2. **Owner address and telephone number:**
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. **Facility Name:** Bldg. TT-48 (Tarawa Terrace II School)
2. **Facility ID#:** 0-002740
3. **Facility address, telephone number and county:** Marine Corps Base
Camp Lejeune, NC - Onslow County

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. **Name, address and telephone number of closure contractor:**
North American Resources
Construction & Management
6145 West Sundust Road Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. **Name, address and telephone number of primary consultant:**
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600

4. Name, address, telephone number, and state certification number of laboratory: GeoChem, Inc.
 2500 Gateway Centre, Suite 300
 Morrisville, NC 27560 (919) 460-8093
 State Nos. 37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1953	8,000	8' X 21'4"	Heating Oil	Heating Oil

E. Site Characteristics

1. Describe any past releases at this site: Unknown
2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active
3. Describe surrounding property use (for example, residential, commercial, farming, etc.) The UST is located at an elementary school on the Marine Corps Base. The surrounding area is primarily residential.
4. Describe site geology/hydrogeology The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject Site is Baymeade-Urban land complex (Bmb) with slopes generally 0 to 6 percent. Infiltration is rapid and runoff is slow. The seasonal high water table is 4 to 5 feet. Soils exposed in the excavation consisted of the following:

0-5"	Brown silty SAND (SM)
5"-1'9"	Light brown silty clayey SAND (SM/SC)
1'9"-12'	Light brown silty sandy CLAY (CL)

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be generally to the north.

II. Closure Procedures

- A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks
 WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: UST Permanent Closure or Change in Service" form (GW/UST-3). Base authorities were notified. Product was removed before tank closure. Dry ice was placed in UST to eliminate O₂.
- B. Note the amount of residual material pumped from the tank(s): Approximately 325 gallons of heating oil was pumped from the tank.
- C. Describe the storage, sampling and disposal of the residual material: P&W

Oil Services of Leland, NC transported the 325 gallons of heating oil to their disposal facility in Leland, NC.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the trackhoe, and the top of the excavation extended laterally about 3 to 6 feet from the edge of the tank. Excavation beneath the tank was about 1 foot. Excavation dimensions were 21'6" x 35' x 11' deep. The soil excavated from 0 to approximately 7' appeared to be clean. The soil from 7' to 11' was contaminated and stockpiled on plastic.

2. Note the depth of tank burial(s) (from land surface to top of tank):

Top of the tank, 2 feet below ground surface.

3. Quantity of soil removed: 388.19 tons total; 87.0 tons of the 388.19 tons were confirmed contaminated; the remaining soil was returned to the UST pit.

4. Describe soil type(s): Excavated materials in the tank excavation consisted of silty SAND (SM).

5. Type and source of backfill used: Medium grain sand from military base designated borrow site.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

The silty sand was removed which generally exhibited OVM readings in excess of 40 ppm.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic and then transported to Clean East Environmental Services licensed Landfarm facility in Kinston, NC for remediation. A hand auger was used to bore at least two feet into the stockpile at appropriate locations so that a composite soil sample could be collected.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Soils were screened with an Organic Vapor Meter (OVM) while excavation took place. The contaminated soil at depths ranging from 7' to 11' generally had OVM readings ranging from 46 ppm to 52 ppm. OVM readings from 0-7' ranged from 0 to 10 ppm. The UST appeared to be in fair condition with some minor pitting. The TEI 580B Organic Vapor Meter (OVM) was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

Two closure samples were taken 1-2' beneath the east and west ends of the tank (AS-1 and AS-2). One composite sample was taken from the stockpiled contaminated silty sand that was removed from the tank excavation. The two soil samples from beneath the UST were collected out of the trackhoe bucket. A hand auger was used to bore at least 2' into the stockpile at various locations for a composite sample.

The samples were analyzed for Total Petroleum Hydrocarbon content as gasoline (5030) and diesel (3550). Drawing No. 2 shows the location of the samples.

C. Describe groundwater or surface water sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

No groundwater was encountered.

D. Quality control measures

The hand auger sampling equipment was deconned using analconox-deionized water solution followed by a deionized water rinse. This procedure was conducted before each sampling event. New surgical gloves were also used for each sampling event. The samples were properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC along with proper chain-of-custody documentation. The laboratory analytical testing generally correlated with site observations and OVM readings. The closure samples and stockpile sample were collected between 1007 and 1038 on January 27, 1996 and were delivered to the laboratory at 1655 on January 29, 1996.

E. Investigation results

Laboratory analyses by TPH 3550 indicated diesel content of the stockpiled material (SP-2) at 40 ppm and 69 ppm for the east end (AS-1) closure sample. The west end returned results of below detectable limits. All three samples returned results below detectable limits for TPH 5030 (gasoline).

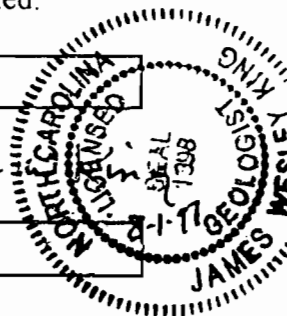
IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

The probable source of contamination is from the leaking 8,000 gallon UST. The stockpiled soil and the east end closure sample exceeded the NC Reportable Concentration of 40 ppm for diesel. Further evaluation and remediation work appears warranted.

V. Signature of Professional Engineer or Licensed Geologist

Licensed Geologist License #: 1398

**VI. Enclosures****A. Drawings**

Area Map (No. 1)

Site Map (No. 2)

B. Tables

Soil Analyses Results

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

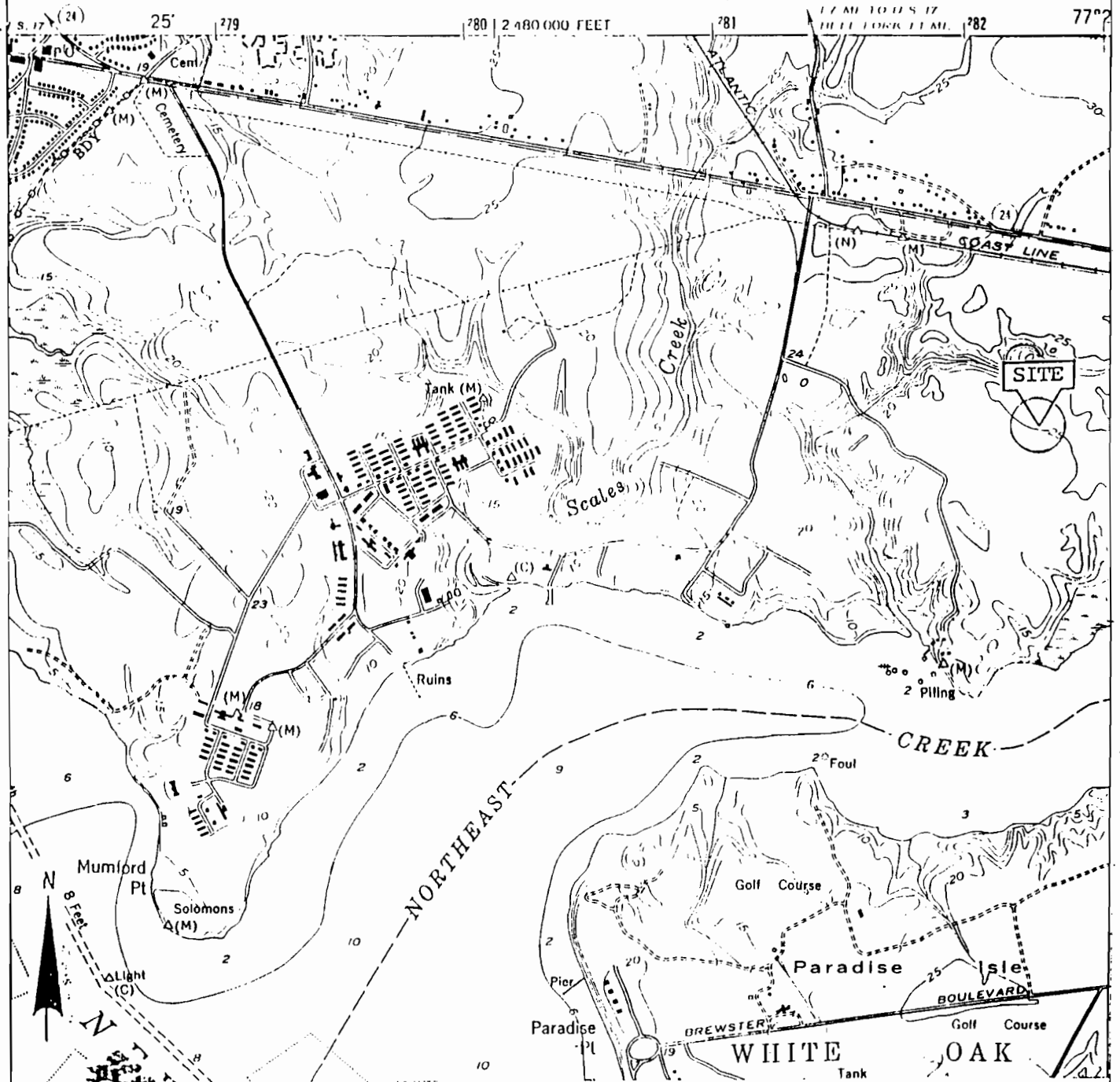
Appendix C: Certificate & Disposal Manifest of Tank

Appendix D: Soil and Sludge Disposal Manifests/Certificates

Appendix E: Complete Chain-of-Custody Records and Analytical Results

Appendix F: Photographs

JACKSONVILLE SOUTH QUADRANGLE
 NORTH CAROLINA-ONSLOW CO.
 7.5 MINUTE SERIES (TOPOGRAPHIC)
 NW/4 NEW RIVER 15' QUADRANGLE



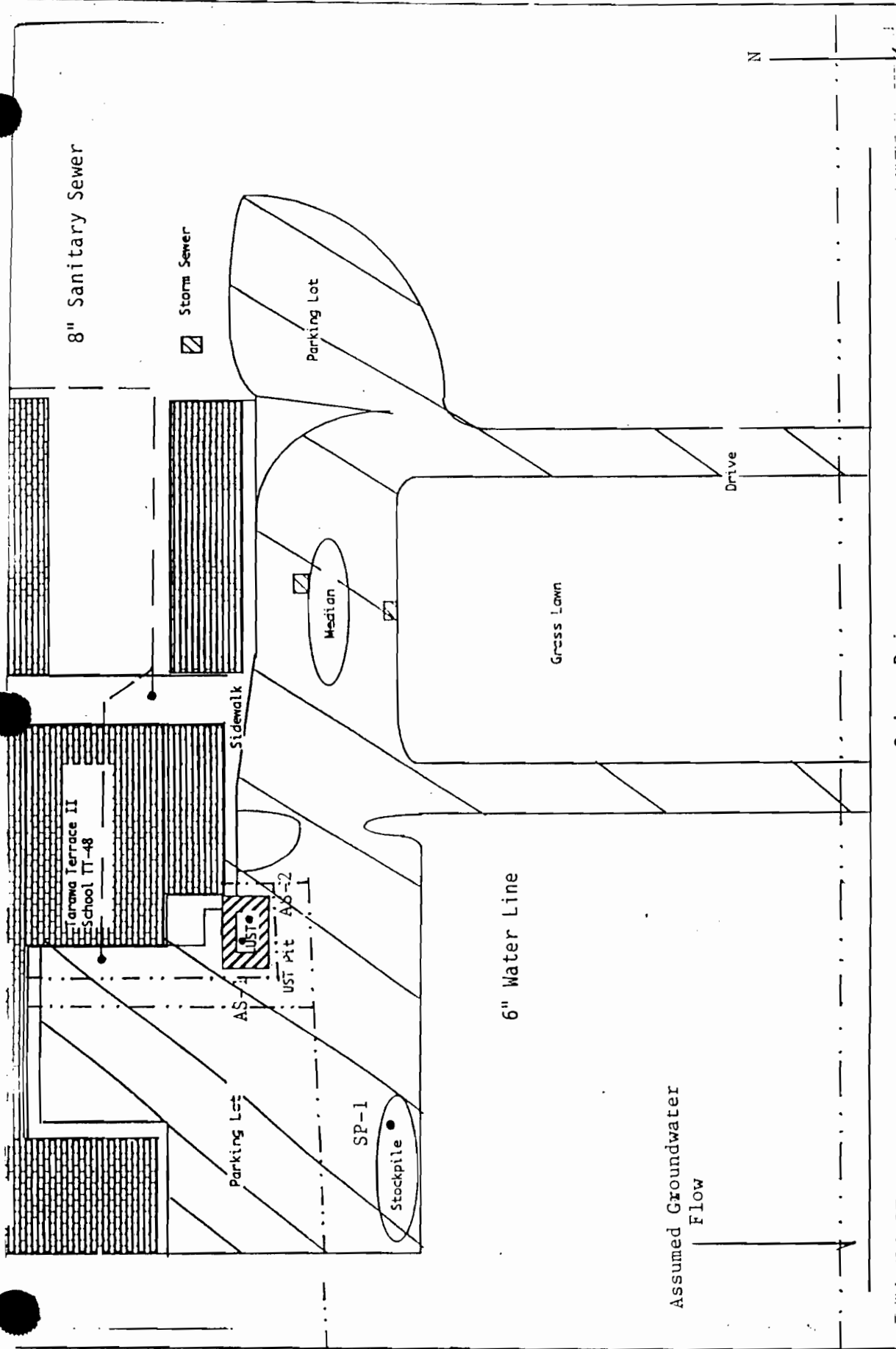
CLEAN-EAST Associates, Inc.

P.O. Box 189
 Kinston, NC 28501
 Fax: (919) 523-8191
 1-800-849-1145
 24 Hour Phone: (919) 523-9090

AREA MAP

Camp Lejeune
 Tarawa Terrace II School (TT-48)
 Jacksonville, NC

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	DRAWING NO.
1:24000	USGS	HKJ	1952	96-045D	1



Saipan Drive

Drawing Label SITE MAP Camp Lejeune Tarawa Terrace II School (TT-48) Jacksonville, NC	Scale:	1" = 67.5'	Drawn by:	HKJ	Checked by:	JWK
	Date:	2-15-96	Project No:	96-045D	Drawing No.	2
						
	CLEAN-EAST Associates, Inc.					
	P.O. Box 189 Kinston, NC 28502 Fax (919) 523-4191 1-800-848-1145 24 Hour Phone: (919) 523-9090					

Table 1
Sample Analyses Results - Soil (ppm)

Sample ID	Location	Depth	Date	EPA Method 5030	EPA Method 3550	Field Screenings OVM
AS-1	East end of tank pit	11'-12'	1-27-96	BDL	69*	48 ppm
AS-2	West end of tank pit	11'-12'	1-27-96	BDL	BDL	52 ppm
SP-2	Stockpile	----	1-27-96	BDL	40*	0 ppm
NC Reportable Concentration (RC)				10	40	----

“ppm” denotes parts per million

“BDL” denotes below detectable limits

“*” exceeds NC Reportable Concentration

Appendix A

Notification of Intent to Close (GW/UST-3)

GW/UST-3

Notice of Intent: UST Permanent Closure or Change-In-Service

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Marine Corps Base

(Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004County: OnslowCity: Camp Lejeune State: NC Zip Code: 28542-0004Tele. No. (Area Code): (910) 451-5063

II. LOCATION OF TANK(S)

Facility Name or Company: TT-48-2

Facility ID # (if available): _____

Street Address or State Road: _____

County: Onslow City: _____ Zip Code: _____

Tele. No. (Area Code): _____

III. CONTACT PERSON

Name: Gary Fitzpatrick Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used

- Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.

7. The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all **closure site assessment reports must be signed and sealed by a P.E. or L.G.**
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

Contractor Name: Onslow Environmental ContractorsAddress: 3109 Gum Branch Rd., Jacksonville State: NCZip Code: 28540Contact: Ed JonesPhone: 910 347-9010Primary Consultant: E2SPhone: 914-781-7888

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment In Place	New Contents Stored
<u>1</u>	<u>6000</u>	<u>Airsel</u>	☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title

Jeff Pierce, LTJG, CEC, USN*Scheduled Removal Date: 28 Dec 95Signature: Jeff PierceDate Submitted: 18 Dec 95

If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity

Street Address: PSC Box 20004

County: Onslow

City: C. Lejeune State: NC Zip Code: 28542-0004

Telephone Number: (910) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: TT-48-2

(or Company)

Facility ID # (if available): 0-002740

Street Address

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542

Telephone Number: ()

(Area Code)

III. Contact Person

Name: Mr. Greg Fitzpatrick

Job Title: Commanding General

Tel. No.: (910) 451-5063

Closure Contractor: North American Resource Address: 6145 W. Sundust Rd. Arizona 85226 Tel. No.: (520) 796-4054

Primary Consultant: CEA

Address: P.O. Box 189 Kinston, NC 28501

Tel. No.: (919) 939-1600

Lab: GeoChem, Inc.

Address: 2500 Gateway Ctr. Blvd. Morrisville, NC Tel. No.: (919) 460-8093

IV. U.S.T. Information

V. Excavation Condition

VI. Additional Information Required

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water In Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	8,000	8' x 21' 4"	Heating oil		X		X	X	

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- ☒ Contact local fire marshal.
☒ Notify DWQ Regional Office before abandonment.
☒ Drain & flush piping into tank.
☒ Remove all product and residuals from tank.
☒ Excavate down to tank.
☒ Clean and inspect tank.
☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
☒ Cap or plug all lines except the vent and fill lines.
☒ Purge tank of all product & flammable vapors.
☒ Cut one or more large holes in the tanks.
☒ Backfill the area.
- Date Tank(s) Permanently closed: 1/27/96
- Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
☐ Plug or cap all openings.
☐ Disconnect and cap or remove vent line.
☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
☒ Label tank.
☒ Dispose of tank in approved manner.
 Final tank destination: Carolina Welding & Salvage
 7250 Hwy 70 E., New Bern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate and Disposal Manifest of Tank

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank
- UST -
D E A T H C E R T I F I C A T E
Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 2/20/96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Rd.

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site TT-48 (Tarawa Terrace II School)

ADDRESS: Tarawa Terrace II, Camp Lejeune NC

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 8,000 gallon PRODUCT: Heating Oil

UST MATERIAL: Steel

DEFUEL DATE: 1-26-96 TIME: 1300

PURGE DATE: 1-26-96 TIME: 1530

REMOVAL DATE: 1-27-96 TIME: 930

DATE OF DEATH (DISPOSAL): January 30, 1996

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISON

CAROLINA WELDING & SALVAGE
7250 HWY. 70 E.
NEW BERN, N. C. 28560
919 636-3006

[illegible]

11762

REC'D BY

5030 NEOLITHIC 1

carbonless

2/1/97

Linda King Hill, Notary
Kinston, NC 28501

My Commission expires Nov. 21, 2001

USTs were cut into scraps.

Appendix D

Soil and Sludge Disposal Manifests/Certificates

CLEAN-EAST

Environmental Services



Highway 258 North • P.O. Box 189 • Kinston, NC 28502 • (919) 523-9090
24 Hour Phones: (919) 747-3250 • (919) 522-4786
Facsimile: (919) 523-8191

Certificate of Disposal

This is to certify that

87.0 tons of heating oil contaminated soil
from Site TT-48, Camp Lejeune, Jacksonville,
NC

*has been disposed of in accordance
with State and EPA regulations.*

Given this 27th day of February, 19 96.

A. W. Cousins
Authorized Signature

8/1/97

*Linda King Hill, Notary
Kinston, NC
My Commission expires Nov. 21, 2001*



CLEAN EAST Environmental Services

1502 Greenville Hwy. • P.O. Box 189 • Kinston, North Carolina 28502
(919) 939-1600 • 24 Hour Phone 1-800-425-6097 • Facsimile: (919) 527-1086

Certificate of Remediation

This is to certify that

87.0 tons of heating oil contaminated soil
from Site TT-48 Camp Lejeune, Jacksonville,
NC

have been remediated under NC Land Farm Permit No: SR 0700039
in accordance with EPA and State Regulations.

Given this

12th

day of

September

, 19

96.

J. D. Cousins
Authorized Signature

Linda King Hill, Notary 8/1/97
Kinston, NC

My Commission Expires Nov. 21, 2001

P & W OIL CO., INC. WASTE MATERIAL MANIFEST

JOB# TT48 & TT60	Generator's US EPA ID No.:	Page 1 of	01306
Generator's Name and Mailing Address			
Generator's Phone			
Transporter 1 Company Name		US EPA ID No.:	
P&W Waste Oil Services, Inc. P.O. Box 656, Leland, NC 28451			
Transporter 2 Company Name		US EPA ID No.:	
P & W OIL CO., INC.		US EPA ID No.:	
P.O. Box 656 Leland, NC 28451 (910) 371-5792		NCD986215242	

US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	Circle Form	Containers No.	Type	Total Quantity	Circle Units	Waste No.
Non Hazardous Sludge	Solid Sludge	1	TT	650	Pounds	
	Liquid Gas				Cu. Yds.	
	Liquid Gas				Gallons	
	Liquid Gas				Tons	
	Solid Sludge				Pounds	
	Liquid Gas				Cu. Yds.	
	Liquid Gas				Gallons	
	Liquid Gas				Tons	

TIME IN _____	P & W EMERGENCY	(910) 791-1724
TIME OUT _____	N.C. ENVIRONMENTAL	1-800-662-7956
	N.C. NATURAL RESOURCES	(910) 395-3900

Vehicle License Tag Number(s):	Profile #:
Lab:	Invoice #:
Analysis #:	Broker:

Special Handling Instructions, Additional information, and Discrepancy Indication:

 CONTRACTOR - North American Resources
 6145 South Sundust Road, Box 5073, Chandler, AZ 85226

GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name John Boyer	Signature <i>John Boyer</i> Date: <i>1-24-96</i>

Transporter #1: Acknowledgement of Receipt of Materials Printed/Typed Name	Signature _____ Date: _____

Transporter #2: Acknowledgement of Receipt of Materials Printed/Typed Name	Signature _____ Date: _____

P & W OIL CO., INC. CERTIFICATION OF RECEIPT Printed/Typed Name Mark Greenleaf	Signature _____ Date: _____ 1-24-96

8/1/96
1-24-96

Appendix E

1. Chain-of-Custody
2. Analytical Results

no: Kes-604

Environmental Laboratories

**2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560**

Bill To:

Bill To: North American

Page 1 of

Chain of Custody Record

PROJECT SITE NUMBER		PO#		GEOCHEM PROJECT #	
SITE NAME		DATE AND TIME COLLECTED		DATE DUE	
COLLECTED BY (Signature)		SAMPLE MATRIX		LAB ID NO. (for lab use only)	
FIELD SAMPLE ID	TURNAROUND IN DAYS	NO. OF CONTAINERS PER LOCATION	ANALYSES	REMARKS	DATE
AS-1	Normal Soil	1	1-27-96 1007	0249	12/24/96
AS-2	↓	1	1-27-96 1008	0250	12/24/96
SP-2	↓	1	1-27-96 1038	0251	12/24/96
REMARKS					
RECEIVED BY: DATE TIME RELINQUISHED BY: DATE TIME					

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560

Report To:

Bill To:

Chain of Custody Record

PROJECT SITE NUMBER 77-48		PO# D	NO. OF CONTAINERS PER LOCATION		ANALYSES		GEOCHEM PROJECT #	
SITE NAME			DATE AND TIME COLLECTED		SAMPLE MATRIX		TURNAROUND IN DAYS	
COLLECTED BY (Signature)			DATE		TIME		LAB ID NO. (for lab use only)	
FIELD SAMPLE ID	TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED	NO. OF CONTAINERS PER LOCATION		ANALYSES		GEOCHEM PROJECT #
1	1		11/1/98	1	ANALYSES		DATE DUE	
2	1		11/1/98	1	ANALYSES		VERBAL/FAX/HARDCOPY	
3	1		11/1/98	1	ANALYSES		REMARKS	
4					ANALYSES		LAB ID NO. (for lab use only)	
5					ANALYSES			
6					ANALYSES			
7					ANALYSES			
8					ANALYSES			
9					ANALYSES			
10					ANALYSES			
11					ANALYSES			
12					ANALYSES			
13					ANALYSES			
14					ANALYSES			
15					ANALYSES			
16					ANALYSES			
17					ANALYSES			
18					ANALYSES			
19					ANALYSES			
20					ANALYSES			
REMARKS				RELINQUISHED BY: <i>Carolyn W. King</i>				DATE 11/1/98
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Mr. Ken Jordan

Site Name:

Terawa Terrace II School

0450

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Wednesday, February 07, 1996

PO #

Date Received in lab:

Tuesday, January 30, 1996

GCI Project #: 9601-060

Summary of requested analytical work

Sample type code #s:	1 = solid samples;	2 = liquid samples;	3 = Air samples;	4 = sludges/unknowns
Field Number AS-1	Lab ID 249	Sample Type: 1	Date Analyzed: 2/1/96	for 5030 mve 3550
Date Sampled 1/27/96	at 10:07 A			
Field Number AS-2	Lab ID 250	Sample Type: 1	Date Analyzed: 2/1/96	for 5030 mve 3550
Date Sampled 1/27/96	at 10:08 A			
Field Number SP-2	Lab ID 251	Sample Type: 1	Date Analyzed: 2/1/96	for 5030 mve 3550
Date Sampled 1/27/96	at 10:38 A			

Dena J. Barrett

Here by certify that I have Reviewed and approve this data set

GeoChem Incorporated Certified Analytical Laboratory

NC #37745, NC #336, NC #461, EPA ID #155

Wednesday, February 07, 1996

GCI Project 9601-060

Name: Tarawa Terrace II School

Field ID AS-1

Date Analyzed: 2/1/96

Dry Wt %: 0.72

Lab ID 249

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	6.91
TPH Diesel	69	6.91

Field ID AS-2

Date Analyzed: 2/1/96

Dry Wt %: 0.69

Lab ID 250

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	7.27
TPH Diesel	BDL	7.27

Field ID SP-2

Date Analyzed: 2/1/96

Dry Wt %: 0.84

Lab ID 251

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	5.98
TPH Diesel	40	5.98

GeoChem Incorporated Quality Control Results

NC #37745, NC #336, NC #461, EPA ID #155

Site Name:

Wednesday, February 07, 1996

Tarawa Terrace II School

ICI Project # 9601-060

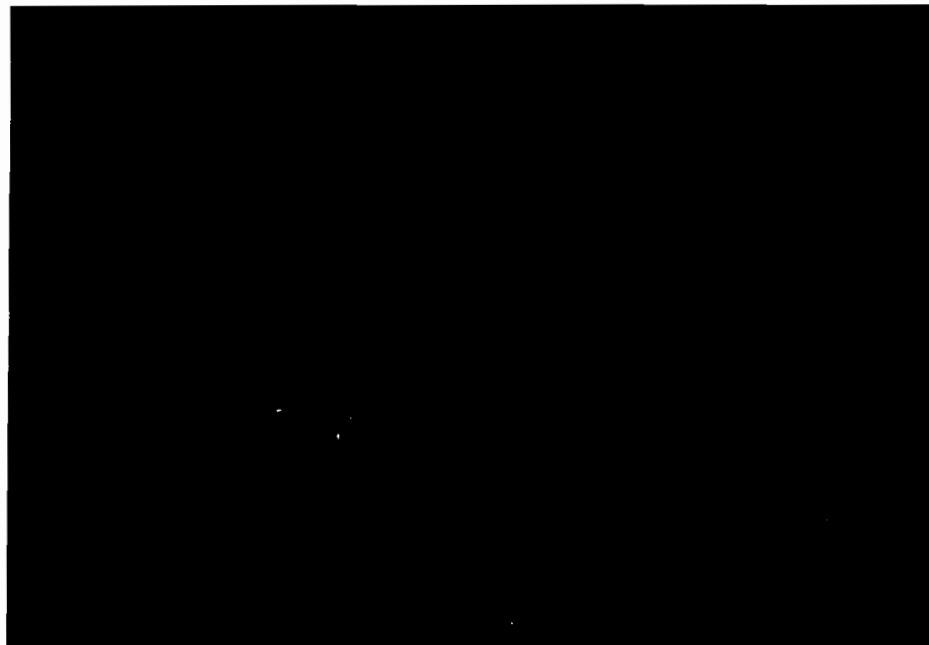
<i>Date Analyzed: 2/3/96</i>	<i>Dry Wt %: 0.91</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	TPH Gas	102.	0	2.43

<i>Date Analyzed: 2/4/96</i>	<i>Dry Wt %: 0.85</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	TPH Diesel	96.4	0	2.43

Appendix F

Photographs

8,000 gallon UST
in the ground



8,000 gallon UST removed
from ground

Contaminated soil
stockpiled







CLEAN-EAST
Associates, Inc.

July 29, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. HP-250 -1, 2, 3
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

On February 19, 1996 one (1) 4,000 gallon and two (2) 550 gallon diesel fiberglass tanks were removed. The tanks were in good condition. Organic Vapor Meter (OVM) readings indicated no release and visual site observations indicated no product on the groundwater exposed in the excavation. Approximately 239.46 tons of material (pea gravel) was excavated from the tank excavation. The pea gravel was not contaminated based on OVM readings. The pea gravel was scheduled to be put back in the excavated area after a new tank was installed.

UST Death Certificates are included in Appendix C from North American Resources, but a final destination or disposal manifest were not provided to CEA.

Groundwater was encountered in the excavation at approximately 11.0 feet below ground level. Analytical testing indicated dissolved compounds in the groundwater and included Benzene, Ethylbenzene, Toluene, Xylenes and Lead. However, only Benzene and Lead exceeded the "GA" groundwater standards as set forth by NCAC 15A 2L 0202. Because two compounds exceeded the Class GA groundwater standards, additional evaluation work appears warranted, unless otherwise directed by the NCDEHNR-DWQ.

P.O. Box 189

Kinston,

North Carolina

28501

24 Hour Phones:

(919) 939-1600

1-800-425-6097

Fax:

(919) 527-1086

24 Hour

Hazmat Response.

UST Removal

and Closure,

Site Assessment,

Soil and

Groundwater

Remediation,

Corrective Action

Systems.

Environmental

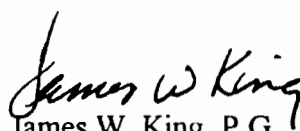
Audits.

The GW/UST-2 form in Appendix B should be signed by government personnel.

We appreciate serving Camp Lejeune on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,


H. Kenneth Jordan
Project Manager
HKJ/ckw


James W. King, P.G.
Manager

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

0451 - HP-250

A. Ownership of UST(s)

1. **Name of UST Owner:** United States Marine Corps.
2. **Owner address and telephone number:** Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. **Facility Name:** Bldg. HP-250
2. **Facility ID#:** 0-002740
3. **Facility address, telephone number and county:** Marine Corps Base
Camp Lejeune-Onslow County
(919) 451-5063

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. **Name, address and telephone number of closure contractor:**
North American Resources
6145 West Sundust Road
Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. **Name, address and telephone number of primary consultant:**
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600
4. **Name, address, telephone number, and state certification number of laboratory:** GeoChem, Inc.
2500 Gateway Centre Blvd., Suite 300
Morrisville, NC 27560 (919) 460-8093 Nos. #37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1989	4,000	64" x 24'	Diesel	Diesel
2	1989	550	46" x 74"	Diesel	Diesel
3	1989	550	46" x 74"	Diesel	Diesel

E. Site Characteristics

1. Describe any past releases at this site: Unknown

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active.

3. Describe surrounding property use (for example, residential, commercial, farming, etc.). The USTs were located in a parking lot of a maintenance facility on the Marine Corps Base. The surrounding area is primarily residential.

4. Describe site geology/hydrogeology: The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject site is Marvyn loamy fine sand (MaC) with slopes of 6 to 15 percent. The soil is well drained. The surface layer is brown loamy fine sand 4 inches thick. The subsoil is 45 inches thick and is brown sandy loam to brownish yellow sandy loam. Infiltration is moderate and runoff is medium. The seasonal high water table is 3 to 5 feet below the surface. Soils exposed in the excavation consisted of the following:

0-11'8" pea gravel

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be in a direction to the southwest.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks.

WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: UST Permanent Closure or Change in Service form (GW/UST-3). Base authorities were notified. Product was removed before tank removal. Dry ice was placed in USTs to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): The two 550 gallon diesel tanks were empty prior to removal. Approximately 1100 gallons of diesel were pumped from the 4,000 gallon tank.

C. Describe the storage, sampling and disposal of the residual material: P&W Oil Services of Leland, NC transported the 1100 gallons of diesel fuel to their disposal facility in Leland, NC.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the trackhoe, and the top of the excavation extended laterally about 3 to 6 feet from the edges of each of the tanks. Pea gravel surrounded all three USTs. The pea gravel did not appear to be contaminated based on field observations and OVM readings. Only enough pea gravel was excavated to sufficiently remove the USTs. However, during excavation the pump island was undercut and no dispenser samples could be collected. In addition, the product lines had been removed prior to the arrival of CEA personnel on site, so no samples could be obtained.

2. Note the depth of tank burial(s) (from land surface to top of tank): Top of the two 550 gallon tanks 3'6" feet below ground surface. Top of the 4,000 gallon tank 3'9" feet below ground surface.

3. Quantity of soil removed: 239.46 tons of pea gravel

4. Describe soil type(s): In the tank excavation, the excavated materials consisted of pea gravel.

5. Type and source of backfill used: The pea gravel was scheduled to be returned to the pit once the new tank was installed.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

Pea gravel was only excavated enough to sufficiently remove the tanks. The OVM did not detect any contaminated pea gravel during excavation.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Pea gravel was temporarily stored on plastic and was scheduled to be returned to the hole after new tanks were installed.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): The three USTs removed were in good condition. Based on field observations and OVM readings no contamination was observed or detected in the pea gravel excavated. The TEI 580B Organic Vapor Meter (OVM) was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

One (1) sample was taken 1-2' beneath each of the 550 gallon tanks (PT-1 and PT-2). No line or dispenser samples were taken due to caving of pea gravel in the excavation pit, which undercut the lines and dispensers.

The samples were analyzed for Total Petroleum Hydrocarbon Content as gasoline (5030) and diesel (3550). The samples were collected with a shovel. Drawing No. 2 shows the location of the samples.

C. Describe groundwater or surface water sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

One (1) groundwater sample (WS-3) was taken beneath the 4,000 gallon UST at 11.0' with analytical testing consisting of EPA Method 625 B/N + 10, 602 and 3030C (lead only). The groundwater sample was collected using a clean laboratory jar. Drawing No. 2 shown the location of the water sample.

D. Quality control measures

The shovel sampling equipment was deconned using analconox-deionized water rinse. This procedure was conducted before each sampling event. New surgical gloves were also used for each sampling event. The water was collected with a clean laboratory sampling jar. The samples were properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC, along with proper chain-of-custody documentation. The laboratory analytical testing generally correlated with site observations and OVM readings. The groundwater sample was collected at 1530 on February 19, 1996. The closure samples for each 550 gallon tank were collected between 1103 and 1105 on February 19, 1996. The soil and water samples were delivered to the laboratory at 1649 on February 20, 1996.

E. Investigation results

During excavation of the tank, the excavated material was screened with the OVM and no petroleum volatiles were detected. Laboratory analyses by TPH 3550 indicated no diesel content in either sample PT-1 or PT-2.

Groundwater was encountered in the excavation of the 4,000 gallon tank. Dissolved compounds detected by EPA 602 included Benzene, Ethylbenzene, Toluene and Total Xylenes. Only the Benzene concentration exceeded the action level as set by NCAC 15A 2L. 0200. Lead (3030C) was also encountered above the standard.

IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

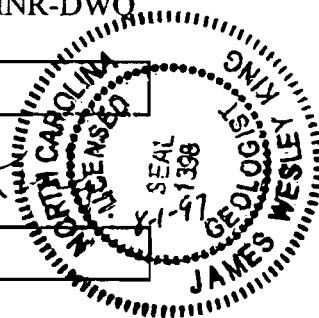
Benzene and Lead exceeded the Class "GA" Groundwater Standards. Further evaluation and remediation work appears warranted, unless otherwise directed by the NCDEHNR-DWO

V. Signature of Professional Engineer or Licensed Geologist



Licensed Geologist License #: 1398

James W. King



VI. Enclosures

- A. Drawings
 - Site Map (No. 1)
 - Area Map (No. 2)
- B. Tables
 - Soil Analyses Results (No. 1)
 - Groundwater Analyses Results (No. 2)
- C. Appendices
 - Appendix A: Notification of Intent to Close (GW/UST-3)
 - Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)
 - Appendix C: Certificate of Tank Disposal
 - Appendix D: Product Disposal Manifest
 - Appendix E: Complete Chain-of-Custody Records & Analytical Results
 - Appendix F: Photographs



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-0191
1-800-049-1145
24 Hour Phone: (919) 523-9090

SITE MAP

Camp Lejeune
Building HP250
Jacksonville, NC

SCALE:
1:24000

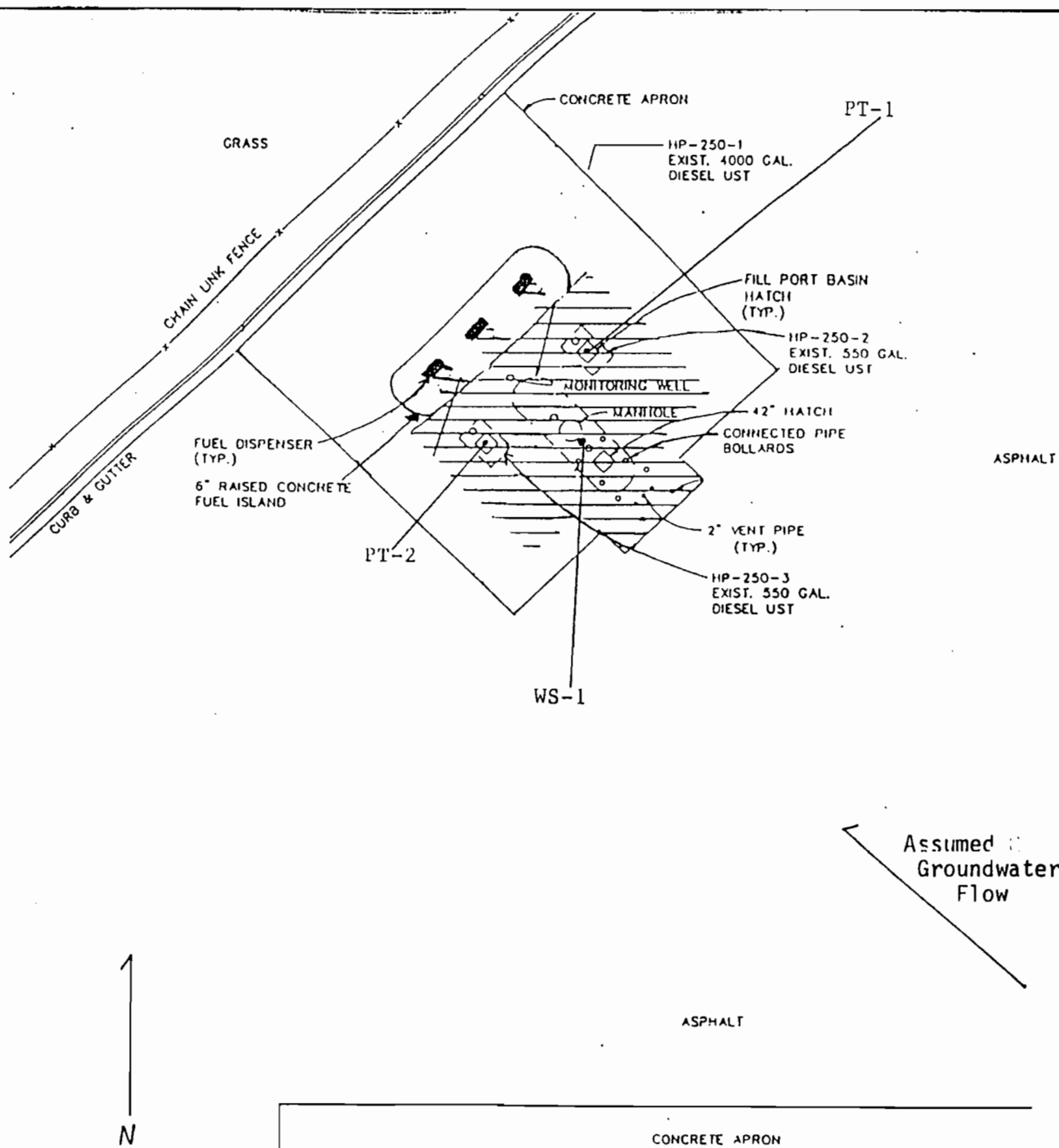
DRAWN BY:
USGS

CHECKED BY:
HKJ

DATE:
1971

PROJECT NO.
96-0451

DRAWING NO.
1



N

Building HP-250

CLEAN-EAST Associates, Inc.

P.O. Box 109
Kinston, NC 28501
Fax: (919) 523-0191
1-800-849-1145
24 Hour Phone: (919) 523-9090

SITE MAP

Camp Lejeune
Building HP250
Jacksonville, NC

SCALE:

1"=30'

DRAWN BY:

HKJ

CHECKED BY:

JWK

DATE:

3-6-96

PROJECT NO.

96-0451

DRAWING NO.

2

Table 1
Sample Analyses Results-Soil (ppm)

Sample ID	Location	Depth	Date	EPA Method 5030	EPA Method 3550	Field Screenings OVM
PT-1	1.0' beneath tank 1	8'4"	2-19-96	BDL	BDL	0 ppm
PT-2	1.0' beneath tank 2	8'5"	2-19-96	BDL	BDL	0 ppm
NC Reportable Concentration (RC)				10	40	----

"ppm" denotes parts per million

"BDL" denotes below detectable limits

Table 2
Groundwater Analytical Results (ppb)
EPA Method 602

Sample ID	Depth	Date	Compounds	Concentration	NCAC 2L Limit
WS-3	11'	2-19-96	Benzene	20.5*	1.0
			Toluene	3.5	1000
			Ethylbenzene	5.5	29.0
			Xylenes	12.0	530

EPA Method 3030C

Sample ID	Depth	Date	Compound	Concentration	NCAC 2L Limit
WS-3	11'	2-19-96	Lead	77.0*	15

EPA Method 625 BN+10

Sample ID	Depth	Date	Compound	Concentrations	NCAC 2L Limit
WS-3	11'	2-19-96	None detected	None detected	N/A

"ppb" denotes parts per billion

"*" denotes concentration in excess of 2L standards

Appendix A

Notification of Intent to Close (GW/UST-3)

FOR
TANKS
IN

Return Completed Form To:

The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

II. LOCATION OF TANK(S)

Tank Owner Name: Marine Corps BaseFacility Name or Company: Blg. HP-250Street Address: PSC Box 20004Facility ID # (if available): not availableCounty: Onslow

Street Address or State Road: _____

City: Camp Lejeune State: NC Zip Code: 28542County: Onslow City: _____ Zip Code: _____Tele. No. (Area Code) (910) 451-5063Tele. No. (Area Code): not available

III. CONTACT PERSON

Name: Gary Fitzpatrick Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

- Contact Local Fire Marshall.
- Plan the entire closure event.
- Conduct Site Soil Assessments.
- If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used
- Underground Petroleum Storage Tanks".
- Provide a sketch locating piping, tanks and soil sampling locations.
- Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
- The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all **closure site assessment reports must be signed and sealed by a P.E. or L.G.**
- Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

Contractor Name: Onslow Environmental Contractors

Address: 3109 Fern Branch Rd Jacksonville State: NC Zip Code: 28540

Contact: Ed Jones Phone: 910-347-9810

Primary Consultant: ECS Phone: 919-781-7798

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment in Place	New Contents Stored
<u>1</u>	<u>4,000g</u>	<u>diesel</u>	☒	☐	
<u>2</u>	<u>550g</u>	<u>diesel</u>	☒	☐	
<u>3</u>	<u>550g</u>	<u>diesel</u>	☒	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title:

Jeff PIERCE, LTJG, CEC, USN

*Scheduled Removal Date: 24 Jan 96Signature: Jeff PierceDate Submitted: 18 Dec 95

If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR TANKS IN NC

Return Completed Form To:
The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only
I.D. Number _____
Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)	II. Location of Tank(s)
Owner Name: <u>Marine Corps Base</u>	Facility Name: <u>HP-250</u>
Corporation, Individual, Public Agency, or Other Entity	(or Company)
Street Address: <u>PSC Box 20004</u>	Facility ID # (if available): <u>0-002740</u>
County: <u>Onslow</u>	Street Address
City: <u>Camp Lejeune</u> State: <u>NC</u> Zip Code: <u>28542-004</u>	(or State Road)
Telephone Number: <u>(910) 451-5063</u>	County: <u>Onslow</u> City: <u>C. Lejeune</u> Zip Code: <u>28542</u>
(Area Code)	Telephone Number: ()
	(Area Code)

III. Contact Person

Name: Mr. Greg Fitzpatrick Job Title: Commanding General Tel. No.: (910) 451-5063

Closure Contractor: North American Resource Address: 6145W. Sundust Rd. Chandler, AZ 85226 Tel. No.: (520) 796-4054

Primary Consultant: CEA Address: P.O. Box 189 Kinston, NC 28501 Tel. No.: (919) 939-1600

Lab: GeoChem Inc. Address: 2500 Gateway Blvd. Morrisville, NC Tel. No.: (919) 460-8093

IV. U.S.T. Information				V. Excavation Condition				VI. Additional Information Required	
Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	550	46" x 74"	diesel		X		X		X
2	550	46" x 74"	diesel		X		X		X
3	4,000	64" x 24"	diesel	X			X		X

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- ☒ Contact local fire marshal.
 - ☒ Notify DWQ Regional Office before abandonment.
 - ☒ Drain & flush piping into tank.
 - ☒ Remove all product and residuals from tank.
 - ☒ Excavate down to tank.
 - ☒ Clean and inspect tank.
 - ☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
 - ☒ Cap or plug all lines except the vent and fill lines.
 - ☒ Purge tank of all product & flammable vapors.
 - ☒ Cut one or more large holes in the tanks.
 - ☒ Backfill the area.
- Date Tank(s) Permanently closed: 2/19/96
- Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
- ☐ Plug or cap all openings.
- ☐ Disconnect and cap or remove vent line.
- ☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
 - ☒ Label tank.
 - ☒ Dispose of tank in approved manner.
- Final tank destination: North American Resources

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached reports, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative	Signature	Date Signed

Appendix C

Certificate of Tank Disposal

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E

Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 3-7-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #HP-250

ADDRESS: Camp Lejeune, NC

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 550 gallon PRODUCT: diesel

UST MATERIAL: fiberglass

DEFUEL DATE: 2-19-96 TIME: _____

PURGE DATE: 2-19-96 TIME: _____

REMOVAL DATE: 2-19-96 TIME: _____

DATE OF DEATH (DISPOSAL): _____ 8/1/97

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISON

*Linda King Hill, Notary
Kinston, NC
My commission expires Nov. 21, 2001*

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E
Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 3-7-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #HP-250

ADDRESS: Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 550 gallon PRODUCT: diesel

UST MATERIAL: fiberglass

DEFUEL DATE: 2-19-96 TIME: _____

PURGE DATE: 2-19-96 TIME: _____

REMOVAL DATE: 2-19-96 TIME: _____

DATE OF DEATH (DISPOSAL): _____ 8/1/97

RESPECTFULLY,

Linda King Hill, Notary
Lexington, NC
My commission expires Nov. 21, 2001

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E

Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 3-7-96

CLIENT: Department of the Navy

Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #HP-250

ADDRESS: Camp Lejeune NC

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 4,000 gallon PRODUCT: diesel

UST MATERIAL: fiberglass

DEFUEL DATE: 2-19-96 TIME: _____

PURGE DATE: 2-19-96 TIME: _____

REMOVAL DATE: 2-19-96 TIME: _____

DATE OF DEATH (DISPOSAL): _____ 8/1/97

RESPECTFULLY,

*Linda King Hill, Notary
Kinston, NC
My Commission Expires Nov. 21, 2001*

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

Appendix D

Product Disposal Manifest

P & W OIL CO., INC. WASTE MATERIAL MANIFEST

Generator's US EPA ID No.:		Page 1 of 01347	
Generator's Name and Mailing Address North American Resources camp LeJune, NC Site HP250			
Generator's Phone		US EPA ID No.:	
Transporter 1 Company Name P&W Oil Co.		US EPA ID No.:	
Transporter 2 Company Name		US EPA ID No.:	
P & W OIL CO., INC. P.O. Box 656 Leland, NC 28451 (910) 371-5792		US EPA ID No.: NCD986215242	
US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	Circle Form	Containers No. Type	Total Quantity
Diesel mix	Solid Sludge <u>Liquid</u> Gas	1 T	1100
	Solid Sludge Liquid Gas		
TIME IN _____		P & W EMERGENCY (910) 791-1724	
TIME OUT _____		N.C. ENVIRONMENTAL 1-800-662-7956	
		N.C. NATURAL RESOURCES (910) 395-3900	
Vehicle License Tag Number(s):		Profile #:	
Lab:		Invoice #:	
Analysis #:		Broker:	
Special Handling Instructions, Additional Information, and Discrepancy Indication:			
North American Resources 6145 Sundust Road Chandler, AZ 85226			
GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.			
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.			
Printed/Typed Name Joe Osborne		Signature <i>Lincoln King Hill</i> Date: <i>8/1/97</i> <i>Notary</i> <i>My Commission Expires Nov. 31, 2001</i>	
Transporter #1: Acknowledgement of Receipt of Materials Printed/Typed Name John Boyer		Signature _____ Date: _____	
Transporter #2: Acknowledgement of Receipt of Materials Printed/Typed Name		Signature _____ Date: _____	
P & W OIL CO., INC. CERTIFICATION OF RECEIPT Printed/Typed Name Mark Greenleaf		Signature <i>Mark Greenleaf</i> Date: 7-31-97	

Appendix E

1. Chain-of-Custody
2. Analytical Results

GeoChem, Incorporated

Bill To:

Environmental Laboratories

**2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560**

Chain of Custody Record

Page 1 of _____

[illegible]

This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

GeoChem, Incorporated

III to: North American Resources

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Chain of Custody Record

Page 1 of _____

[illegible]

This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Mr. Ken Jordan

Site Name:

IIP250

96-0451

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Thursday, February 29, 1996

PO #

Date Received in lab:

Wednesday, February 21, 1996

GCI Project #: 9602-046

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: PT-1	Lab ID: 583	Sample Type: 1	Date Analyzed: 2/22/96	for 5030 mve 3550
Date Sampled: 2/19/96	at 11:03			
Field Number: PT-2	Lab ID: 584	Sample Type: 1	Date Analyzed: 2/22/96	for 5030 mve 3550
Date Sampled: 2/19/96	at 11:05			
Field Number: WS-3	Lab ID: 585	Sample Type: 2	Date Analyzed: 2/22/96	for 602
Date Sampled: 2/19/96	at 15:30			
Field Number: WS-3	Lab ID: 585	Sample Type: 2	Date Analyzed: 2/26/96	for 625 BN
Date Sampled: 2/19/96	at 15:30			
Field Number: WS-3	Lab ID: 585	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled: 2/19/96	at 15:30			
Field Number: WS-3	Lab ID: 585	Sample Type: 2	Date Analyzed: 2/28/96	for Pb
Date Sampled: 2/19/96	at 15:30			

Dena J. Bassett

I hereby certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560

Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Thursday, February 29, 1996

GCI Project 9602-046

Site Name: HP250

Field ID PT-1

Lab ID 583

Date Analyzed: 2/22/96

Dry Wt %: 0.94

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	5.34
TPH Diesel	BDL	5.34

Field ID PT-2

Lab ID 584

Date Analyzed: 2/22/96

Dry Wt %: 0.92

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	5.44
TPH Diesel	BDL	5.44

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Thursday, February 29, 1996

ICI Project 9602-046

Site Name: HP250

lowest detect on sample

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
625 BN				
n-Nitrosodimethylamine	BDL	50	1.	N/A
Bis(2-chloroethyl)ether	BDL	50	1.	N/A
1,3-Dichlorobenzene	BDL	10	1.	620.0
1,4-Dichlorobenzene	BDL	10	1.	75.0
1,2-Dichlorobenzene	BDL	10	1.	620.0
Bis-2-Chloroisopropylether	BDL	10	1.	N/A
Hexachloroethane	BDL	10	1.	N/A
n-Nitrosodi-n-propylamine	BDL	10	1.	N/A
Nitrobenzene	BDL	10	1.	N/A
Isophorone	BDL	10	1.	N/A
Bis-2-Chloroethoxymethane	BDL	10	1.	N/A
1,2,4-Trichlorobenzene	BDL	10	1.	N/A
Naphthalene	BDL	10	1.	21.0
Hexachlorobutadiene	BDL	10	1.	N/A
Hexachlorocyclopentadiene	BDL	10	1.	N/A
2-Chloronaphthalene	BDL	10	1.	N/A
Acenaphthylene	BDL	10	1.	210.0
Dimethylphthalate	BDL	10	1.	N/A
2,6-Dinitrotoluene	BDL	10	1.	N/A
Acenaphthene	BDL	10	1.	80.0
2,4-Dinitrotoluene	BDL	10	1.	N/A
Fluorene	BDL	10	1.	280.0
4-Chlorophenyl Phenyl Ether	BDL	10	1.	N/A
Diethylphthalate	BDL	10	1.	5,000.0
n-Nitrosodiphenylamine	BDL	10	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	10	1.	N/A
Hexachlorobenzene	BDL	10	1.	N/A
Benzidine	BDL	50	1.	N/A
Phenanthrene	BDL	10	1.	210.0
Anthracene	BDL	10	1.	2,100.0
Di-n-Butylphthalate	BDL	10	1.	700.0
Fluoranthene	BDL	10	1.	280.0
Pyrene	BDL	10	1.	210.0
Benzylbutylphthalate	BDL	20	1.	N/A
Benzo(a)anthracene	BDL	10	1.	0.1

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Thursday, February 29, 1996

GCI Project 9602-046

Site Name: HP250

lowest detect on sample

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	20	1.	N/A
Chrysene	BDL	5	1.	5.0
Bis-2-Ethylhexylphthalate	BDL	10	1.	N/A
Di-n-Octylphthalate	BDL	10	1.	140.0
Benzo(b)fluoranthene	BDL	10	1.	N/A
Benzo(k)fluoranthene	BDL	10	1.	N/A
Benzo(a)pyrene	BDL	10	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	10	1.	N/A
Dibenzo(a,h)anthracene	BDL	10	1.	N/A
Benzo(g,h,i)perylene	BDL	10	1.	N/A

End of 625 BN

End WS-3

Geochem (NC #336/SC #99008)
Project#9602-046

1

Site Name HP250

Library Search: *Ten Largest Identified Compounds*

Sample	Compound(s)	ug/L	Total Number of Compounds
0585 (WS-3)	None	—	0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Thursday, February 29, 1996

Site Name:

HP250

GCI Project # 9602-046

Conc. in
mg/l

PQL in
mg/l

Dilution
Factor

NCAC 2L
in mg/l

Field ID WS-3

Date Analyzed:

Lab ID 585

2/28/96

Pb

Lead

0.077

0.015

1.

0.015

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Thursday, February 29, 1996

GCI Project 9602-046

Site Name: HP250

Field ID WS-3

Date Analyzed:

Lab ID 585

2/22/96

602

	Conc. in ug/l	lowest detect on sample PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Benzene	20.5	2.5	5.	1.0
Toluene	3.5	2.5	5.	1,000.0
Chlorobenzene	BQL	2.5	5.	50.0
Ethylbenzene	5.5	2.5	5.	29.0
Xylenes	12.0	7.5	5.	530.0
1,3-Dichlorobenzene	BQL	2.5	5.	620.0
1,4-Dichlorobenzene	BQL	2.5	5.	75.0
1,2-Dichlorobenzene	BQL	2.5	5.	620.0

End of 602

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Site Name:

Thursday, February 29, 1996

HP250

GCI Project # 9602-046

Date Analyzed:	Dry Wt %:	Percent Recovery	Lab Blank	MDL in mg/kg
2/20/96	0.9			
	TPH Gas	96.3	0	2.43
Date Analyzed:	Dry Wt %:	Percent Recovery	Lab Blank	MDL in mg/kg
2/22/96	0.94			
	TPH Diesel	93.7	0	2.43

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Thursday, February 29, 1996

ite Name:

P250

CI Project # 9602-046

Percent
Recovery

Lab Blank:

lowest detection limit @ ideal conditions
MDL in
mg/l

Lead

98

0

0.001

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Site Name:

Thursday, February 29, 1996

HP250

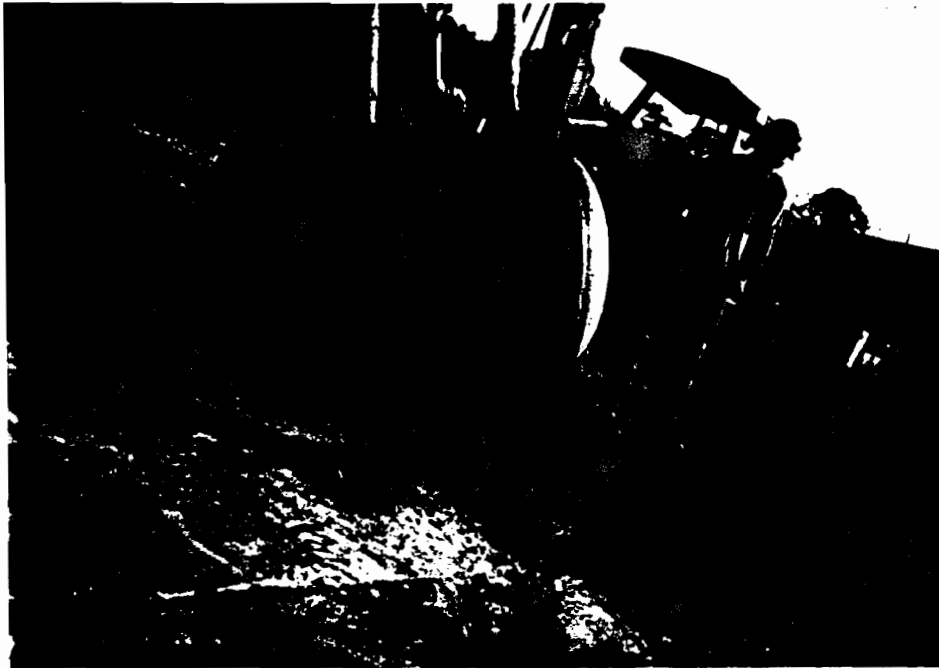
GCI Project # 9602-046

602

	Percent Recovery	Lab Blank:	lowest detection @ ideal conditions MDL in ug/l
Benzene	88	0	0.2
Toluene	89	0	0.13
Chlorobenzene	88	0	0.16
Ethylbenzene	87	0	0.2
Xylenes	89	0	0.6
1,3-Dichlorobenzene	101	0	0.34
1,4-Dichlorobenzene	88	0	0.14
1,2-Dichlorobenzene	86	0	0.06
1,4-Dichlorobenzene	84	0	2.96
n-Nitrosodi-n-propylamine	106	0	4.77
1,2,4-Trichlorobenzene	93	0	2.68
Acenaphthene	100	0	6.83
2,4-Dinitrotoluene	85	0	2.48
Pyrene	98	0	3.34

Appendix F

Photographs



550 gallon diesel tank (tank #1) removed from site HP-250.

Excavation pit of tank #1 at site HP-250.

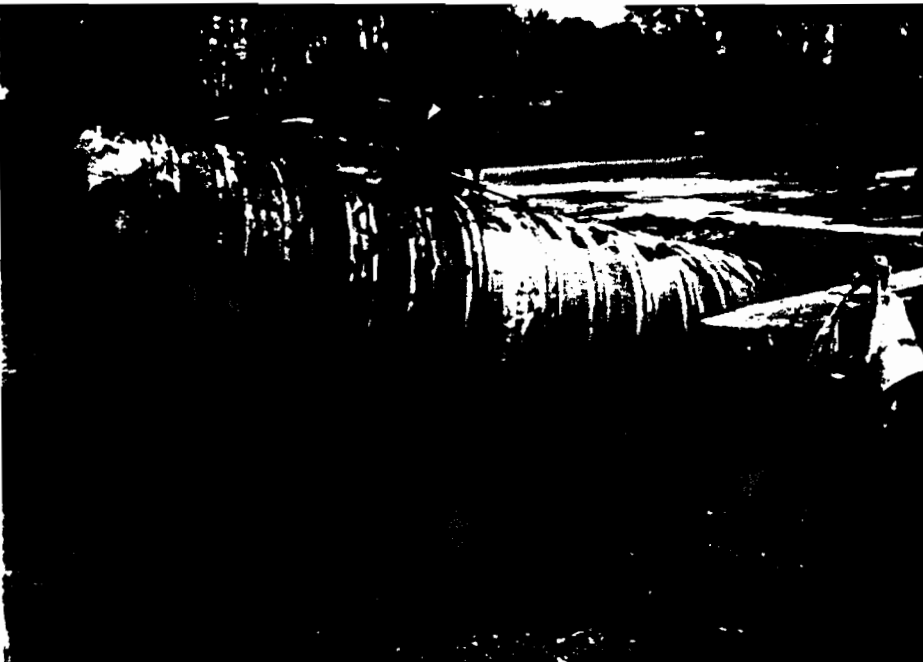




4,000 gallon diesel tank site HP-250
in the ground.



Groundwater encountered
in excavation pit.



4,000 gallon ust removed
removed from the ground.



550 gallon diesel tank (tank #2) removed from ground at site HP-250.

Excavation pit of tank #2 at site HP-250.





CLEAN-EAST
Associates, Inc.

P.O. Box 189

Kinston,

North Carolina

28501

24 Hour Phones:

(919) 939-1600

1-800-425-6097

Fax:

(919) 527-1086

24 Hour

Hazmat Response.

UST Removal

and Closure,

Site Assessment,

Soil and

Groundwater

Remediation,

Corrective Action

Systems,

Environmental

Audits.

July 30, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. 1817
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

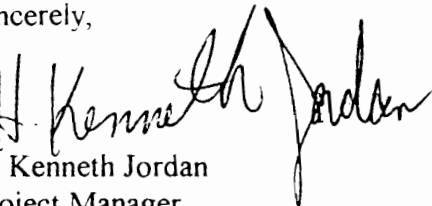
The one (1) steel 300 gallon waste oil tank was removed on January 30, 1996. The tank was in poor condition with holes noted. Organic Vapor Meter (OVM) readings indicated a release as well as visual field observations. Analytical results confirmed the release. Approximately 28.11 tons of material (nominal soil) were excavated from the tank excavation with waste oil constituents above the NC Reportable Concentration of 250 ppm. The contaminated soil was stockpiled on plastic on site. The contaminated soil should be transported for proper disposal.

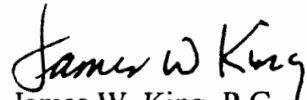
Analysis by EPA Method 8021 indicated the closure sample (PS-1) contains compounds exceeding the NC Reportable Concentrations; additional evaluation work appears warranted.

The GW/UST-2 form in Appendix B needs to be signed by Government personnel.

appreciate serving Camp Lejeune on this project. Please contact us if you
have any questions about this tank closure evaluation.

Sincerely,


Kenneth Jordan
Project Manager


James W. King, P.G.
Manager

KJ/ckw

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

045F 1817

A. Ownership of UST(s)

1. **Name of UST Owner:** United States Marine Corps.
2. **Owner address and telephone number:**
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. **Facility Name:** Bldg. 1817
2. **Facility ID#:** 0-002740
3. **Facility address, telephone number and county:** Marine Corps Base
Camp Lejeune, NC - Onslow County (919)1-5063

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. **Name, address and telephone number of closure contractor:**
North American Resources
Construction & Management
6145 West Sundust Road Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. **Name, address and telephone number of primary consultant:**
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600

4. Name, address, telephone number, and state certification number of laboratory: GeoChem, Inc.

2500 Gateway Centre, Suite 300
Morrisville, NC 27560 (919) 460-8093
State Nos. 37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1977	300	4'6" x 3'	Waste Oil	Waste Oil

E. Site Characteristics

1. Describe any past releases at this site: Unknown
2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active
3. Describe surrounding property use (for example, residential, commercial, farming, etc.) The UST is located at a warehouse on the Marine Corps Base. The surrounding area is primarily industrial.
4. Describe site geology/hydrogeology The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil survey of Onslow County, the soil beneath the subject Site is Baymeade-Urban land complex (Bmb) with slopes generally 0 to 6 percent. Infiltration is rapid and runoff is slow. The seasonal high water table is 4 to 5 feet. Soils exposed in the excavation consisted of the following:

0-6"	Grey silty SAND (SM)
6"-1'9"	Light brown silty clayey SAND (SM/SC)
9"-7'10"	Light brown silty sandy CLAY (CL)

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be in a south to southeasterly direction.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks

WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: UST Permanent Closure or Change in Service" form (GW/UST-3). Base authorities were notified. The tank was purged with forced air. Dry ice was placed in UST to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): None. The tank was empty.

C. Describe the storage, sampling and disposal of the residual material: N/A

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the backhoe. The piping had been removed prior to CEA personnel's arrival on site. The excavation dimensions were 7'6" x 10'3" x 7'10".

2. Note the depth of tank burial(s) (from land surface to top of tank):

Top of the tank, 4 feet 10 inches below ground surface.

3. Quantity of soil removed: 20.46 tons total

4. Describe soil type(s): In the tank excavation, the excavated materials consisted of silty SAND (SM).

5. Type and source of backfill used: Medium grain sand from military base designated borrow site.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

The silty sand was removed which generally had oil odor and staining. OVM would not detect heavy compounds, especially in cold weather.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic on site. A hand auger was used to excavate at least two feet into the pile at different locations for a composite sample.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Soils excavated and disposed of visually exhibited staining and petroleum odors during the initial excavation. The UST was in poor condition with holes noted. The TEI 580B Organic Vapor Meter (OVM) was calibrated

with isobutylene gas.

B. Describe soil sampling points and sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

One closure sample was taken at 1-2 feet beneath the tank. One composite sample was taken from the stockpiled silty sand that was removed from the tank excavation. The samples were analyzed for Total Petroleum Hydrocarbon content as waste oil (EPA Methods 9071 and 8021). The samples were collected with a hand auger. Drawing No. 2 shows the location of the samples.

C. Describe groundwater or surface water sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

No groundwater was encountered.

D. Quality control measures

The hand auger sampling equipment was deconned using analconox-deionized water solution followed by a deionized water rinse. This procedure was conducted before each sampling event. New surgical gloves were also used for each sampling event. The samples were properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC along with proper chain-of-custody documentation. The laboratory analytical testing generally correlated with site observations and OVM readings. The closure sample and stockpile sample were collected between 1036 and 1056 on January 24, 1996 and were delivered to the laboratory at 1655 on January 26, 1996.

E. Investigation results

Oil and Grease (EPA Method 9071) concentrations were detected at 20 ppm and 1,810 ppm in closure sample PS-1 and stockpile sample SP-1, respectively. During excavation of the tank, the excavated material exhibited staining and petroleum odor. Laboratory analysis by TPH 8021 indicated the following waste oil constituents in the closure sample (PS-1) :

Toluene	Naphthalene
Ethylbenzene	Tert-Butylbenzene
m,p-Xylene	
o-Xylene	
n-Propylbenzene	
1,3,5-Trimethylbenzene	
1,2,4-Trimethylbenzene	
sec-Butylbenzene	
p-Isopropyltoluene	
n-Butylbenzene	

Laboratory analysis by TPH 8021 indicated Benzene, Toluene, m,p-Xylene, 1,3,5 Triethylbenzene, 1,2,4 Trimethylbenzene, sec-Butylbenzene, n-Butylbenzene, Naphthalene, Tert-Butylbenzene constituents in the stockpile soil (SP-1).

A TCLP RCRA Metals Scan indicated no metals present in either sample.

IV. Conclusions and Recommendations

Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

Many of the compounds detected in the closure sample and stockpiled material by EPA Method 8021 were above NCAC 2L limits.

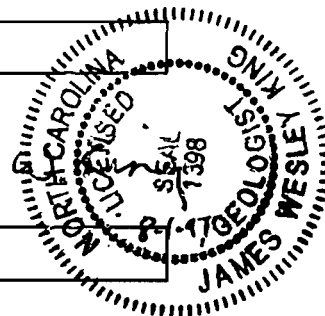
The stockpiled material exceeded the NC Action Level of 250 ppm for oil and grease.

Further evaluation and remediation work appears warranted. The contaminated soil should be transported for proper disposal.

V. Signature of Professional Engineer or Licensed Geologist



Licensed Geologist License #: 1398



VI. Enclosures

A. Drawings

Area Map (No. 1)

Site Map (No. 2)

B. Tables

Soil Analyses Results - EPA Method 8021

Soil Analyses Results - EPA 9071

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

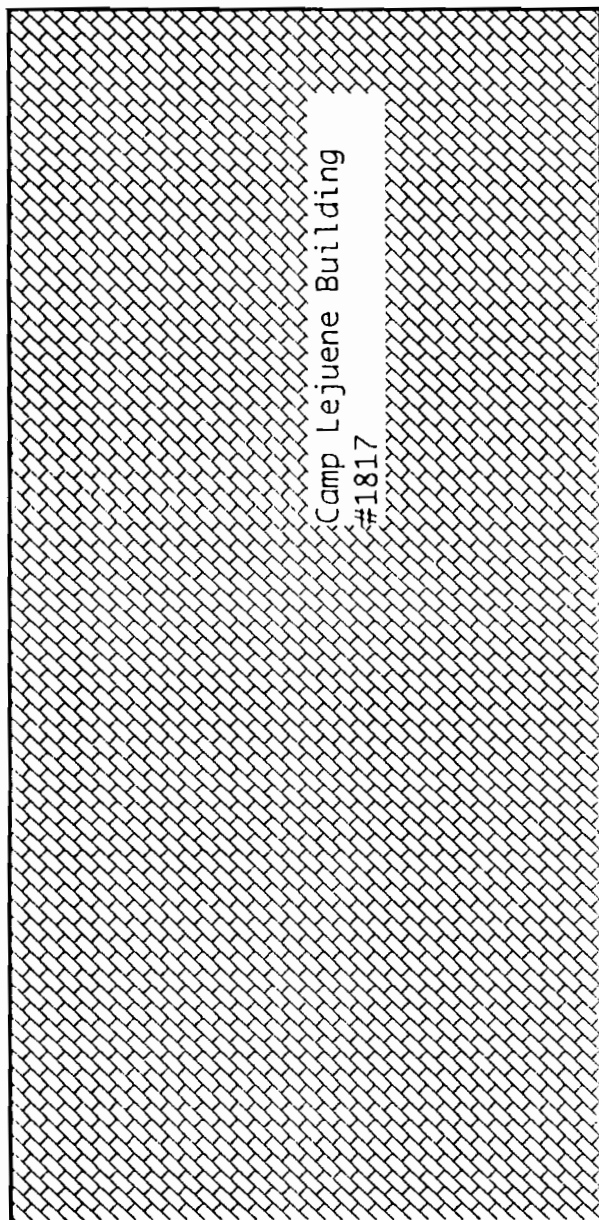
Appendix C: Certificate and Disposal Manifest of Tank

Appendix D: Sludge Disposal Manifest - N/A

Appendix E: Complete Chain-of-Custody Records and Analytical Results

Appendix F: Photographs

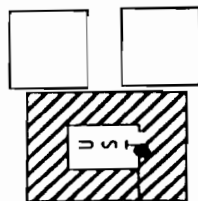
8" Sanitary Sewer



Camp Lejeune Building
#1817

Grit Pit

Oil & Water
Separator



SP-1



PS-1

Assumed
Groundwater
Flow



Drawing Label	SITE MAP			Checked by:	JWK
	Camp Lejeune Building #1817 Jacksonville, NC			Project No:	96-045F
Scale:	1" = 17'			Drawing No.	2
Date:	2-15-96				

CLEAN-EAST Associates, Inc.
P.O. Box 189
Kinston, NC 28502
Fax: (919) 523-8191
(401) 406-1145
24 Hour Phone: (919) 523-9300

Table 1
Sample Analyses Results - Soil (ppb)
EPA Method 8021

Sample	Date	Location	Depth	Compound	Concentration (ppb)	Field Screenings (OVM)	NCAC 2L
PS-1	1-24-96	Beneath UST	8'10"	Toluene	42.94	18.1 ppm	1,000
				Ethylbenzene	35.28*		29
				m,p-Xylene	186.09		530
				o-Xylene	45.89		530
				n-Propylbenzene	42.52*		.22
				1,3,5 Tri-methylbenzene	910.66*		.19
				sec-Butylbenzene	157.04*		.26
				1,2,4 Tri-methylbenzene	522.79*		.22
				p-Isopropyl-toluene	295.13*		.23
				n-Butylbenzene	412.59*		.47
				Napthalene	198.72*		15
				tert-Butylbenzene	384.39*		.23
SP-1	1-24-96	Stockpile	N/A	Benzene	26.75*		1.0
				Toluene	25.14		1,000
				m,p-Xylene	65.38		530
				1,3,5 Tri-methylbenzene	208.80*		.19
				1,2,4-Tri-methylbenzene	94.52*		.22
				sec-Butylbenzene	269.27*		.26

Table 1 Continued

Sample	Date	Location	Depth	Compound	Concentration (ppm)	Field Screenings (OVM)	NCAC 2L
				n-Butyl-benzene	81.91*		.47
				Naphthalene	102.40*		15
				tert- Butylbenzene	92.30*		.23

“ppb” denotes parts per billion

“*” denotes exceeds NCAC 2L limits

Table 2
Sample Analyses Results - Soil (ppm)
EPA Method 9071

Sample ID	Location	Depth	Date	EPA Method 9071	Field Screenings OVM
PS-1	Beneath UST	8'10"	1-24-96	20 ppm	18.0 ppm
SP-1	Stockpile	----	1-24-96	1,810 ppm*	7.3 ppm
NC Reportable Concentration (RC)				250 ppm	----

“ppm” denotes parts per million

“*” denotes exceeds NC Reportable Concentration

Appendix A

Notification of Intent to Close (GW/UST-3)

GW/UST-3

Notice of Intent: UST Permanent Closure or Change-In-Service

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Marine Corps Base
 Street Address: PSC Box 20004
 County: Onslow
 City: Camp Lejeune State: NC Zip Code: 28542
 Tele. No. (Area Code) (910) 451-3063

II. LOCATION OF TANK(S)

Facility Name or Company: Marine Corps Base
 Facility ID # (if available): not available
 Street Address or State Road: _____
 County: Onslow City: _____ Zip Code: _____
 Tele. No. (Area Code): not available

III. CONTACT PERSON

Name: Greg Fitzpatrick Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The site assessment portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

Contractor Name: Onslow Environmental Contractors
 Address: 3104 Gum Branch Rd Jacksonville State: NC Zip Code: 28540
 Contact: Ed Jones Phone: (910)-347-9010
 Primary Consultant: E2S Phone: (919) 781-7798

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment in Place	New Contents Stored
<u>1817/51821</u>	<u>150g</u>	<u>waste oil</u>	☒	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title

Jeff PIERCE, LTJG, LEC, USN

*Scheduled Removal Date: 31 Jan 96Signature: Jeff PierceDate Submitted: 18 Dec 95

If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004County: OnslowCity: Camp Lejeune State: NC Zip Code: 28542-0004Telephone Number: (910) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: Building #1817

(or Company)

Facility ID # (if available): 0-002740

Street Address _____

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542

Telephone Number: (_____) _____

(Area Code)

III. Contact Person

Name: Mr. Greg Fitzpatrick Job Title: Commanding General Tel. No.: (910) 451-5063Closure Contractor: North American Resource Address: 6145 W. Sundust Rd., Chandler, AZ 85226 Tel. No.: (520) 796-4054Primary Consultant: CEA Address: P.O. Box 189, Kinston, NC 28501 Tel. No.: (919) 939-1600Lab: GeoChem, Inc. Address: 2500 Gateway Blvd., Morrisville, NC 27560 Tel. No.: (919) 460-8093

IV. U.S.T. Information

V. Excavation Condition

VI. Additional Information Required

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	300	4' 5" x 3' 0"	Waste oil		X		X	X	

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- ☒ Contact local fire marshal.
☒ Notify DWQ Regional Office before abandonment.
☒ Drain & flush piping into tank.
☒ Remove all product and residuals from tank.
☒ Excavate down to tank.
☒ Clean and inspect tank.
☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
☒ Cap or plug all lines except the vent and fill lines.
☒ Purge tank of all product & flammable vapors.
☒ Cut one or more large holes in the tanks.
☒ Backfill the area.
 Date Tank(s) Permanently closed: 1/30/96
 Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
☐ Plug or cap all openings.
☐ Disconnect and cap or remove vent line.
☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
☒ Label tank.
☒ Dispose of tank in approved manner.
 Final tank destination: Carolina Welding & Salvage
7250 Hwy. 70E., New Bern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate & Disposal Manifest of Tank

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank
- UST -
D E A T H C E R T I F I C A T E
Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: February 21, 1996

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #1817

ADDRESS:) Street - Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: 929790

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 300 gallon PRODUCT: Waste Oil

UST MATERIAL: Steel

DEFUEL DATE: 1-23-96 TIME: _____

PURGE DATE: 1-23-96 TIME: _____

REMOVAL DATE: 1-24-96 TIME: _____

DATE OF DEATH (DISPOSAL): January 30, 1996

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISON

Appendix D

Sludge Disposal Manifest - N/A

CAROLINA WELDING & SALVAGE
7250 HWY. 70 E.
NEW BERN, N. C. 28560
919 636-3006

[illegible]

11762

REC'D BY

51330 FLUOROPOLYMER e

carbonless

Linda King Hill, Notary
Kinston, NC

8/1/97

My Commission expires Nov. 21, 2001

USTs were cut into scraps.

Appendix E

1. Chain-of-Custody
2. Analytical Results

Report To: Mr. Tolson
CEA

1

Page 1 of 1

This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC #37745, NC #336, NC #461, EPA ID #155

Client Project Manager

Mr. Ken Jordan

Site Name:

Camp LeJeune- Bldg 1817

5-045B

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Friday, February 09, 1996

PO #

Date Received in lab:

Friday, January 26, 1996

GCI Project #: 9601-052

Summary of requested analytical work

Sample type code #s :	1 = solid samples;	2 = liquid samples;	3 = Air samples;	4 = sludges/unknowns
Field Number PS-1	Lab ID 223	Sample Type: 1	Date Analyzed: 1/26/96	for 8021 soil
Date Sampled 1/24/96	at 10:56 A			
Field Number PS-1	Lab ID 223	Sample Type: 1	Date Analyzed: 1/26/96	for 9071 soil
Date Sampled 1/24/96	at 10:56 A			
Field Number PS-1	Lab ID 223	Sample Type: 2	Date Analyzed: 1/31/96	for TCLP RCRA Metals
Date Sampled 1/24/96	at 10:56 A			
Field Number SP-1	Lab ID 224	Sample Type: 1	Date Analyzed: 1/26/96	for 8021 soil
Date Sampled 1/24/96	at 10:36 A			
Field Number SP-1	Lab ID 224	Sample Type: 1	Date Analyzed: 1/26/96	for 9071 soil
Date Sampled 1/24/96	at 10:36 A			
Field Number SP-1	Lab ID 224	Sample Type: 2	Date Analyzed: 1/31/96	for TCLP RCRA Metals
Date Sampled 1/24/96	at 10:36 A			

Dena J. Barrett

Here by certify that I have Reviewed and approve this data set

GeoChem, Inc. Analytical Laboratory Bench Sheet

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Friday, February 09, 1996

601-052

soil

Date Sampled: 1/24/96

Date Analyzed: 1/26/96

Lab ID	223	GC Run	NV-F0302			Wet wt: 6.54	Dry wt: 5.53	Dry wt %: 84.6
PS-1	Field ID	Conc. in ug/kg	PQL in ug/kg	MDL in ug/l	Dilution Factor			
	Dichlorodifluoromethane	BQL	17.8	0.22	35.6			
	Chloromethane	BQL	17.8	0.16	35.6			
	Vinyl Chloride	BQL	17.8	0.14	35.6			
	Bromomethane	BQL	17.8	0.07	35.6			
	Chloroethane	BQL	17.8	0.25	35.6			
	Trichlorofluoromethane	BQL	17.8	0.33	35.6			
	1,1-Dichloroethene	BQL	17.8	0.37	35.6			
	Methylene Chloride	BQL	17.8	0.19	35.6			
	trans-1,2-Dichloroethene	BQL	17.8	0.23	35.6			
	1,1-Dichloroethane	BQL	17.8	0.33	35.6			
	2,2-Dichloropropane	BQL	17.8	0.46	35.6			
	cis-1,3-Dichloropropene	BQL	17.8	0.13	35.6			
	Chloroform	BQL	17.8	0.18	35.6			
	Bromochloromethane	BQL	17.8	0.16	35.6			
	1,1,1-Trichloroethane	BQL	17.8	0.2	35.6			
	1,1-Dichloropropene	BQL	17.8	0.28	35.6			
	Carbon Tetrachloride	BQL	17.8	0.38	35.6			
	Benzene	BQL	17.8	0.22	35.6			
	1,2-Dichloroethane	BQL	17.8	0.37	35.6			
	Trichloroethene	BQL	17.8	0.36	35.6			
	1,2-Dichloropropane	BQL	17.8	0.3	35.6			
	Bromodichloromethane	BQL	17.8	0.3	35.6			
	Dibromomethane	BQL	17.8	0.22	35.6			
	Toluene	42.944	17.8	0.2	35.6			
	1,1,2-Trichloroethane	BQL	17.8	0.18	35.6			
	Tetrachloroethene	BQL	17.8	0.19	35.6			
	1,3-Dichloropropane	BQL	17.8	0.39	35.6			
	Dibromochloromethane	BQL	17.8	0.24	35.6			
	1,2-Dibromoethane	BQL	17.8	0.28	35.6			
	Chlorobenzene	BQL	17.8	0.13	35.6			
	Ethylbenzene	35.2815	17.8	0.26	35.6			
	1,1,1,2-Tetrachloroethane	BQL	17.8	0.31	35.6			
	m,p-Xylene	186.0908	35.6	0.35	35.6			
	o-Xylene	45.8912	17.8	0.18	35.6			

9601-052

1021 soil

Date Sampled: 1/24/96

Date Analyzed: 1/26/96

Styrene	BQL	17.8	0.18	35.6
Isopropylbenzene	BQL	17.8	0.28	35.6
Bromoform	BQL	5.34	0.22	35.6
1,1,2,2-Tetrachloroethane	BQL	17.8	0.28	35.6
1,2,3-Trichloropropane	BQL	17.8	0.24	35.6
n-Propylbenzene	42.523	17.8	0.22	35.6
Bromobenzene	BQL	17.8	0.18	35.6
1,3,5-Trimethylbenzene	910.666	17.8	0.19	35.6
2-Chlorotoluene	BQL	17.8	0.2	35.6
4-Chlorotoluene	BQL	17.8	0.22	35.6
trans-1,3-Dichloropropene	BQL	17.8	0.17	35.6
1,2,4-Trimethylbenzene	552.7991	17.8	0.22	35.6
sec-Butylbenzene	157.0404	17.8	0.26	35.6
p-Isopropyltoluene	295.1349	17.8	0.23	35.6
1,3-Dichlorobenzene	BQL	17.8	0.21	35.6
1,4-Dichlorobenzene	BQL	17.8	0.23	35.6
n-Butylbenzene	412.5995	17.8	0.47	35.6
1,2-Dichlorobenzene	BQL	17.8	0.25	35.6
1,2-Dibromo-3-Chloropropa	BQL	17.8	0.16	35.6
1,2,4-Trichlorobenzene	BQL	17.8	0.17	35.6
Hexachlorobutadiene	BQL	17.8	0.17	35.6
Naphthalene	198.7214	17.8	0.15	35.6
1,2,3-Trichlorobenzene	BQL	17.8	0.12	35.6
cis-1,2-Dichloroethene	BQL	17.8	0.15	35.6
tert-Butylbenzene	384.3912	17.8	0.23	35.6

Date Sampled: 1/24/96

Date Analyzed: 1/26/96

224 GC Run NV-F0303 Wet wt: 7.49 Dry wt: 6.56 Dry wt %: 87.6

SP-1	Field ID	Conc. in ug/kg	FQL in ug/kg	MDL in ug/l	Dilution Factor
	Dichlorodifluoromethane	BQL	19.05	0.22	38.1
	Chloromethane	BQL	19.05	0.16	38.1
	Vinyl Chloride	BQL	19.05	0.14	38.1
	Bromomethane	BQL	19.05	0.07	38.1
	Chloroethane	BQL	19.05	0.25	38.1
	Trichlorofluoromethane	BQL	19.05	0.33	38.1
	1,1-Dichloroethene	BQL	19.05	0.37	38.1
	Methylene Chloride	BQL	19.05	0.19	38.1
	trans-1,2-Dichloroethene	BQL	19.05	0.23	38.1
	1,1-Dichloroethane	BQL	19.05	0.33	38.1
	2,2-Dichloropropane	BQL	19.05	0.46	38.1
	cis-1,3-Dichloropropene	BQL	19.05	0.13	38.1
	Chloroform	BQL	19.05	0.18	38.1
	Bromochloromethane	BQL	19.05	0.16	38.1
	1,1,1-Trichloroethane	BQL	19.05	0.2	38.1
	1,1-Dichloropropene	BQL	19.05	0.28	38.1
	Carbon Tetrachloride	BQL	19.05	0.38	38.1
	Benzene	26.7533	19.05	0.22	38.1
	1,2-Dichloroethane	BQL	19.05	0.37	38.1
	Trichloroethene	BQL	19.05	0.36	38.1
	1,2-Dichloropropane	BQL	19.05	0.3	38.1
	Bromodichloromethane	BQL	19.05	0.3	38.1
	Dibromomethane	BQL	19.05	0.22	38.1
	Toluene	25.1438	19.05	0.2	38.1
	1,1,2-Trichloroethane	BQL	19.05	0.18	38.1
	Tetrachloroethene	BQL	19.05	0.19	38.1
	1,3-Dichloropropane	BQL	19.05	0.39	38.1
	Dibromochloromethane	BQL	19.05	0.24	38.1
	1,2-Dibromoethane	BQL	19.05	0.28	38.1
	Chlorobenzene	BQL	19.05	0.13	38.1
	Ethylbenzene	BQL	19.05	0.26	38.1
	1,1,1,2-Tetrachloroethane	BQL	19.05	0.31	38.1
	m,p-Xylene	65.3826	38.1	0.35	38.1
	o-Xylene	BQL	19.05	0.18	38.1
	Styrene	BQL	19.05	0.18	38.1
	Isopropylbenzene	BQL	19.05	0.28	38.1
	Bromoform	BQL	5.715	0.22	38.1
	1,1,2,2-Tetrachloroethane	BQL	19.05	0.28	38.1

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Friday, February 09, 1996

Camp LeJeune- Bldg 1817

CI Project # 9601-052

	Percent Recovery	Lab Blank:	lowest detection limit @ ideal conditions MDL in mg/kg
Oil and Grease	99	0	1.57

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Friday, February 09, 1996

Camp LeJeune- Bldg 1817

lowest detection limit @ ideal conditions

GCI Project # 9601-052

**Percent
Recovery**

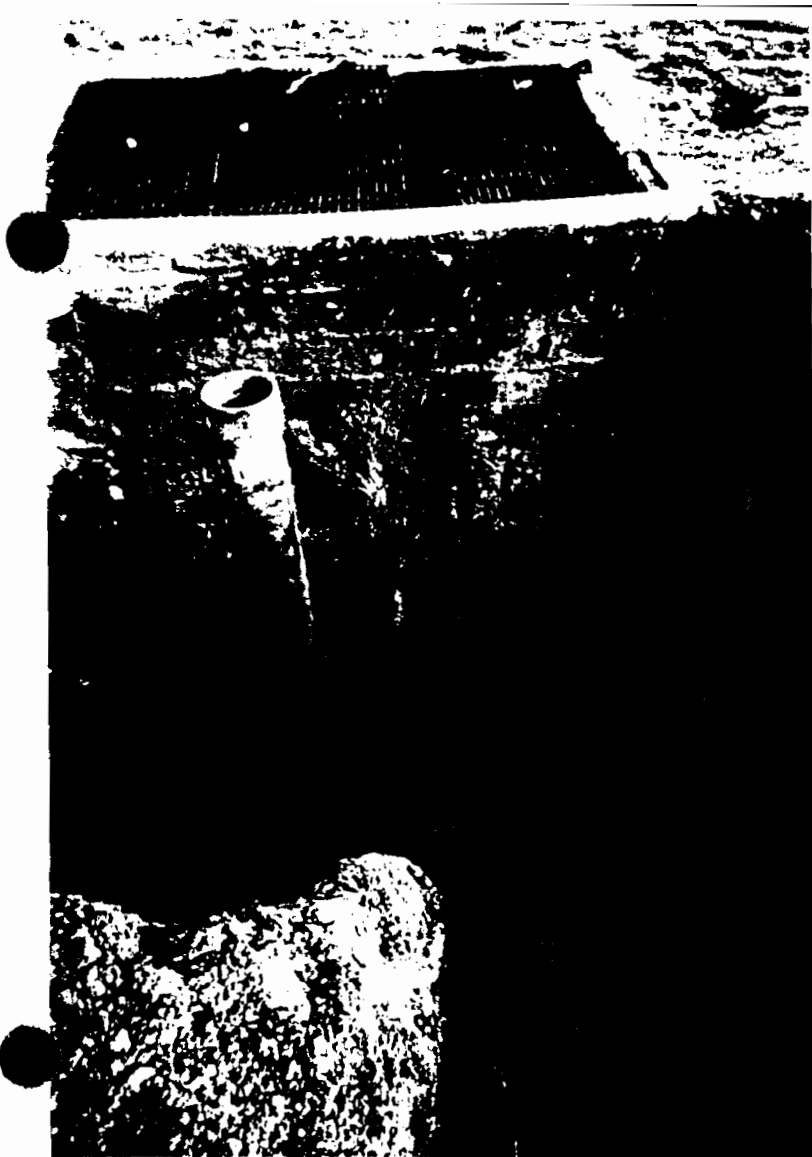
Lab Blank:

**MDL in
mg/l**

Arsenic	90	0	0.005
Barium	115	0	0.005
Cadmium	99	0	0.02
Chromium	94	0	0.0005
Lead	101	0	0.5
Mercury	80	0	0.0004
Selenium	96	0	0.005
Silver	100	0	0.05

Appendix F

Photographs



300 gallon waste oil tank
in the ground

300 gallon waste oil tank
removed from ground







CLEAN-EAST
Associates, Inc.

P.O. Box 189

Kinston,

North Carolina

28501

24 Hour Phones:

(919) 939-1600

1-800-425 6097

Fax:

(919) 527-1086

24 Hour

Hazmat Response,

UST Removal

and Closure,

Site Assessment,

Soil and

Groundwater

Remediation,

Corrective Action

Systems,

Environmental

Audits.

July 30, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. SBB-94
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

One (1) 4,000 gallon gasoline tank and one (1) 6,000 gallon gasoline tank were removed on February 6, 1996. The tanks were in good condition. Organic Vapor Meter (OVM) readings indicated no release and visual site observations indicated no product on the groundwater exposed in the excavation. Approximately 303.18 tons of material (nominal soil) were excavated from the tank pit area. The soil was put back into the excavation pit after the removal of the tanks, pending analytical results.

Groundwater was encountered in the excavation at approximately 6.0 feet below ground level. Analytical testing indicated dissolved compounds in the groundwater and included Benzene, Ethylbenzene, Toluene, Xylene, IPE, MTBE, Benzene and Lead. Because only two (2) compounds (Benzene & Lead) exceeded the Class GA Groundwater Standards, additional evaluation work may be warranted, unless otherwise directed by NCDEHNR-DWQ; contaminant concentrations are minor.

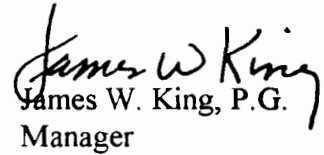
The GW/UST-2 form in Appendix B needs to be signed by Government personnel.

We appreciate serving Camp Lejeune on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,

A handwritten signature in black ink, appearing to read "H. Kenneth Jordan". The signature is fluid and cursive, with the first name "H." and last name "Jordan" clearly distinguishable.

H. Kenneth Jordan
Project Manager

A handwritten signature in black ink, appearing to read "James W. King". The signature is cursive and stylized, with the first name "James" and last name "King" clearly distinguishable.

James W. King, P.G.
Manager

HKJ/ckw

UNDERGROUND STORAGE TANK CLOSURE REPORT

report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

Information

045K - SBB-94

Ownership of UST(s)

1. Name of UST Owner: United States Marine Corps.
2. Owner address and telephone number: Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

Facility Information

1. Facility Name: Bldg. SBB-94 (Courthouse Bay)
2. Facility ID#: 0-002740
3. Facility address, telephone number and county: Marine Corps Base
Camp Lejeune-Onslow County
(919) 451-5063

Contacts

Name, address, telephone number and job title of primary contact person:

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063

Name, address and telephone number of closure contractor:

North American Resources
6145 West Sundust Road
Box 5073
Chandler, Arizona 85226 (520) 796-4054

Name, address and telephone number of primary consultant:

Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600

Name, address, telephone number, and state certification number of laboratory:

GeoChem, Inc.
2500 Gateway Centre Blvd., Suite 300
Morrisville, NC 27560 (919) 460-8093 Nos. #37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
A (1)	1960	4,000	64" x 24'	Gasoline	Gasoline
B (2)	1959	6,000	8.0' x 16'	Gasoline	Gasoline

E. Site Characteristics

1. Describe any past releases at this site: Unknown

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active

3. Describe surrounding property use (for example, residential, commercial, farming, etc.). The UST is located at a sports complex on the Marine Corps Base. The surrounding area is primarily residential.

4. Describe site geology/hydrogeology: The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject Site is Urban Land (Ur) with slopes generally 0 to 6 percent. Because of extensive urbanization, the original soils have been altered. Infiltration and runoff are rapid. Soils exposed in the excavation consisted of the following:

- 0-6" Brown silty SAND (SM)
- 6"-1'9" Light brown silty clayey SAND (SM/SC)
- 1'9"-6' Light brown silty sandy CLAY (CL)

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be in an east to southeasterly direction.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks.

WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: Closure or Change in Service" form (GW/UST-3). Base authorities were notified. Product was removed before tank closure. Dry ice was placed in USTs to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): Approximately 8200 gallons of water/gasoline was pumped from the two tanks.

C. Describe the storage, sampling and disposal of the residual material: P&W Oil Services of Leland, NC transported the 8,200 gallons of water/gasoline to their disposal facility in Leland, NC.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the trackhoe, and the top of the excavation extended laterally about 3 feet from the edge of the tanks. The dispenser, island and product lines had been removed prior to CEA personnel's arrival on site. The soils and groundwater did not appear to be contaminated based on field observations and OVM readings. The excavation dimensions were 35'4" x 29'5" x 12'5".

2. Note the depth of tank burial(s) (from land surface to top of tank): Top of the A tank, 2 feet below ground surface. Top of the B tank, 4.5 feet below ground surface.

3. Quantity of soil removed: 303.18 tons

4. Describe soil type(s): In the tank excavation, the excavated materials consisted of silty SAND (SM).

5. Type and source of backfill used: Medium grain sand from military base designated borrow site and sand from excavation.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

Soils were only excavated enough to sufficiently remove the tanks. The OVM did not detect any contaminated soil during excavation. The product lines, dispensers, and pump island, had been removed and area had been disturbed before CEA's personnel arrived on site.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic and then returned to the excavation pit due to no readings on the OVM, and no visual evidence of contamination. A stockpile sample was not collected because there was no contamination evident based on field observations and OVM readings.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Field screening of the soils excavated detected no contamination. The TEI 580B Organic Vapor Meter (OVM) was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

No soil samples were taken in the UST pit due to the fact that water was encountered at approximately 6.0' and no contamination was detected by the OVM. The dispenser, product lines, and island had been removed and the area disturbed prior to CEA's personnel arrival on site. Soil samples were not collected in this area. According to North American, the dispenser and lines were very close to tanks.

C. Describe groundwater or surface water sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

One (1) groundwater sample (WS-1) was taken at 6.0' in the UST pit with analytical testing consisting of EPA Methods 601, 602 (+ MTBE, IPE and EDB), 625 B/N and 3030C (Lead only). The groundwater sample was collected using a clean laboratory sampling jar. Drawing No. 2 shows the location of the water sample.

D. Quality control measures

New surgical gloves were used for each sampling event. The water was collected with a clean laboratory sampling jar. The sample was properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC, along with proper chain-of-custody documentation. The laboratory analytical testing generally correlated with site observations. The groundwater sample was collected at 1317 February 6, 1996, and was delivered to the laboratory at 1645 on February 7, 1996.

E. Investigation results

During excavation of the tanks and disturbed area of product delivery lines and dispensers, excavated soils were screened with no contamination detected. Groundwater was encountered in the excavation of approximately 6.0'. Dissolved compounds detected by EPA Method 602 included Benzene, Ethylbenzene, Toluene, IPE, MTBE and Total Xylenes. EPA Method detected 3030C detected Lead. Only Benzene and Lead concentrations exceeded the action levels as set by NCAC 15A 2L 0200.

IV. Conclusions and Recommendations

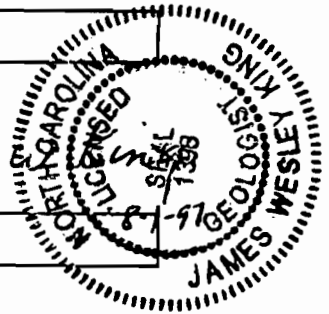
Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

Benzene and Lead exceeded the Class GA Groundwater Standards, but contamination is minor. Further evaluation and remediation work may be warranted, unless otherwise directed by NCDEHNR-DWQ.

V. Signature of Professional Engineer or Licensed Geologist

Licensed Geologist License #: 1398

James

**VI. Enclosures****A. Drawings**

Site Map (No.1)

Area Map (No. 2)

B. Tables

Soil Analyses Results

Groundwater Analyses Results

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

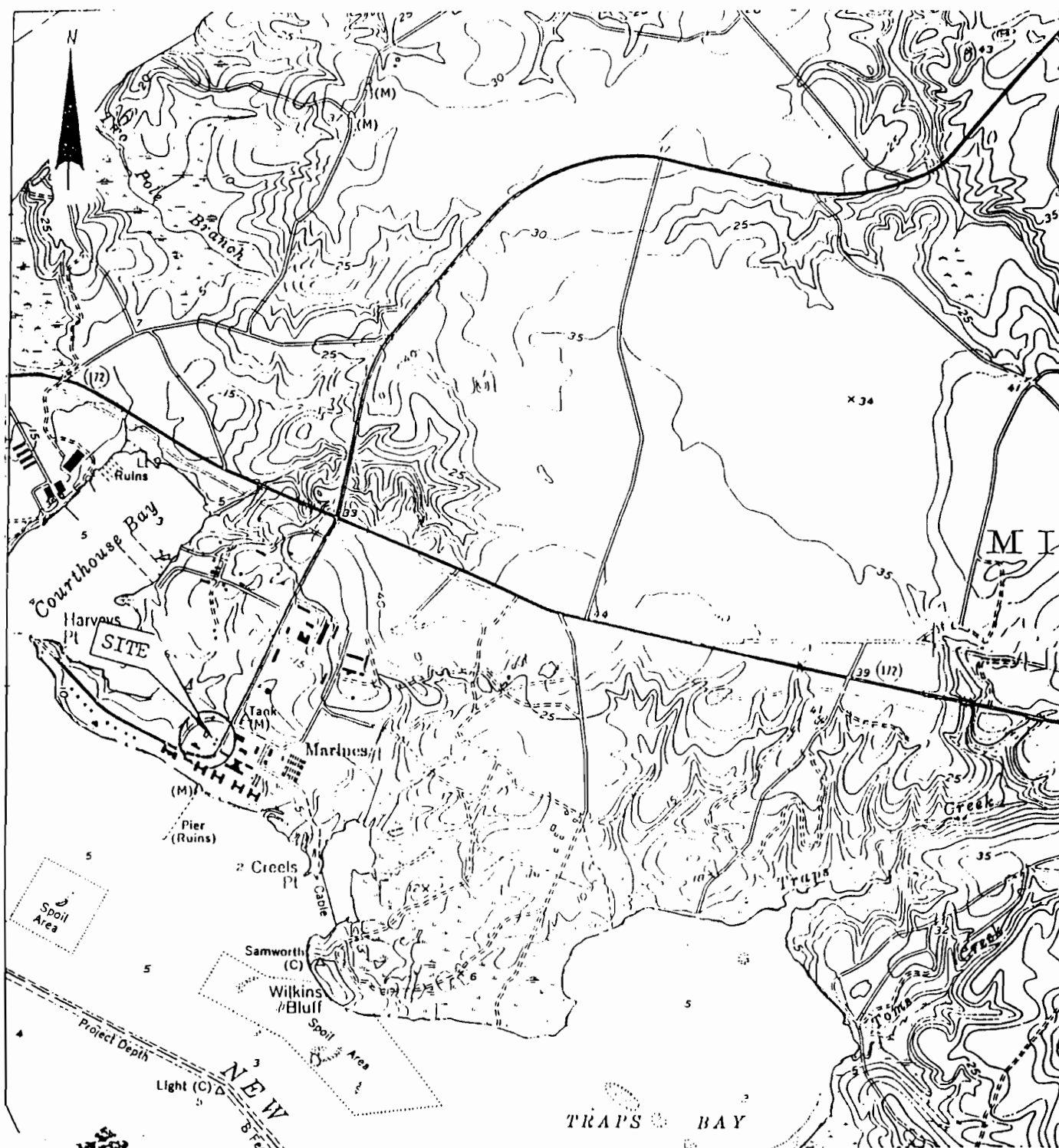
Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

Appendix C: Certificate of Tank Disposal

Appendix D: Water/Gasoline Disposal Manifest

Appendix E: Complete Chain-of-Custody and Analytical Results

Appendix F: Photographs



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-8191
1-800-819-1145
24 Hour Phone: (919) 523-9090

AREA MAP

Camp Lejeune
Building #94
Jacksonville, NC

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	DRAWING NO.
1:24000	USGS	HKJ	1971	96-045K	1

P
A
R
K
I
N
G

L
O
T

SBB-59

SBB-94

6" water line

UST B

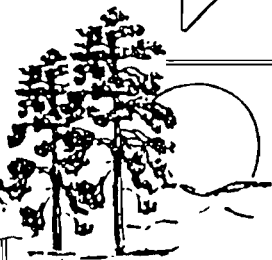
WS-1

UST A

M
I
D
D
L
E

S
T

Assumed Groundwater Flow



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-8191
1-800-849-1145
24 Hour Phone: (919) 523-9090

SITE MAP

Camp Lejeune
Building #94
Jacksonville, NC

SCALE:

1" = 30'

DRAWN BY:

HKJ

CHECKED BY:

JWK

DATE:

2-28-96

PROJECT NO.

96-045K

DRAWING NO.

2

Table 1
Sample Analyses Results-Groundwater (ppb)
EPA Method 601, 602-MTBE, IPE, EDB
Time/Date Collected: 1317/2-6-96

Sample ID	Compound	Concentration	NCAC 2L (ppb)
WS-1	Benzene	1.8*	1.0
	Toluene	3.2	1,000
	Ethylbenzene	1.3	29.0
	Xylenes	13.9	530
	MTBE	1.3	200
	IPE	1.2*	1.0
	EDB	BDL	1.0

“BDL” denotes below detection limit

“ppb” denotes parts per billion

“NA” denotes not analyzed

“*” denotes concentration in excess of 2L limits

EPA Method 3030C

Sample ID	Compound	Concentration	NCAC 2L
WS-1	Lead	23*	15

EPA Method 625 BN

Sample ID	Compound	Concentration	NCAC 2L
WS-1	None detected	N/A	N/A

Library Search: Ten Largest Identified Compounds

Sample ID	Compound	Concentration	NCAC 2L
WS-1	None detected	N/A	N/A

“BDL” denotes below detection limit

“ppb” denotes parts per billion

“NA” denotes not analyzed

“*” denotes concentration in excess of 2L limits

Appendix A

Notification of Intent to Close (GW/UST-3)

GW/UST-3

Notice of Intent: UST Permanent Closure or Change-In-Service

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Marine Corps Base
 (Corporation, Individual, Public Agency, or Other Entity)
 Street Address: PSC Box 20004
 County: Onslow
 City: Camp Lejeune State: NC Zip Code: 28542-0004
 Tele. No. (Area Code) (910) 451-5063

II. LOCATION OF TANK(S)

Facility Name or Company: Courthouse Bldg Area 588-94
 Facility ID # (if available): not available
 Street Address or State Road: _____
 County: Onslow City: _____ Zip Code: _____
 Tele. No. (Area Code): not available

III. CONTACT PERSON

Name: Greg Fitzpatrick Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

- Contact Local Fire Marshall.
- Plan the entire closure event.
- Conduct Site Soil Assessments.
- If Removing Tanks or Closing in Place refer to API Publications 1515 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used
- Underground Petroleum Storage Tanks".
- Provide a sketch locating piping, tanks and soil sampling locations.
- Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
- The site assessment portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.
- Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Onslow Environmental Contractors
 Address: 3109 Gum Branch Rd Jacksonville State: NC Zip Code: 28540
 Contact: Ed Jones Phone: (910) 347-9000
 Primary Consultant: E2S Phone: (919) 781-7798

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment in Place	New Contents Stored
<u>1</u>	<u>4000</u>	<u>gasoline</u>	☒	☐	
<u>2</u>	<u>2000</u>	<u>gasoline</u>	☒	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Name and official title: Jeff PIERCE, LTJG, CEC, USN *Scheduled Removal Date: 175 Nov 95
 Signature: Jeff Pierce Date Submitted: 18 Dec 95

If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004County: OnslowCity: Camp Lejeune State: NC Zip Code: 28542-0004Telephone Number: (910) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: Building SBB-94

(or Company)

Facility ID # (if available): 0-002740

Street Address

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542

Telephone Number: (_____) _____

(Area Code)

III. Contact Person

Name: Mr. Greg Fitzpatrick Job Title: Commanding GeneralTel. No.: (910) 451-5063Closure Contractor: North American Resource Address: 6145 W. Sundust Rd., Chandler, AZ 85226 Tel. No.: (520) 796-4054Primary Consultant: CEA Address: P.O. Box 189, Kinston, NC 28501 Tel. No.: (919) 939-1600Lab: GeoChem, Inc. Address: 2500 Gateway Blvd., Morrisville, NC 27560 Tel. No.: (919) 460-8093

IV. U.S.T. Information

V. Excavation Condition

VI. Additional Information Required

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water In Excavation		Free Product		Noticeable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
	4,000	64" x 24'	Gasoline	X			X		X
2	6,000	8' x 16'	Gasoline	X			X		X

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning in-place)

- ☒ Contact local fire marshal.
- ☒ Notify DWQ Regional Office before abandonment.
- ☒ Drain & flush piping into tank.
- ☒ Remove all product and residuals from tank.
- ☒ Excavate down to tank.
- ☒ Clean and inspect tank.
- ☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
- ☒ Cap or plug all lines except the vent and fill lines.
- ☒ Purge tank of all product & flammable vapors.
- ☒ Cut one or more large holes in the tanks.
- ☒ Backfill the area.

Date Tank(s) Permanently closed: 2/6/96

Date of Change-in-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
- ☐ Plug or cap all openings.
- ☐ Disconnect and cap or remove vent line.
- ☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
 - ☒ Label tank.
 - ☒ Dispose of tank in approved manner.
- Final tank destination: Carolina Welding & Salvage
7250 Hwy. 70 E., New Bern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate and Disposal Manifest of Tank

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E
Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 2-22-96

CLIENT: Department of the Navy

Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site SBB-94B

ADDRESS: Middle Street, Courthouse Bay-Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 4,000 gallon PRODUCT: Gasoline

UST MATERIAL: Steel

DEFUEL DATE: 1-22-96 TIME: _____

PURGE DATE: 1-22-96 TIME: _____

REMOVAL DATE: 2-6-96 TIME: _____

DATE OF DEATH (DISPOSAL): _____

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E

Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 2-22-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: site SBB-94A

ADDRESS: Middle Street, Courthouse Bay - Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 6,000 gallon PRODUCT: Gasoline

UST MATERIAL: Steel

DEFUEL DATE: 2-6-96 TIME: 0930

PURGE DATE: 2-6-96 TIME: 1030

REMOVAL DATE: 2-6-96 TIME: 1130

DATE OF DEATH (DISPOSAL): _____

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

CAROLINA WELDING & SALVAGE
7250 HWY. 70 E.
NEW BERN, N. C. 28560
919 635-3006

CUSTOMER'S ORDER NO.	DATE 2/27/1996
NAME North American Resources	
ADDRESS C.L.N.C.	

[illegible]

ALL CLAIMS AND RETURNED GOODS MUST BE ACCOMPANIED BY THIS BILL

11763

RECD BY

54330 PEEDIFORM 1.

carbonless

USTs were cut into scraps.

My Commission expires Nov. 21, 2001

Appendix D

Water/Gasoline Disposal Manifest

P & W OIL CO., INC. WASTE MATERIAL MANIFEST

FDB94	Generator's US EPA ID No.:	Page 1 of	01314
Generator's Name and Mailing Address North American Resources 6145 South Sundust Road Chandler, AZ 85226			
Generator's Phone		SBB-94	
Transporter 1 Company Name		US EPA ID No.:	
P&W Waste Oil Services, Inc. P.O. Box 656, Leland, NC 28451			
Transporter 2 Company Name		US EPA ID No.:	
P & W OIL CO., INC. P.O. Box 656 Leland, NC 28451 (910) 371-5792		US EPA ID No.: COPY NCD986215242	

US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	Circle Form	Containers No.	Type	Total Quantity	Circle Units	Waste No.
(Petroleum) Non-Hazardous Waste Water	Solid Sludge <u>Liquid</u> Gas	1	TT	8200	Pounds Cu. Yds. <u>Gallons</u> Tons	7777
	Solid Sludge Liquid Gas				Pounds Cu. Yds. Gallons Tons	

TIME IN _____	P & W EMERGENCY	(910) 791-1724
TIME OUT _____	N.C. ENVIRONMENTAL	1-800-662-7956
	N.C. NATURAL RESOURCES	(910) 395-3900

Vehicle License Tag Number(s):	Profile #:
Lab:	Invoice #:
Analysis #:	Broker:

Special Handling Instructions, Additional Information, and Discrepancy Indication:

Joe Osborne

North American Resources, 6145 South Sundust Road, Chandler, AZ 85226

GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature
	<i>Linda King Hill, Notary</i> <i>Kinston, NC</i> <i>My Commission expires Nov. 21, 2001</i>

Transporter #1: Acknowledgement of Receipt of Materials Printed/Typed Name	Signature
John Boyer	<i>John Boyer</i> Date: 2-6-96

Transporter #2: Acknowledgement of Receipt of Materials Printed/Typed Name	Signature
	<i>Mark Greenleaf</i> Date: 2-6-96

P & W OIL CO., INC. CERTIFICATION OF RECEIPT Printed/Typed Name	Signature
Mark Greenleaf	<i>Mark Greenleaf</i> Date: 2-6-96

Appendix E

1. Chain-of-Custody
2. Analytical Results

GeoChem, Incorporated

Bill To:

Environmental Laboratories

**2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560**

Chain of Custody Record

Page 1 of _____

[illegible]

This Chapter of Custody is considered a written contract to perform the services requested in the analyses section of this document.

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Mr. Ken Jordan

Site Name:

A,B Camp LeJeune
-045K

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Tuesday, February 13, 1996

PO #

Date Received in lab:

Thursday, February 08, 1996

GCI Project #: 9602-015

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: WS-1

Lab ID 433

Sample Type: 2

Date Analyzed: 2/8/96 for 601 602 MTBE IPE EDB

Date Sampled 2/6/96

at 1:17 PM

Field Number: WS-1

Lab ID 433

Sample Type: 2

Date Analyzed: 2/12/96 for 625 BN

Date Sampled 2/6/96

at 1:17 PM

Field Number: WS-1

Lab ID 433

Sample Type: 2

Date Analyzed: for Library at analysis

Date Sampled 2/6/96

at 1:17 PM

Field Number: WS-1

Lab ID 433

Sample Type: 2

Date Analyzed: 2/9/96 for Pb

Date Sampled 2/6/96

at 1:17 PM

Here by certify that I have Reviewed and approve this data set

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

ICI Project 9602-015

Site Name: 94 A,B Camp LeJeune

Field ID WS-1 Date Analyzed:
Lab ID 433 2/8/96

lowest detect on sample

Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
IPE	1.2	1.	N/A
MTBE	1.3	1.	200.0
Dichlorodifluoromethane	BDL	1.	1,400.0
Chloromethane	BDL	1.	N/A
Vinyl Chloride	BDL	1.	N/A
Bromomethane	BDL	1.	N/A
Chloroethane	BDL	1.	N/A
Trichlorofluoromethane	BDL	1.	2,100.0
1,1-Dichloroethene	BDL	1.	7.0
Methylene chloride	BDL	1.	5.0
trans-1,2-Dichloroethene	BDL	1.	N/A
1,1-Dichloroethane	BDL	1.	700.0
Chloroform	BDL	1.	0.2
1,1,1-Trichloroethane	BDL	1.	200.0
Carbon tetrachloride	BDL	1.	0.3
1,2-Dichloroethane	BDL	1.	0.4
Trichloroethene	BDL	1.	2.8
1,2-Dichloropropane	BDL	1.	0.6
Bromodichloromethane	BDL	1.	0.6
2-Chloroethylvinylether	BDL	1.	N/A
cis-1,3-Dichloropropene	BDL	1.	0.2
trans-1,3-Dichloropropene	BDL	1.	0.2
1,1,2-Trichloroethane	BDL	1.	N/A
Tetrachloroethene	BDL	1.	0.7
Dibromochloromethane	BDL	1.	N/A
Chlorobenzene	BDL	1.	50.0
Bromoform	BDL	1.	0.2
1,1,2,2-Tetrachloroethane	BDL	1.	N/A
1,3-Dichlorobenzene	BDL	1.	620.0
1,4-Dichlorobenzene	BDL	1.	75.0
1,2-Dichlorobenzene	BDL	1.	620.0
Benzene	1.8	1.	1.0
Toluene	3.2	1.	1,000.0
Chlorobenzene	BDL	1.	50.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

ICI Project 9602-015

lowest detect on sample

Site Name: 94 A,B Camp LeJeune

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Ethylbenzene	1.3	0.5	1.	29.0
Xylenes	13.9	1.5	1.	530.0
1,3-Dichlorobenzene	BDL	0.5	1.	620.0
1,4-Dichlorobenzene	BDL	0.5	1.	75.0
1,2-Dichlorobenzene	BDL	0.5	1.	620.0
EDB	BDL	1	1.	N/A

End of 601 602 MTBE IPE EDB

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

Project 9602-015

Name: 94 A,B Camp LeJeune

lowest detect on sample

625 BN

	Cone. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	50	1.	N/A
Bis(2-chloroethyl)ether	BDL	50	1.	N/A
1,3-Dichlorobenzene	BDL	10	1.	620.0
1,4-Dichlorobenzene	BDL	10	1.	75.0
1,2-Dichlorobenzene	BDL	10	1.	620.0
Bis-2-Chloroisopropylether	BDL	10	1.	N/A
Hexachloroethane	BDL	10	1.	N/A
n-Nitrosodi-n-propylamine	BDL	10	1.	N/A
Nitrobenzene	BDL	10	1.	N/A
Isophorone	BDL	10	1.	N/A
Bis-2-Chloroethoxymethane	BDL	10	1.	N/A
1,2,4-Trichlorobenzene	BDL	10	1.	N/A
Naphthalene	BDL	10	1.	21.0
Hexachlorobutadiene	BDL	10	1.	N/A
Hexachlorocyclopentadiene	BDL	10	1.	N/A
2-Chloronaphthalene	BDL	10	1.	N/A
Acenaphthylene	BDL	10	1.	210.0
Dimethylphthalate	BDL	10	1.	N/A
2,6-Dinitrotoluene	BDL	10	1.	N/A
Acenaphthene	BDL	10	1.	80.0
2,4-Dinitrotoluene	BDL	10	1.	N/A
Fluorene	BDL	10	1.	280.0
4-Chlorophenyl Phenyl Ether	BDL	10	1.	N/A
Diethylphthalate	BDL	10	1.	5,000.0
n-Nitrosodiphenylamine	BDL	10	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	10	1.	N/A
Hexachlorobenzene	BDL	10	1.	N/A
Benzidine	BDL	50	1.	N/A
Phenanthrene	BDL	10	1.	210.0
Anthracene	BDL	10	1.	2,100.0
Di-n-Butylphthalate	BDL	10	1.	700.0
Fluoranthene	BDL	10	1.	280.0
Pyrene	BDL	10	1.	210.0
Benzylbutylphthalate	BDL	20	1.	N/A
benzo(a)anthracene	BDL	10	1.	0.1

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

LeJeune		lowest detect on sample			
#	9602-015	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
VS-1	Date Analyzed:				
433	2/9/96				
	Pb				
	Lead	0.023	0.015	1.	0.015

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Name:

Tuesday, February 13, 1996

,B Camp LeJeune

Project # 9602-015

502 MTBE IPE EDB

	Percent Recovery	Lab Blank:	lowest detection @ ideal conditions MDL in ug/l
IPE	95	0	0.21
MTBE	104	0	0.29
Dichlorodifluoromethane	113	0	0.2
Vinyl Chloride	84	0	0.2
Bromomethane	87	0	0.63
Trichlorofluoromethane	84	0	0.2
1,1-Dichloroethene	88	0	0.16
Methylene chloride	84	0	0.11
trans-1,2-Dichloroethene	78	0	0.05
Chloroform	76	0	0.11
1,1,1-Trichloroethane	90	0	0.16
1,2-Dichloroethane	86	0	0.43
Trichloroethene	94	0	0.09
1,2-Dichloropropane	98	0	0.08
Bromodichloromethane	81	0	0.07
2-Chloroethylvinylether	78	0	0.2
cis-1,3-Dichloropropene	86	0	0.22
trans-1,3Dichloropropene	90	0	0.06 --
1,1,2-Trichloroethane	99	0	0.09
Dibromochloromethane	104	0	0.06
Bromoform	97	0	0.05
1,3-Dichlorobenzene	85	0	0.07
1,4-Dichlorobenzene	84	0	0.07

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

e Name:

Tuesday, February 13, 1996

A,B Camp LeJeune

Project # 9602-015

1,2-Dichlorobenzene	82	0	0.13
Benzene	89	0	0.2
Toluene	88	0	0.13
Chlorobenzene	87	0	0.16
Ethylbenzene	87	0	0.2
Xylenes	89	0	0.6
1,3-Dichlorobenzene	100	0	0.34
1,4-Dichlorobenzene	87	0	0.14
1,2-Dichlorobenzene	85	0	0.06
EDB	103	0	0.28
n-Nitrosodimethylamine		0	2.71
Bis(2-chloroethyl)ether		0	3.21
1,3-Dichlorobenzene		0	2.87
1,4-Dichlorobenzene	66	0	2.96
1,2-Dichlorobenzene		0	2.92
Bis-2-Chloroisopropylether		0	3.28
Hexachloroethane		0	2.88
n-Nitrosodi-n-propylamine	97	0	4.77
Nitrobenzene		0	2.79
Isophorone		0	2.8
Bis-2-Chloroethoxymethane		0	2.36
1,2,4-Trichlorobenzene	75	0	2.68
Naphthalene		0	3.12
Hexachlorobutadiene		0	10
Hexachlorocyclopentadiene		0	10
2-Chloronaphthalene		0	2.9

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

e Name:

Tuesday, February 13, 1996

A,B Camp LeJeune

Project # 9602-015

Acenaphthylene		0	3.41
Dimethylphthalate		0	1.26
2,6-Dinitrotoluene		0	2.28
Acenaphthene	88	0	6.83
2,4-Dinitrotoluene	84	0	2.48
Fluorene		0	2.3
4-Chlorophenyl Phenyl Ether		0	2.89
Diethylphthalate		0	2.9
n-Nitrosodiphenylamine		0	2.2
4-Bromophenyl Phenyl Ether		0	3.02
Hexachlorobenzene		0	2.94
Benzidine		0	50
Phenanthrene		0	2.88
Anthracene		0	3.19
Di-n-Butylphthalate		0	3.77
Fluoranthene		0	3.16
Pyrene	75	0	3.34
Benzylbutylphthalate		0	3.43
Benzo(a)anthracene		0	3.19
3,3'-Dichlorobenzidine		0	1.88
Chrysene		0	3.35
Bis-2-Ethylhexylphthalate		0	6.95
Di-n-Octylphthalate		0	2.96
Benzo(b)fluoranthene		0	3.13
Benzo(k)fluoranthene		0	3.13
Benzo(a)pyrene		0	3

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

CI Project 9602-015

te Name: 94 A,B Camp LeJeune

lowest detect on sample

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	20	1.	N/A
Chrysene	BDL	5	1.	5.0
Bis-2-Ethylhexylphthalate	BDL	10	1.	N/A
Di-n-Octylphthalate	BDL	10	1.	140.0
Benzo(b)fluoranthene	BDL	10	1.	N/A
Benzo(k)fluoranthene	BDL	10	1.	N/A
Benzo(a)pyrene	BDL	10	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	10	1.	N/A
Dibenzo(a,h)anthracene	BDL	10	1.	N/A
Benzo(g,h,i)perylene	BDL	10	1.	N/A

End of 625 BN

End WS-1

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Tuesday, February 13, 1996

Assay

Project # 9602-015

Percent
Recovery

Lab Blank:

lowest detection limit @ ideal conditions
MDL in
mg/l

Lead

112

0

0.001

Geochem (NC #336/SC #99008)
Project#9602-015

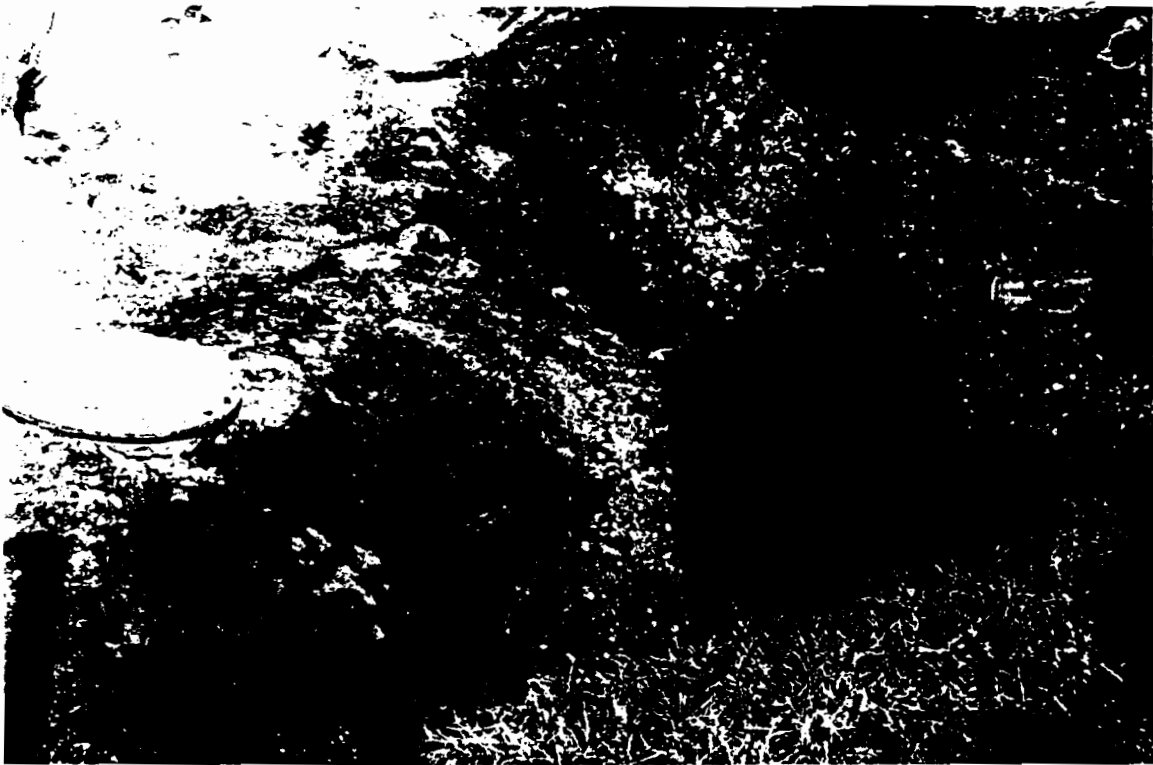
1 Site Name 94 A,B Camp LeJeune

Library Search: Ten Largest Identified Compounds

Sample	Compound(s)	ug/l	Total Number of Compounds
0433 (WS-1)	None	-	0

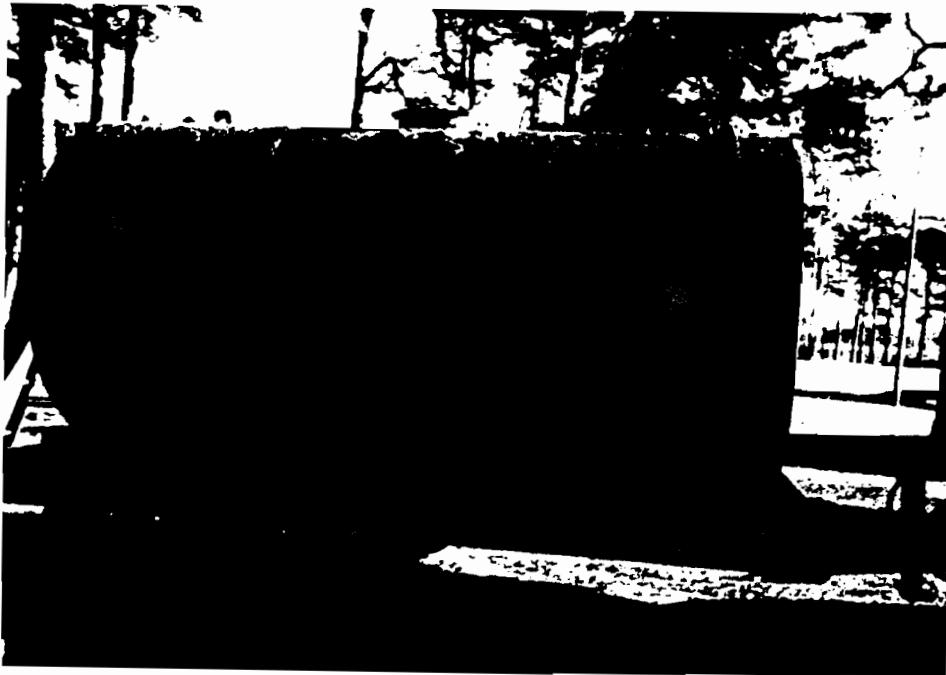
Appendix F

Photographs



UST no. 1 in the ground at site 94.

UST no. 1 removed from the ground at site 94.





UST no. 2 in the ground at site 94.

UST no. 2 removed from the ground at site 94.







CLEAN-EAST
Associates, Inc.

P.O. Box 189

Kinston,

North Carolina

28501

24 Hour Phones:

(919) 939-1600

1-800-425-6097

Fax:

(919) 527-1086

24 Hour

Hazmat Response,

UST Removal

and Closure,

Site Assessment,

Soil and

Groundwater

Remediation,

Corrective Action

Systems,

Environmental

Audits.

July 31, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. TT-60
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

The one (1) steel 10,000 gallon heating oil tank was removed on January 26, 1996. The tank was in poor condition with holes noted. Organic Vapor Meter (OVM) readings indicated a release. Approximately 347.31 tons of material (nominal soil) were excavated from the tank excavation. 87.0 tons of the 347.31 tons of material excavated had a range of Total Petroleum Hydrocarbon content as diesel of 152 parts per million (ppm) to 234 ppm. The contaminated soil was transported to Clean East Environmental Services licensed landfarm in Kinston, NC at your request.

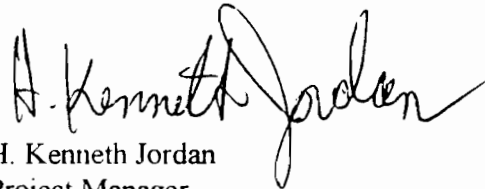
The sludge disposal manifest included in Appendix D was for this site and another site. P&W Oil Services consolidated this site and another site into one manifest.

Groundwater was encountered in the excavation at approximately 11.0 feet below ground level. Analytical testing indicated dissolved compounds in the groundwater and included Ethylbenzene, Naphthalene, Fluorene, Xylenes, Phenanthrene and Lead. These compounds (except Xylenes) exceeded the "GA" groundwater standards as set forth by NCAC 15A 2L .0202. Because several compounds exceeded the Class GA groundwater standards, additional evaluation work appears warranted.

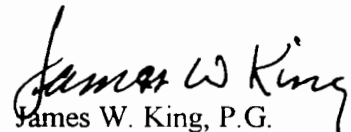
The GW/UST-3 form in Appendix B needs to be signed by Government personnel.

We appreciate serving Camp Lejeune this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,



H. Kenneth Jordan
Project Manager


James W. King, P.G.
Manager

HKJ/ckw

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

96-045Cc TT-60

A. Ownership of UST(s)

1. **Name of UST Owner:** United States Marine Corps.
2. **Owner address and telephone number:** Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. **Facility Name:** Bldg. TT-60 (Tarawa Terrace I Elementary School)
2. **Facility ID#:** 0-002740
3. **Facility address, telephone number and county:** Marine Corps Base
Camp Lejeune-Onslow County
(919) 451-5063

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. **Name, address and telephone number of closure contractor:**
North American Resources
6145 West Sundust Road
Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. **Name, address and telephone number of primary consultant:**
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600
4. **Name, address, telephone number, and state certification number of laboratory:** GeoChem, Inc.
2500 Gateway Centre Blvd., Suite 300
Morrisville, NC 27560 (919) 460-8093 Nos. #37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1967	10,000	8'0" x 26'10"	Heating oil	Heating oil

E. Site Characteristics

1. Describe any past releases at this site: Unknown

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active

3. Describe surrounding property use (for example, residential, commercial, farming, etc.). The UST is located at an elementary school on the Marine Corps Base. The surrounding area is primarily residential.

4. Describe site geology/hydrogeology: The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject Site is Bayneade-Urban land complex (Bmb) with slopes generally 0 to 6 percent. Infiltration is rapid and runoff is slow. The seasonal high water table is 4 to 5 feet. Soils exposed in the excavation consisted of the following:

0-5"	Brown silty SAND (SM)
5"-1'9"	Light brown silty clayey SAND (SM/SC)
1'9"-12'	Light brown silty sandy CLAY (CL)

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be in a east to southeast direction.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks.

WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: UST Permanent Closure or Change in Service" form (GW/UST-3). Base authorities were notified. Product was removed before tank closure. Dry ice was placed in UST to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): Approximately 325 gallons of heating oil/water was pumped from the tank.

C. Describe the storage, sampling and disposal of the residual material: P&W Oil Services of Leland, NC transported the 325 gallons of heating oil/water to their disposal facility in Leland, NC.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the trackhoe, and the top of the excavation extended laterally about 3 to 6 feet from the edge of the tank. There was no excavation beneath the tank due to groundwater being encountered at approximately 11.0 feet. The excavation dimensions measured approximately 29'9" x 21' x 11' deep. The soil excavated from 0 to 7' registered clean on the OVM. The soil from 7' to 11' was above the Reportable Concentration of 40 ppm and was excavated and stockpiled on plastic.

2. Note the depth of tank burial(s) (from land surface to top of tank): Top of the tank 2 feet below ground surface.

3. Quantity of soil removed: 347.31 tons; 87.0 tons of the 347.31 tons was contaminated.

4. Describe soil type(s): silty SAND (SM).

5. Type and source of backfill used: Medium grain sand from military base designated borrow site.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

Silty sand in the excavation pit was removed which generally exhibited OVM readings in excess of 40 ppm. Once groundwater was encountered excavation stopped.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic in accordance with DWQ guidelines and then transported to Clean East Environmental Services licensed landfarm in Kinston, NC for remediation. Composite sampling was in accordance with groundwater section guidelines. However, due to caving of the hand auger hole, hand auger into the stockpile was not possible and a shovel was used to excavate at least two feet into the pile at appropriate locations. Subsequent to this sampling, a trackhoe was used to excavate into the piles to collect samples.

III. Site investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Soils were screened with an OVM. The contaminated soil at depths ranging from 7' to 11' generally had OVM readings ranging from 37 to 79 ppm. The UST was in poor condition with holes noted in the bottom. The TEI 580B Organic Vapor Meter (OVM) was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

One composite soil sample was taken from the 87.0 tons of stockpiled silty sand that was removed from the tank excavation. Two soil samples were taken at approximately 9'6" on the south and north ends of the excavation pit. They were taken at approximately 5' laterally from where the tank had been placed underground. The two samples were to confirm/deny that all the contaminated soil had been removed.

The samples were analyzed for Total Petroleum Hydrocarbon Content as gasoline (5030) and diesel (3550). The samples were collected with the trackhoe bucket. Drawing No.2 shows the location of the samples.

C. Describe groundwater or surface water sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

One (1) groundwater sample (WS-1) was taken at 11.0' with analytical testing consisting of EPA 602, EPA 625 B/N + 10 and 3030C (lead only). The groundwater sample was collected using a clean laboratory jar dipped into the standing water. Drawing No. 2 shows the location of the water sample.

D. Quality control measures

The hand auger and shovel sampling equipment were deconned using analconox-deionized water rinse. This procedure was conducted before each sampling event. New surgical gloves were also used for each sampling event. The water was collected with a clean laboratory sampling jar. The samples were properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC, along with proper chain-of-custody documentation. The laboratory analytical testing generally correlated with site observations and OVM readings. The groundwater closure sample was collected at 1300 on January 26, 1996. The confirmation samples and stockpile sample were collected between 1309 and 1411 on January 26, 1996 and were delivered to the laboratory at 1650 on January 26, 1996.

E. Investigation results

During excavation of the tank, the excavated contaminated soils exhibited OVM readings in excess of 40 ppm. Laboratory analyses by TPH 3550 indicated diesel content of the stockpiled materials at 152 ppm. The sample taken from the south end of the excavation pit indicated diesel content below detectable limits. However, the north end sample test results

indicated diesel contents of 234 ppm (see Table 1 and Appendix E).

Groundwater was encountered in the excavation. Dissolved compounds detected by EPA Method 602 included Ethylbenzene and Total Xylenes. The Ethylbenzene concentration exceeded the action levels as set by NCAC 15A 2L. 0200. Lead (3030C) was encountered above the standards. Compounds detected by EPA 625 B/N + 10 that were above the standards were Naphthalene, Fluorene and Phenanthrene (see Table 2 and Appendix E).

IV. Conclusions and Recommendations

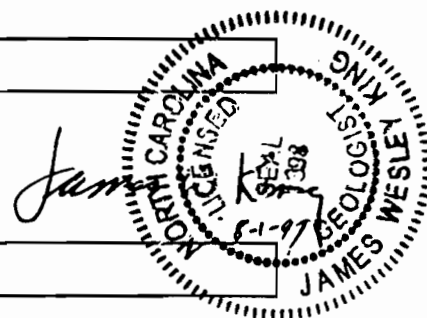
Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

The north end of the tank pit soil remains above the NC Reportable Concentration of 40 ppm. Ethylbenzene, Xylene, Lead, Naphthalene, Fluorene and Phenanthrene exceeded the Class GA Groundwater Standards. Further evaluation and remediation work appears warranted.

V. Signature of Professional Engineer or Licensed Geologist



Licensed Geologist License #: 1398



VI. Enclosures

A. Drawings

Area Map (No.1)

Site Map (No. 2)

B. Tables

Soil Analyses Results (No.1)

Groundwater Analyses Results (No.2)

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

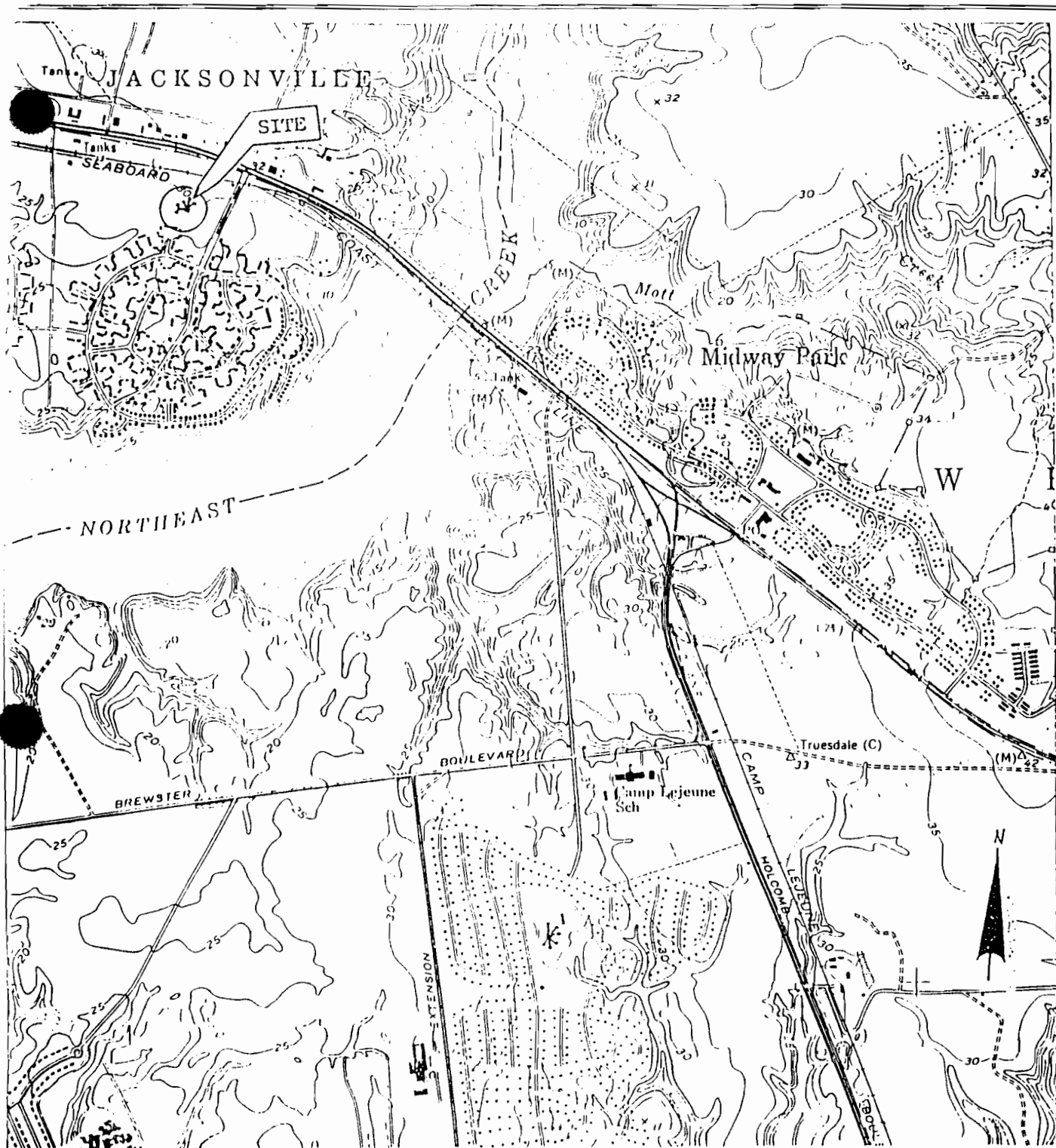
Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

Appendix C: Certificate and Disposal Manifest of UST

Appendix D: Soil and Sludge Disposal Manifests/Certificates

Appendix E: Complete Chain-of-Custody & Analytical Results

Appendix F: Photographs



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-8191
1-800-849-1145
24 Hour Phone: (919) 523-9090

AREA MAP

Tarawa Terrace II School (TT-60)
Camp Lejeune
Jacksonville, NC

SCALE:
1:24000

DRAWN BY:
USGS

CHECKED BY:
HKJ

DATE:
1971

PROJECT NO.
96-045Cc

DRAWING NO.
1

Table 1
Sample Analyses Results-Soil (ppm)

Sample ID	Location	Depth	Date	EPA Method 5030	EPA Method 3550	Field Screenings OVM
AS-2	North end of tank pit	9'6"	1-26-96	BDL	234*	79 ppm
AS-5	South end of tank pit	9'6"	1-26-96	BDL	16	14 ppm
SP-1	Stockpile	----	1-26-96	BDL	152*	60 ppm
NC Reportable Concentration (RC)				10	40	----

“ppm” denotes parts per million

“BDL” denotes below detectable limits

“*” exceeds Reportable Concentration

Table 2
Sample Analyses Results - Groundwater (ppb)
Time/Date Collected: 1300/1-26-96
Depth 11 Feet
EPA Method 602

Sample	Compound	Concentration	NCAC 2L
WS-1	Ethylbenzene	80.0*	29.0
	Total Xylenes	280.0	530

“ppb” denotes parts per billion

EPA Method 3030 (Lead)

Sample	Compound	Concentration	NCAC 2L
WS-1	Lead	741*	15

“ppb” denotes parts per billion

EPA Method 625 B/N

Sample	Compound	Concentration	NCAC 2L
WS-1	Naphthalene	6,650*	21.0
	Fluorene	3,200*	280.0
	Phenanthrene	6,275*	210.0

“ppb” denotes parts per billion

Library Search: Ten Largest Identified Compounds

Sample	Compound	Concentration	Total Number of Compounds
WS-1	Undecane	46,000	88
	Dodecane	54,000	
	Methylnaphthalene	61,000	
	Tetradecane	59,000	
	Pentadecane	55,000	
	Hexadecane	35,000	
	Heptadecane	39,000	
	Octadecane	40,000	
	Nonadecane	24,000	
	Eicosane	49,000	

“ppb” denotes parts per billion

“*” exceeds NCAC 2L limits

Appendix A

Notification of Intent to Close (GW/UST-3)

FOR
TANKS
IN

Return Completed Form To:

The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Marine Corps Base
 Street Address: PSC BOX 20004
 County: Onslow
 City: Long Grove State: NC Zip Code: 28542-0004
 Tele. No. (Area Code) (910) 451-5063

II. LOCATION OF TANK(S)

Facility Name or Company: Bldg TF60
 Facility ID # (if available): not available
 Street Address or State Road: _____
 County: Onslow City: _____ Zip Code: _____
 Tele. No. (Area Code): not available

III. CONTACT PERSON

Name: Greg Fitzpatrick Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Re-oval & Disposal of Used Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The **site assessment** portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

Contractor Name: Onslow Environmental Contractors
 Address: 3109 Gun Branch Rd Jacksonville State: NC Zip Code: 28540
 Contact: Ed Jones Phone: 910-347-9000
 Primary Consultant: ECS Phone: 919-781-7795

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment in Place	New Contents Stored
<u>1</u>	<u>10,000 g</u>	<u>diesel</u>	☒	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title: JEFF PIERCE, LTSG, CEC, USN *Scheduled Removal Date: 19 Jan 96
 Signature: Jeff Pierce Date Submitted: 19 Dec 95

Scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date.

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity

Street Address: PSC Box 20004

County: Onslow

City: C. Lejeune State: NC Zip Code: 28542-0004

Telephone Number: (910) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: TT-60

(or Company)

Facility ID # (if available): 0-002740

Street Address

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542

Telephone Number: ()

(Area Code)

III. Contact Person

Name: Mr. Greg Fitzpatrick Job Title: Commanding Office Tel. No.: (910) 451-5063

Closure Contractor: North American Resource Address: 6145 W. Sundust Rd. Chandler, NC 85226 Tel. No.: (520) 796-4054

Primary Consultant: CEA Address: P.O. Box 189 Kinston, NC 28501 Tel. No.: (919) 939-1600

Lab: GeoChem, Inc. Address: 2500 Gateway Blvd. Morrisville, NC Tel. No.: (919) 460-8093

IV. U.S.T. Information

V. Excavation Condition

VI. Additional Information Required

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	10,000	8' x 26' 10"	Heating oil	X		X		X	

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-in-place)

- ☒ Contact local fire marshal.
☒ Notify DWQ Regional Office before abandonment.
☒ Drain & flush piping into tank.
☒ Remove all product and residuals from tank.
☒ Excavate down to tank.
☒ Clean and inspect tank.
☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
☒ Cap or plug all lines except the vent and fill lines.
☒ Purge tank of all product & flammable vapors.
☒ Cut one or more large holes in the tanks.
☒ Backfill the area.

Date Tank(s) Permanently closed: 1/26/96

Date of Change-in-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
☐ Plug or cap all openings.
☐ Disconnect and cap or remove vent line.
☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
☒ Label tank.
☒ Dispose of tank in approved manner.
 Final tank destination: Carolina Welding & Salvage
 7250 Hwy. 70 E., New Bern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate & Disposal Manifest of UST

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E

Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 2-16-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site TT-60

ADDRESS: Tarawa Terrace II School-Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 10,000 gallon PRODUCT: Heating Oil

UST MATERIAL: Steel

DEFUEL DATE: 1-25-96 TIME: 1600

PURGE DATE: 1-25-96 TIME: _____

REMOVAL DATE: 1-26-96 TIME: 1200

DATE OF DEATH (DISPOSAL): January 30, 1996

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

CAROLINA WELDING & SALVAGE
7250 HWY. 70 E.
NEW BERN, N. C. 28560
919 636-3006

CUSTOMER'S ORDER NO.						DATE Jan. 30 19 96	
NAME North American Resources							
ADDRESS C.L.N.C.							
SOLD BY		CASH	COD	CHARGE	ACCT	MORE INFO	PAID OUT
QUANTITY	DESCRIPTION				PRICE	AMOUNT	
2	300 Gal Tanks #1812 / #333					No Value	
1	500 Gal Tank #SBP-293					"	
1	8000 Gal Tank #TT-#8					"	
2	10,000 Gal Tanks #TT-60 / #5400					"	
1	200 Gal Tank #118-1					No Value	
						Tax	
						Total	

11762

REC'D BY

[illegible]

субординация

Linda King Hill, Katarzyna
Kinston, NC

8/1/97

USTs were cut into scraps.

My Commission Expires: Nov. 21, 2001

Appendix D

Soil and Sludge Disposal Manifests/Certificates



CLEAN-EAST

Environmental Services

Highway 258 North • P.O. Box 189 • Kinston, NC 28502 • (919) 523-9090
24 Hour Phones: (919) 747-3250 • (919) 522-4786
Facsimile: (919) 523-8191

Certificate of Disposal

This is to certify that

87.0 tons of heating oil contaminated
soil from Site TT-60, Camp Lejeune,
Jacksonville, NC

*has been disposed of in accordance
with State and EPA regulations.*

Given this 27th day of February, 19 96.

J. D. Carls
Authorized Signature

*Linda King Hill, Notary
Kinston, NC 8/1/96*

My Commission Expires: Nov. 21, 2001



CLEAN EAST Environmental Services

1502 Greenville Hwy. • P.O. Box 189 • Kinston, North Carolina 28502
(919) 939-1600 • 24 Hour Phone 1-800-425-6097 • Facsimile: (919) 527-1086

Certificate of Remediation

This is to certify that

87.0 tons of heating oil contaminated
soil from Site TT-60, Camp Lejeune,
Jacksonville, NC

have been remediated under DEC Land Farm Permit No. SA 0700039
in accordance with EPA and State Regulations.

Given this 12th day of September, 19 1996.

J. D. Casoria
Authorized Signatory

Lincoln King, III, Notary
Kinston, NC 8/11/97
My Commission Expires: Nov. 21, 2001

P & W OIL CO., INC. WASTE MATERIAL MANIFEST

JOB# TT48 & TT60	Generator's US EPA ID No.:	Page 1 of	01306
Generator's Name and Mailing Address			
Generator's Phone			
Transporter 1 Company Name		US EPA ID No.:	
P&W Waste Oil Services, Inc. P.O. Box 656, Leland, NC 28451			
Transporter 2 Company Name		US EPA ID No.:	
P & W OIL CO., INC.		US EPA ID No.:	
P.O. Box 658 Leland, NC 28451 (910) 371-5792		NCD986215242	

US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	Circle Form	Containers No.	Type	Total Quantity	Circle Units	Waste No.
Non Hazardous Sludge	Solid Sludge	1	TT	650	Pounds	
	Liquid				Cu. Yds.	
	Gas				Gallons	
					Tons	
	Solid Sludge				Pounds	
	Liquid				Cu. Yds.	
	Gas				Gallons	
					Tons	

TIME IN _____	P & W EMERGENCY	(910) 791-1724
TIME OUT _____	N.C. ENVIRONMENTAL	1-800-662-7956
	N.C. NATURAL RESOURCES	(910) 395-3900

Vehicle License Tag Number(s):	Profile #:
Lab:	Invoice #:
Analysis #:	Broker:

Special Handling Instructions, Additional Information, and Discrepancy Indication:

CONTRACTOR - North American Resources
6145 South Sundust Road, Box 5073, Chandler, AZ 85226

GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Date:
John Boyer		1-24-96

Transporter #1: Acknowledgement of Receipt of Materials Printed/Typed Name	Signature	Date:

Transporter #2: Acknowledgement of Receipt of Materials Printed/Typed Name	Signature	Date:

P & W OIL CO., INC. CERTIFICATION OF RECEIPT Printed/Typed Name	Signature	Date:
Mark Greenleaf		1-24-96

Linda K. Rice, Notary 8/1/97
My Commission Expires: Nov. 21, 2001

Appendix E

1. Chain-of-Custody
2. Analytical Results

GeoChem, Incorporated

Environmental Laboratories

**2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560**

Chain of Custody Record

Page 1 of

[illegible]

This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

Bill To:

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Chain of Custody Record

Page 1 of 1

[illegible]

This Chain of Custody, is considered a written protocol to confirm the evidence contained in the analysis container of this document.

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Mr. Ken Jordan

Client Name:

Law Terrace I School
-045C

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Tuesday, February 13, 1996

PO #

Date Received in lab:

Tuesday, January 30, 1996

GCI Project #: 9601-061

Summary of requested analytical work

Sample type code #s :	1 = solid samples;	2 = liquid samples;	3 = Air samples;	4 = sludges/unknowns
Field Number: AS-2	Lab ID 252	Sample Type: 1	Date Analyzed: 2/1/96	for 5050 mve 3550
Date Sampled 1/26/96	at 1:43 PM			
Field Number: AS-5	Lab ID 253	Sample Type: 1	Date Analyzed: 2/1/96	for 5050 mve 3550
Date Sampled 1/26/96	at 1:09 PM			
Field Number: SP-1	Lab ID 254	Sample Type: 1	Date Analyzed: 2/1/96	for 5050 mve 3550
Date Sampled 1/26/96	at 2:11 PM			
Field Number: WS-1	Lab ID 255	Sample Type: 2	Date Analyzed: 2/4/96	for 602
Date Sampled 1/26/96	at 1:00 PM			
Field Number: WS-1	Lab ID 255	Sample Type: 2	Date Analyzed: 2/5/96	for 625 BN
Date Sampled 1/26/96	at 1:00 PM			
Field Number: WS-1	Lab ID 255	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 1/26/96	at 1:00 PM			
Field Number: WS-1	Lab ID 255	Sample Type: 2	Date Analyzed: 1/30/96	for Pb
Date Sampled 1/26/96	at 1:00 PM			

I hereby certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

Project 9601-061

Site Name: Tarawa Terrace I School

lowest detect on sample

Id ID	WS-1	Date Analyzed:	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Lab ID	255	2/4/96				
602						
	Benzene		BQL	25	50.	1.0
	Toluene		BQL	25	50.	1,000.0
	Chlorobenzene		BQL	25	50.	50.0
	Ethylbenzene		80.0	25	50.	29.0
	Xylenes		280.0	75	50.	530.0
	1,3-Dichlorobenzene		BQL	25	50.	620.0
	1,4-Dichlorobenzene		BQL	25	50.	75.0
	1,2-Dichlorobenzene		BQL	25	50.	620.0

End of 602

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Name:

Tuesday, February 13, 1996

UB

CI Project # 9601-061

15 BN

	Percent Recovery	Lab Blank:	lowest detection @ ideal conditions MDL in ug/l
1,4-Dichlorobenzene	68	0	2.96
n-Nitrosodi-n-propylamine	90	0	4.77
1,2,4-Trichlorobenzene	74	0	2.68
Acenaphthene	82	0	6.83
2,4-Dinitrotoluene	77	0	2.48
Pyrene	86	0	3.34

	Percent Recovery	Lab Blank:	lowest detection @ ideal conditions MDL in ug/l
Benzene	86	0	0.2
Toluene	92	0	0.13
Chlorobenzene	86	0	0.16
Ethylbenzene	87	0	0.2
Xylenes	89	0	0.6
1,3-Dichlorobenzene	101	0	0.34
1,4-Dichlorobenzene	88	0	0.14
1,2-Dichlorobenzene	84	0	0.06

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

Project 9601-061

lowest detect on sample

Site Name: Tarawa Terrace I School

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BQL	12500	250.	N/A
Bis(2-chloroethyl)ether	BQL	12500	250.	N/A
1,3-Dichlorobenzene	BQL	2500	250.	620.0
1,4-Dichlorobenzene	BQL	2500	250.	75.0
1,2-Dichlorobenzene	BQL	2500	250.	620.0
Bis-2-Chloroisopropylether	BQL	2500	250.	N/A
Hexachloroethane	BQL	2500	250.	N/A
n-Nitrosodi-n-propylamine	BQL	2500	250.	N/A
Nitrobenzene	BQL	2500	250.	N/A
Isophorone	BQL	2500	250.	N/A
Bis-2-Chloroethoxymethane	BQL	2500	250.	N/A
1,2,4-Trichlorobenzene	BQL	2500	250.	N/A
Naphthalene	6,650.0	2500	250.	21.0
Hexachlorobutadiene	BQL	2500	250.	N/A
Hexachlorocyclopentadiene	BQL	2500	250.	N/A
2-Chloronaphthalene	BQL	2500	250.	N/A
Acenaphthylene	BQL	2500	250.	210.0
Dimethylphthalate	BQL	2500	250.	N/A
2,6-Dinitrotoluene	BQL	2500	250.	N/A
Acenaphthene	BQL	2500	250.	80.0
2,4-Dinitrotoluene	BQL	2500	250.	N/A
Fluorene	3,200.0	2500	250.	280.0
4-Chlorophenyl Phenyl Ether	BQL	2500	250.	N/A
Diethylphthalate	BQL	2500	250.	5,000.0
n-Nitrosodiphenylamine	BQL	2500	250.	N/A
4-Bromophenyl Phenyl Ether	BQL	2500	250.	N/A
Hexachlorobenzene	BQL	2500	250.	N/A
Benzidine	BQL	12500	250.	N/A
Phenanthrene	6,275.0	2500	250.	210.0
Anthracene	BQL	2500	250.	2,100.0
Di-n-Butylphthalate	BQL	2500	250.	700.0
Fluoranthene	BQL	2500	250.	280.0
Pyrene	BQL	2500	250.	210.0
Benzylbutylphthalate	BQL	5000	250.	N/A
Benzo(a)anthracene	BQL	2500	250.	0.1

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

Project 9601-061

lowest detect on sample

Site Name: Tarawa Terrace I School

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BQL	5000	250.	N/A
Chrysene	BQL	1250	250.	5.0
Bis-2-Ethylhexylphthalate	BQL	2500	250.	N/A
Di-n-Octylphthalate	BQL	2500	250.	140.0
Benzo(b)fluoranthene	BQL	2500	250.	N/A
Benzo(k)fluoranthene	BQL	2500	250.	N/A
Benzo(a)pyrene	BQL	2500	250.	N/A
Indeno(1,2,3-cd)pyrene	BQL	2500	250.	N/A
Dibenzo(a,h)anthracene	BQL	2500	250.	N/A
Benzo(g,h,i)perylene	BQL	2500	250.	N/A

End of 625 BN

End WS-1

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

ite Name:

Tuesday, February 13, 1996

ant #18

lowest detection limit @ ideal conditions

CI Project # 9601-061

Percent
Recovery

Lab Blank:

MDL in
mg/l

Lead

96

0

0.001

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

Site Name:

Marawa Terrace I School

CI Project # 9601-061

Field ID WS-1

Lab ID 255

Date Analyzed:

1/30/96

Pb

Lead

Conc. in
mg/l

0.741

lowest detect on sample

PQL in
mg/l

0.15

Dilution
Factor

10.

NCAC 2L
in mg/l

0.015

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Tuesday, February 13, 1996

iCI Project 9601-061

Site Name: Tarawa Terrace I School

Field ID AS-2

Date Analyzed: 2/1/96

Dry Wt %: 0.79

Lab ID 252

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	6.3
TPH Diesel	234	6.3

Field ID AS-5

Date Analyzed: 2/1/96

Dry Wt %: 0.79

Lab ID 253

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	6.31
TPH Diesel	16	6.31

Field ID SP-1

Date Analyzed: 2/1/96

Dry Wt %: 0.83

Lab ID 254

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	6.02
TPH Diesel	152	6.02

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Tuesday, February 13, 1996

Lawrence Terrace I School

CI Project # 9601-061

Date Analyzed: 2/3/96	Dry Wt %: 0.91	Percent Recovery	Lab Blank	MDL in mg/kg
	TPH Gas	102.	0	2.43

Date Analyzed: 2/4/96	Dry Wt %: 0.85	Percent Recovery	Lab Blank	MDL in mg/kg
	TPH Diesel	96.4	0	2.43

Geochem (NC #336/SC #99008)
Project#9601-061

1

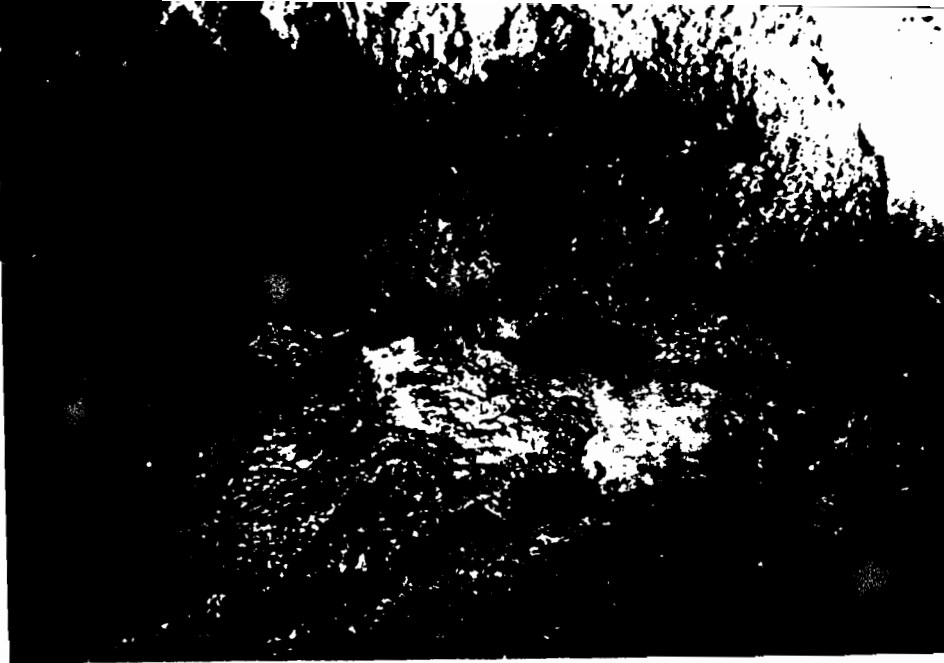
Site Name Tarawa Terrace I

Library Search: Ten Largest Identified Compounds

Sample	Compound(s)	ug/l	Total Number of Compounds
0255 (WS-1)	Undecane	46,000	88
	Dodecane	54,000	
	Methylnaphthalene	61,000	
	Tetradecane	59,000	
	Pentadecane	55,000	
	Hexadecane	35,000	
	Heptadecane	39,000	
	Octadecane	40,000	
	Nonadecane	24,000	
	Eicosane	49,000	

Appendix F

Photographs

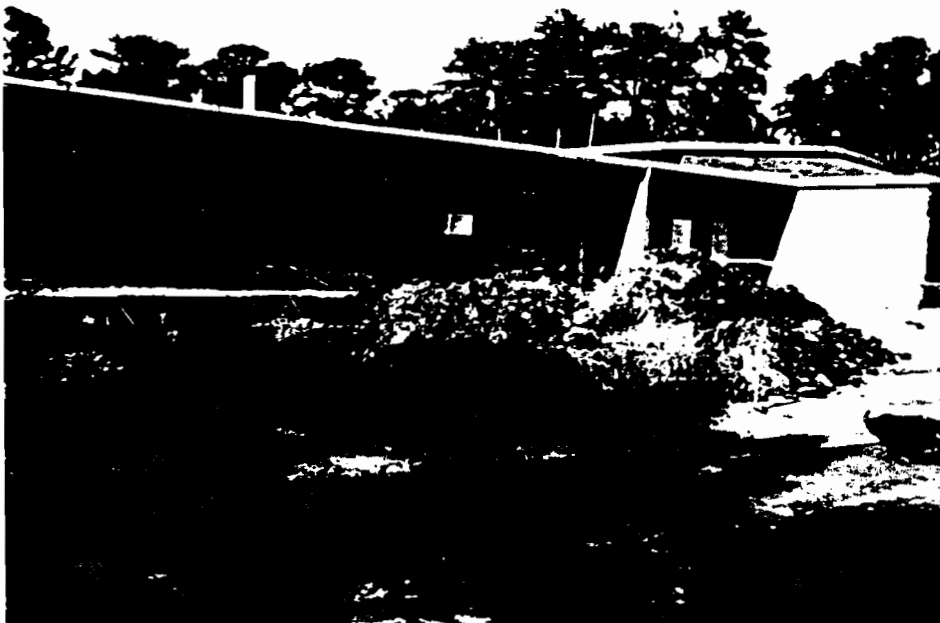


Free product encountered
in groundwater

Contaminated soil
stockpile



Excavation pit with
clean backfill



UST excavation area

10,000 gallon UST
removed from ground



Excavation pit



CLEAN-EAST
Associates, Inc.

P.O. Box 189
Kinston,
North Carolina
28501
24 Hour Phones:
(919) 939-1600
1-800-425-6097

Fax:
(919) 527-1086

24 Hour
Hazmat Response,
UST Removal
and Closure,
Site Assessment,
Soil and
Groundwater
Remediation,
Corrective Action
Systems,
Environmental
Audits.

July 31, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. ~~572-2~~ 575-2
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

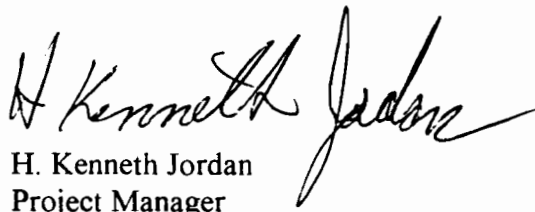
The one (1) fiberglass 6,000 gallon diesel tank was removed on January 27, 1996. The tank was in good condition. Organic Vapor Meter (OVM) readings indicated a release. Approximately 101.09 tons of material (pea gravel) were excavated from the tank excavation with a Total Petroleum Hydrocarbon content as diesel of 398 parts per million (ppm) which is above the NC Reportable Concentration of 40 ppm for diesel. The contaminated soil was sent to Clean East Environmental Services licensed landfarm in Kinston, NC. North American Resources disposed of the tank, but provided CEA with only a UST Death Certificate. CEA never received a disposal manifest for the tank.

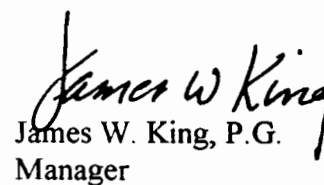
Groundwater was encountered at approximately 11'8". Laboratory analysis of the groundwater detected Benzene, Naphthalene, Fluorene, and Phenanthrene. These compounds exceeded the "GA" groundwater standards as set forth by NCAC 15A 2L. Additional evaluation work appears warranted.

The GW/UST-2 form in Appendix B needs to be signed by Government personnel.

We appreciate serving Camp Lejeune on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,


H. Kenneth Jordan
Project Manager


James W. King, P.G.
Manager

HKJ/ckw

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

045J 575-2

A. Ownership of UST(s)

1. **Name of UST Owner:** United States Marine Corps.
2. **Owner address and telephone number:**
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. **Facility Name:** Bldg. 575-2
2. **Facility ID#:** 0-002740
3. **Facility address, telephone number and county:** Marine Corps Base
Camp Lejeune, NC - Onslow County

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. **Name, address and telephone number of closure contractor:**
North American Resources
Construction & Management
6145 West Sundust Road Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. **Name, address and telephone number of primary consultant:**
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600

4. Name, address, telephone number, and state certification number of laboratory: GeoChem, Inc.

2500 Gateway Centre, Suite 300
Morrisville, NC 27560 (919) 460-8093
State Nos. 37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1987	6,000	7'3" X 18'5"	Diesel	Diesel

E. Site Characteristics

- 1. Describe any past releases at this site:** Unknown
- 2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation:** Active
- 3. Describe surrounding property use (for example, residential, commercial, farming, etc.)** The UST is located at a vehicle maintenance facility on the Marine Corps Base. The surrounding area is primarily used for vehicle storage.
- 4. Describe site geology/hydrogeology** The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject site is Baymeade-Urban land complex (Bmb) with slopes generally 0 to 6 percent. Infiltration is rapid and runoff is slow. The seasonal high water table is 4 to 5 feet. Soils exposed in the excavation consisted of the following:
0-11' pea gravel

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be generally to the south.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks

WiRO of the NCDEHNR-DWQ was notified via "Notice of Intent: UST Permanent Closure or Change in Service" form (GW/UST-3). Base authorities were notified. Product was removed before tank closure. Dry ice was placed in UST to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): Approximately 2,000 gallons of diesel was pumped from the tank.

C. Describe the storage, sampling and disposal of the residual material: P&W Oil Services of Leland, NC transported the 2,000 gallons of diesel to their disposal facility in Leland, NC.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the trackhoe. The pea gravel excavated had petroleum odor and staining. The pea gravel caved with every bucket removal during excavation. The product lines had been removed prior to CEA's personnel arrival on site. The dispenser island was undercut during excavation. Excavation dimensions measured 12'10" x 23' x 11' deep.

2. Note the depth of tank burial(s) (from land surface to top of tank):

Top of the tank, 5 feet below ground surface.

3. Quantity of soil removed: 101.09 tons total; 44.83 of the 101.09 tons was contaminated with diesel.

4. Describe soil type(s): Excavated materials in the tank excavation consisted of pea gravel.

5. Type and source of backfill used: Clean pea gravel was scheduled to be put into the excavation area after a new tank was installed according to North American Resources.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

Contaminated pea gravel which generally exhibited over 40 ppm on the OVM was excavated until it was no longer safe to continue.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic and then transported to Clean East Environmental Services licensed Landfarm facility in Kinston, NC. A shovel was used to excavate at least 1-2 feet into the stockpile at various locations for a composite stockpile sample.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Pea gravel excavated and disposed of had generally in excess of 40 ppm during the excavation. The pea gravel was stained with petroleum and had a petroleum odor. The TEI 580B Organic Vapor Meter (OVM) was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

Due to caving of the pea gravel during UST removal, the dispenser island was undercut so no samples could be collected from this location. The product lines had been removed prior to CEA personnel arrival on site so no line samples could be collected. One composite sample was taken from the stockpiled pea gravel that was removed from the tank excavation.

The sample was analyzed for Total Petroleum Hydrocarbon content as gasoline (5030) and diesel (3550). The sample was collected with a shovel. Drawing No. 2 shows the location of the sample.

C. Describe groundwater or surface water sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

A groundwater sample was collected using a clean laboratory sampling jar. The water sample was tested using EPA Methods 602, 625 B/N and Total Lead 3030C.

D. Quality control measures

The shovel sampling equipment was deconned using analconox-deionized water solution followed by a deionized water rinse. This procedure was conducted before each sampling event. New surgical gloves were also used for each sampling event. The samples were properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC along with proper chain-of-custody documentation. The laboratory analytical testing generally correlated with site observations and OVM readings. The stockpile sample was collected at 1722 on February 24, 1996. The water sample was collected at 1700 on February 24, 1996. The water and stockpile samples were delivered to the laboratory at 1655 on February 26, 1996.

E. Investigation results

During excavation of the tank, the excavated material exhibited OVM readings in excess of 40 ppm. Laboratory analyses by TPH 3550 indicated diesel content of the stockpiled material at 358 ppm.

Laboratory analysis by EPA 602 detected Benzene, Toluene, Ethylbenzene, Xylenes, and MTBE in sample WS-1. Lab analysis by 625 B/N detected Naphthalene,

Fluorene, Phenanthrene and Pyrene. The Library Search identified 53 compounds and can be found in Table No. 2. Benzene, Ethylbenzene, Naphthalene, Fluorene and Phenanthrene were all detected in excess of North Carolina action levels.

IV. Conclusions and Recommendations

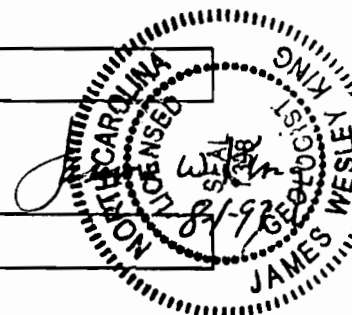
Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

The probable source of contamination is from product lines and their joints. The UST was in good condition. The stockpiled soil sample exceeded the NC Reportable Concentration of 40 ppm for diesel. Benzene, Ethylbenzene, Naphthalene, Fluorene and Phenanthrene are above NCAC 15A 2L Groundwater Standards in the water sample taken from the tank pit. Further evaluation and remediation work appears warranted.

V. Signature of Professional Engineer or Licensed Geologist



Licensed Geologist License #: 1398



VI. Enclosures

A. Drawings

Area Map (No. 1)

Site Map (No. 2)

B. Tables

Soil Analyses Results

Groundwater Analyses Results

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

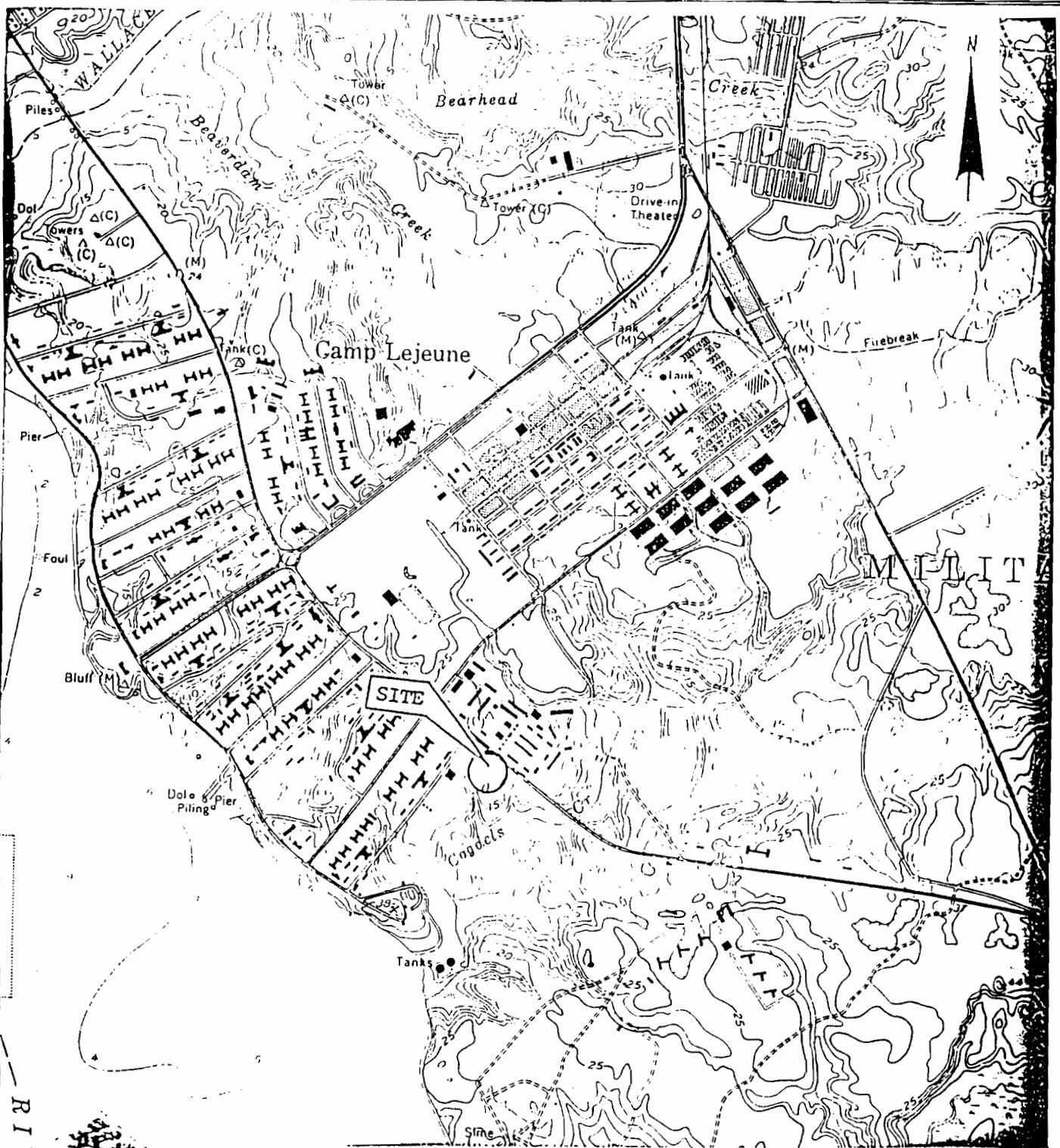
Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

Appendix C: Certificate of Tank Disposal

Appendix D: Soil and Product Certificates and Disposal Manifest

Appendix E: Complete Chain-of-Custody Records and Analytical Results

Appendix F: Photographs



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-8191
1-800-849-1145
24 Hour Phone: (919) 523-9090

SITE MAP

Camp Lejeune
Building #575-2
Jacksonville, NC

SCALE:
1:24000

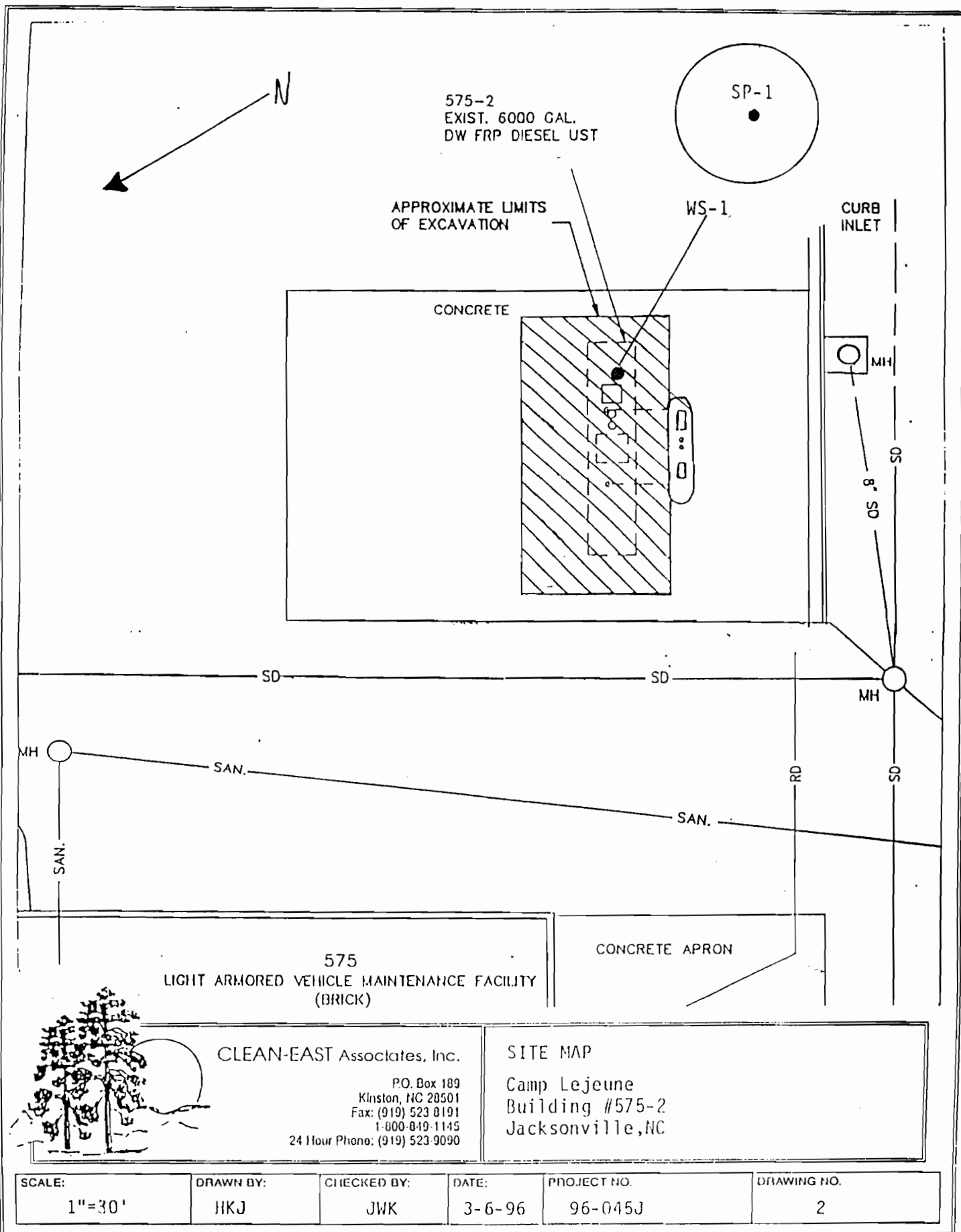
DRAWN BY:
USGS

CHECKED BY:
HKJ

DATE:
1971

PROJECT NO.
96-045J

DRAWING NO.
1



CLEAN-EAST Associates, Inc.

P.O. Box 189
Kinston, NC 28501
Fax: (919) 523-8191
1-800-819-1145
24 Hour Phone: (919) 523-9090

SITE MAP

Camp Lejeune
Building #575-2
Jacksonville, NC

SCALE:

1"=30'

DRAWN BY:

HKJ

CHECKED BY:

JWK

DATE:

3-6-96

PROJECT NO.

96-045J

DRAWING NO.

2

Table 1
Sample Analyses Results - Soil (ppm)

Sample ID	Location	Depth	Date	EPA Method 5030	EPA Method 3550	Field Screenings OVM
STP-1	Stockpile	----	2-24-96	BDL	358*	198 ppm
NC Reportable Concentration (RC)				10	40	----

“ppm” denotes parts per million

“*” exceeds NC Reportable Concentration

Table 2
Groundwater Sample Analyses Results-Groundwater (ppb)
EPA Method 602
Time/Date Collected: 1700 2-24-96

Sample ID	Depth	Compound	Concentration	NCAC 2L
WS-1	11.0'	Benzene	14.0*	1.0
		Toluene	49.6	1000
		Ethylbenzene	32.9*	29
		Xylenes	203.0	530
		MTBE	15.8	200

"ppb" denotes parts per billion
 "**" exceeds NCAC 2L limits

EPA Method 625 B/N

Sample ID	Depth	Compound	Concentration	NCAC 2L
WS-1	11.0'	Naphthalene	1000*	21
		Fluorene	333.0*	280
		Phenanthrene	624.0*	210
		Pyrene	123.0	210

Library Search: Ten Largest Identified Compounds

Sample	Compound	ug/l	Total Number of Compounds
WS-1	Dodecane	4100	53
	Methylnaphthalene	5800	
	Tetradecane	6500	
	Pentadecane	6600	
	Hexadecane	6300	
	Heptadecane	7700	
	Octadecane	5800	
	Nonadecane	3500	
	Eicosane	3100	
	Heneicosane	1900	

"ppb" denotes parts per billion
 "**" exceeds NCAC 2L limits

Appendix A

Notification of Intent to Close (GW/UST-3)

GW/UST-3

Notice of Intent: UST Permanent Closure or Change-In-Service

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DEM Regional Office according to the county of the facility's location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

Tank Owner Name: Marme Corp's Bagge
 (Corporation, Individual, Public Agency, or Other Entity)
 Street Address: PO Box 20004
 County: Dash
 City: Camp Lejeune State: NC Zip Code: 28542-0004
 Tele. No. (Area Code): (910) 451-5063

II. LOCATION OF TANK(S)

Facility Name or Company: M/dg, 575-6
 Facility ID # (if available): not available
 Street Address or State Road: _____
 County: Dash City: _____ Zip Code: _____
 Tele. No. (Area Code): not available

III. CONTACT PERSON

Name: Greg Fitzgerald Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The site assessment portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Dash Environmental Contractors
 Address: 3109 Gum Branch Rd State: NC Zip Code: 28540
 Contact: Ed Jones Phone: 910-347-9010
 Primary Consultant: E2S Phone: 919-781-7798

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment In Place	New Contents Stored
<u>2</u>	<u>6000g</u>	<u>diesel</u>	☒	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title

JEFF PIERCE LTJG, CEC, USN*Scheduled Removal Date: 22 Jan 96Signature: Jeff PierceDate Submitted: 18 Dec 95

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

GW/UST-2

Site Investigation Report For Permanent Closure or Change-in-Service of U.S.T.

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004County: OnslowCity: Camp Lejeune State: NC Zip Code: 28542-0004Telephone Number: (919) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: Building # 575-2

(or Company)

Facility ID # (if available): 0-002740

Street Address

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542

Telephone Number: ()

(Area Code)

III. Contact Person

Name: Mr. Greg FitzpatrickJob Title: Commanding GeneralTel. No.: (919) 451-5063Closure Contractor: North Amercian Resource Address: 6145W. Sundust Rd., Chandler, AZ 85226 Tel. No.: (520) 796-4054Primary Consultant: CEAAddress: P.O. Box 189, Kinston, NC 28501Tel. No.: (919) 939-1600Lab: GeoChem, Inc.Address: 2500 Gateway Blvd., Morrisville, NC 27560 Tel. No.: (919) 460-8093

IV. U.S.T. Information

V. Excavation Condition

VI. Additional Information Required

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	6,000	17'3"x 18'5"	Diesel	X		X		X	

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-In-place)

- ☒ Contact local fire marshal.
☒ Notify DWQ Regional Office before abandonment.
☒ Drain & flush piping into tank.
☒ Remove all product and residuals from tank.
☒ Excavate down to tank.
☒ Clean and inspect tank.
☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
☒ Cap or plug all lines except the vent and fill lines.
☒ Purge tank of all product & flammable vapors.
☒ Cut one or more large holes in the tanks.
☒ Backfill the area.
 Date Tank(s) Permanently closed: 1/27/96
 Date of Change-in-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
☐ Plug or cap all openings.
☐ Disconnect and cap or remove vent line.
☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
☒ Label tank.
☒ Dispose of tank in approved manner.
 Final tank destination: Carolina Welding & Salvage
7250 Hwy. 70E., New Bern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate of Tank Disposal

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E

Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 3-7-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Road

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #575-2

ADDRESS: Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 28546

UNDERWRITERS LABORATORY INC. LABEL NO: _____

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 6000 Gallon PRODUCT: Diesel

UST MATERIAL: Fiberglass

DEFUEL DATE: 2-27-96 TIME: _____

PURGE DATE: 2-27-96 TIME: _____

REMOVAL DATE: 2-27-96 TIME: _____

DATE OF DEATH (DISPOSAL): _____

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

Linda King Hill, Notary 8/1/97
Keniston, NC
My Commission Expires Nov. 21, 2001

Appendix D

Soil and Product Certificates and Disposal Manifest

CLEAN-EAST

Environmental Services



Highway 258 North • P.O. Box 189 • Kinston, NC 28502 • (919) 523-9090
24 Hour Phones: (919) 747-3250 • (919) 522-4786
Facsimile: (919) 523-8191

Certificate of Disposal

This is to certify that

44.83 tons of diesel contaminated soil from

Site 575, Camp Lejeune, Jacksonville, NC

*has been disposed of in accordance
with State and EPA regulations.*

Given this 27th day of February, 19 96.

J. D. Cavanaugh
Authorized Signature

*Lenora King Hill, Notary
Kinston, NC*

My Commission Expires: Nov. 21, 2001

8/1/97



CLEAN EAST Environmental Services
1502 Greenville Hwy. • P.O. Box 189 • Kinston, North Carolina 28502
(919) 939-1600 • 24 Hour Phone 1-800-425-6097 • Facsimile: (919) 527-1086

Certificate of Remediation

This is to certify that

44.83 tons of diesel contaminated soil from
Site 575, Camp Lejeune, Jacksonville, NC

have been remediated under NC Land Farm Permit No: SR 0700039
in accordance with EPA and State Regulations.

Given this 12th day of September, 19 96.

J. D. Cousins
Authorized Signature

Lorinda King Hill, Notary 8/1/97
Kinston, NC
My Commission Expires: Nov. 21, 2001

P & W OIL CO., INC. WASTE MATERIAL MANIFEST

		Generator's US EPA ID No.:		Page1 of	01360	
Generator's Name and Mailing Address Generator's Phone North American Resources Camp LeJune, NC SITE 572-2						
Transporter 1 Company Name		P&W Oil Co.		US EPA ID No.:		
Transporter 2 Company Name		US EPA ID No.:				
P & W OIL CO., INC. P.O. Box 656 Leland, NC 28451 (910) 371-5792				US EPA ID No.: NCD986215242		
US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	Circle Form	Containers No.	Type	Total Quantity	Circle Units	Waste No.
Diesel Fuel Mix	Solid Sludge Liquid Gas	1	T _T	2000	Pounds Cu. Yds. Gallons Tons	
	Solid Sludge Liquid Gas				Pounds Cu. Yds. Gallons Tons	
TIME IN _____		P & W EMERGENCY		(910) 791-1724		
TIME OUT _____		N.C. ENVIRONMENTAL		1-800-662-7956		
		N.C. NATURAL RESOURCES		(910) 395-3900		
Vehicle License Tag Number(s):		Profile #:				
Lab:		Invoice #:				
Analysis #:		Broker:				
Special Handling Instructions, Additional Information, and Discrepancy Indication: North American Resources 1645 South Sunbust Road Chandler, AZ 85226						
GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.						
Printed/Typed Name		Signature <i>Joe Osborne</i> Date: <i>8/1/97</i> <i>Joe Osborne</i>				
Transporter #1: Acknowledgement of Receipt of Materials Printed/Typed Name John Boyer		Signature		Date: <i>07-30-97</i>		
Transporter #2: Acknowledgement of Receipt of Materials Printed/Typed Name Mark Greenleaf		Signature <i>Mark Greenleaf</i>		Date: <i>07-30-97</i>		
P & W OIL CO., INC. CERTIFICATION OF RECEIPT Printed/Typed Name Mark Greenleaf		Signature <i>Mark Greenleaf</i>		Date: <i>07-30-97</i>		

Appendix E

1. Chain-of-Custody
2. Analytical Results

GeoChem, Incorporated

Bill To:

North American Review

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Chain of Custody Record

Page 1 of _____

[illegible]

Report To:

—by love on his face—

11-2-11

1970-1971

[illegible]

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Bill To:

Phil. Stephen Anderson

Chain of Custody Record

Page 1 of

[illegible]

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Mr. Ken Jordan

Site Name:

575-2 (Camp Lejeune)

96-045J

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Monday, March 04, 1996

PO #

Date Received in lab:

Tuesday, February 27, 1996

GCI Project #: 9602-061

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: WS-1
Date Sampled 2/24/96

Lab ID 677
at 17:00

Sample Type: 2

Date Analyzed: 2/29/96 for 602 MTBE IPE EDB

Field Number: WS-1
Date Sampled 2/24/96

Lab ID 677
at 17:00

Sample Type: 2

Date Analyzed: 3/1/96 for 625 BN

Field Number: WS-1
Date Sampled 2/24/96

Lab ID 677
at 17:00

Sample Type: 2

Date Analyzed: for Library at analysis

Field Number: WS-1
Date Sampled 2/24/96

Lab ID 677
at 17:00

Sample Type: 2

Date Analyzed: 2/29/96 for Pb

Field Number: STP-1
Date Sampled 2/24/96

Lab ID 678
at 17:22

Sample Type: 1

Date Analyzed: 2/27/96 for 3550

Field Number: STP-1
Date Sampled 2/24/96

Lab ID 678
at 17:22

Sample Type: 1

Date Analyzed: 2/28/96 for 5030

J

Dona J. Barrett

I hereby certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, March 04, 1996

GCI Project 9602-061

Site Name: 575-2 (Camp Lejeune)

Field ID WS-1

Date Analyzed:

Lab ID 677

2/29/96

lowest detect on sample

602 MTBE IPE EDB

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Benzene	14.0	0.5	1.	1.0
Toluene	49.6	0.5	1.	1,000.0
Chlorobenzene	BDL	0.5	1.	50.0
Ethylbenzene	32.9	0.5	1.	29.0
Xylenes	203.0	1.5	1.	530.0
1,3-Dichlorobenzene	BDL	0.5	1.	620.0
1,4-Dichlorobenzene	BDL	0.5	1.	75.0
1,2-Dichlorobenzene	BDL	0.5	1.	620.0
MTBE	15.8	1	1.	200.0
EDB	BDL	1	1.	N/A
IPE	BDL	1	1.	N/A

End of 602 MTBE IPE EDB

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, March 04, 1996

GCI Project 9602-061

Site Name: 575-2 (Camp Lejeune)

lowest detect on sample

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BQL	500	10.	N/A
Bis(2-chloroethyl)ether	BQL	500	10.	N/A
1,3-Dichlorobenzene	BQL	100	10.	620.0
1,4-Dichlorobenzene	BQL	100	10.	75.0
1,2-Dichlorobenzene	BQL	100	10.	620.0
Bis-2-Chloroisopropylether	BQL	100	10.	N/A
Hexachloroethane	BQL	100	10.	N/A
n-Nitrosodi-n-propylamine	BQL	100	10.	N/A
Nitrobenzene	BQL	100	10.	N/A
Isophorone	BQL	100	10.	N/A
Bis-2-Chloroethoxymethane	BQL	100	10.	N/A
1,2,4-Trichlorobenzene	BQL	100	10.	N/A
Naphthalene	1,000.0	100	10.	21.0
Hexachlorobutadiene	BQL	100	10.	N/A
Hexachlorocyclopentadiene	BQL	100	10.	N/A
2-Chloronaphthalene	BQL	100	10.	N/A
Acenaphthylene	BQL	100	10.	210.0
Dimethylphthalate	BQL	100	10.	N/A
2,6-Dinitrotoluene	BQL	100	10.	N/A
Acenaphthene	BQL	100	10.	80.0
2,4-Dinitrotoluene	BQL	100	10.	N/A
Fluorene	333.0	100	10.	280.0
4-Chlorophenyl Phenyl Ether	BQL	100	10.	N/A
Diethylphthalate	BQL	100	10.	5,000.0
n-Nitrosodiphenylamine	BQL	100	10.	N/A
4-Bromophenyl Phenyl Ether	BQL	100	10.	N/A
Hexachlorobenzene	BQL	100	10.	N/A
Benzidine	BQL	500	10.	N/A
Phenanthrene	624.0	100	10.	210.0
Anthracene	BQL	100	10.	2,100.0
Di-n-Butylphthalate	BQL	100	10.	700.0
Fluoranthene	BQL	100	10.	280.0
Pyrene	123.0	100	10.	210.0
Benzylbutylphthalate	BQL	200	10.	N/A
Benzo(a)anthracene	BQL	100	10.	0.1

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, March 04, 1996

GCI Project 9602-061

lowest detect on sample

Site Name: 575-2 (Camp Lejeune)

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BQL	200	10.	N/A
Chrysene	BQL	50	10.	5.0
Bis-2-Ethylhexylphthalate	BQL	100	10.	N/A
Di-n-Octylphthalate	BQL	100	10.	140.0
Benzo(b)fluoranthene	BQL	100	10.	N/A
Benzo(k)fluoranthene	BQL	100	10.	N/A
Benzo(a)pyrene	BQL	100	10.	N/A
Indeno(1,2,3-cd)pyrene	BQL	100	10.	N/A
Dibenzo(a,h)anthracene	BQL	100	10.	N/A
Benzo(g,h,i)perylene	BQL	100	10.	N/A

End of 625 BN

End WS-1

Geochem (NC #336/SC #99008)
Project#9602-061

1

Site Name 575-2 (Camp LeJeune)

Library Search: Ten Largest Identified Compounds

Sample	Compound(s)	ug/l	Total Number of Compounds
0677 (WS-1)	Dodecane	4100	53
	Methylnaphthalene	5800	
	Tetradecane	6500	
	Pentadecane	6600	
	Hexadecane	6300	
	Heptadecane	7700	
	Octadecane	5800	
	Nonadecane	3500	
	Eicosane	3100	
	Heneicosane	1900	

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, March 04, 1996

Site Name: 575-2 (Camp Lejeune)

GCI Project # 9602-061

Field ID WS-1

Lab ID 677

Date Analyzed: 2/29/96

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Lead	BQL	0.015	1.0	0.015

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, March 04, 1996

GCI Project 9602-061

Site Name:

575-2 (Camp Lejeune)

Field ID STP-1

Lab ID 678

Date Analyzed: 2/27/96

Dry Wt %: 0.94

Conc. in mg/kg

PQL in mg/kg

Diesel

358

5.3

Gasoline

BDL

5.3

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Monday, March 04, 1996

575-2 (Camp Lejeune)

GCI Project # 9602-061

			lowest detection @ ideal conditions
	Percent Recovery	Lab Blank:	MDL in ug/l
625 BN			
1,4-Dichlorobenzene	66	0	2.96
n-Nitrosodi-n-propylamine	74	0	4.77
1,2,4-Trichlorobenzene	70	0	2.68
Acenaphthene	75	0	6.83
2,4-Dinitrotoluene	71	0	2.48
Pyrene	57	0	3.34
End of 625 BN			

			lowest detection @ ideal conditions
	Percent Recovery	Lab Blank:	MDL in ug/l
602 MTBE IPE EDB			
Benzene	84	0	0.2
Toluene	87	0	0.13
Chlorobenzene	95	0	0.16
Ethylbenzene	92	0	0.2
Xylenes	95	0	0.6
1,3-Dichlorobenzene	87	0	0.34
1,4-Dichlorobenzene	101	0	0.14
1,2-Dichlorobenzene	85	0	0.06
MTBE	79	0	0.29
EDB	95	0	0.28
IPE	80	0	0.21
End of 602 MTBE IPE EDB			

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Monday, March 04, 1996

575-2 (Camp Lejeune)

lowest detection limit @ ideal conditions

GCI Project # 9602-061

Percent
Recovery

Lab Blank:

MDL in
mg/l

Lead

88

0

0.001

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Site Name:

Monday, March 04, 1996

575-2 (Camp Lejeune)

GCI Project # 9602-061

<i>Date Analyzed:</i>	<i>Dry Wt %:</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
2/27/96	0.88			
	Diesel	78.3	0	2.43

<i>Date Analyzed:</i>	<i>Dry Wt %:</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
2/28/96	0.84			
	Gasoline	88.8	0	2.43

Appendix F

Photographs



6,000 gallon diesel tank
in the ground at site 575-2.



Groundwater encountered in
excavation pit.



Tank removed from ground at
site 575-2.





CLEAN-EAST
Associates, Inc.

P.O. Box 189
Kinston,
North Carolina
28501
24 Hour Phones:
(919) 939-1600
1-800-425-6097
Fax:
(919) 527-1086

24 Hour
Hazmat Response,
UST Removal
and Closure,
Site Assessment,
Soil and
Groundwater
Remediation,
Corrective Action
Systems,
Environmental
Audits.

August 1, 1997

Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004

RE: Tank Closure Report
Bldg. 118-3
Camp Lejeune, NC
N62470-93-C-5310

Dear Mr. Fitzpatrick:

Submitted is the GW/UST-12 form that should be submitted to the Groundwater Section of the Wilmington Regional Office of the NCDEHNR-DWQ. Following is a brief summary of this form.

The one (1) steel 280 gallon waste oil tank was removed on January 23, 1996. The tank was in fair condition. Organic Vapor Meter (OVM) readings indicated no release; however, field observations indicated soil staining and petroleum odors. Approximately 3.38 tons of material (silty sand) were excavated from the tank excavation. The closure sample (S-1B) had oil and grease content of 1700 ppm by EPA 9071. Analyses by 8021 detected several petroleum constituents above the NCAC 2L regulations for the closure sample S-1B. The contaminated soil was stockpiled on site and should be transported for proper disposal. Laboratory analyses of samples S-1A and S-1C are included in Appendix E but do not apply to site 118-3.

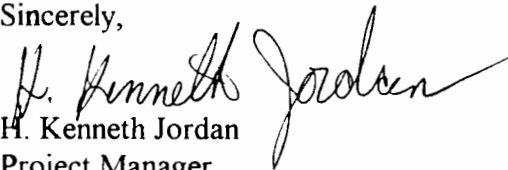
The closure sample was above the NC Reportable Concentration of 250 ppm for oil and grease (EPA 9071). The closure sample tested by EPA 8021 detected petroleum constituents also above the NCAC 2L limits. Additional evaluation work appears warranted.

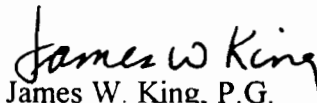
A UST Death Certificate is included in Appendix C from North American Resources but a final destination or disposal manifest was not provided to CEA.

The GW/UST-2 form in Appendix B needs to be signed by government personnel.

We appreciate serving Camp Lejeune on this project. Please contact us if you have any questions about this tank closure evaluation.

Sincerely,


H. Kenneth Jordan
Project Manager


James W. King, P.G.
Manager

HKJ/ckw

UNDERGROUND STORAGE TANK CLOSURE REPORT

The closure report should contain, at a minimum, the following information. Any other information that is pertinent to the site should be included.

I. General Information

045B 118-3

A. Ownership of UST(s)

1. **Name of UST Owner:** United States Marine Corps.
2. **Owner address and telephone number:** Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004
(910) 451-5063

B. Facility Information

1. **Facility Name:** Bldg. 118-3
2. **Facility ID#:** 0-002740
3. **Facility address, telephone number and county:** Marine Corps Base
Camp Lejeune-Onslow County
(919) 451-5063

C. Contacts

1. **Name, address, telephone number and job title of primary contact person:**
Mr. Greg Fitzpatrick
Commanding General
Attn: AC/S EMD/EPD
Marine Corps Base
PSC Box 20004
Camp Lejeune, NC 28542-0004 (910) 451-5063
2. **Name, address and telephone number of closure contractor:**
North American Resources
6145 West Sundust Road
Box 5073
Chandler, Arizona 85226 (520) 796-4054
3. **Name, address and telephone number of primary consultant:**
Clean East Associates, Inc.
P.O. Box 189
Kinston, NC 28502 (919) 939-1600

4. Name, address, telephone number, and state certification number of laboratory:

GeoChem, Inc.
2500 Gateway Centre Blvd., Suite 300
Morrisville, NC 27560 (919) 460-8093 Nos. #37745, 336, 461

D. UST Information

Tank No.	Installation dates	Size in Gallons	Tank Dimensions	Last Contents	Previous Contents (if any)
1	1985	280	36" x 5'	Waste Oil	Waste Oil

E. Site Characteristics

1. Describe any past releases at this site: Unknown

2. Is the facility active or inactive at this time? If the facility is inactive note the last time the USTs were in operation: Active

3. Describe surrounding property use (for example, residential, commercial, farming, etc.). The UST is located at a vehicle maintenance facility on the Marine Corps Base. The surrounding area is primarily commercial.

4. Describe site geology/hydrogeology: The Site is located on the Coastal Plain Physiographic Province within the Belgrade Formation. According to the Soil Survey of Onslow County, the soil beneath the subject Site is Baymeade-Urban (Bmb) with slopes generally 0 to 6 percent. Infiltration is rapid and runoff is slow. The seasonal high water table is to 4 to 5 feet. Soils exposed in the excavation consisted of the following:

0-06"	Brown silty SAND (SM)
6"-1'9"	Light brown silty clayey SAND (SM/SC)
1'9"-3'6"	Light brown silty sandy CLAY (CL)

Assuming that the groundwater is a subdued reflection of the ground surface, it is estimated that the groundwater direction may be generally to northwest.

II. Closure Procedures

A. Describe preparations for closure including the steps taken to notify authorities, permits obtained and the steps taken to clean and purge the tanks.

WiRO of the NCDEHNR-DWQ notified via "Notice of Intent" UST Permanent Closure or Change in Service" form (GW/UST-3). Base authorities were notified. Product was removed before tank closure. Dry ice was placed in UST to eliminate O₂.

B. Note the amount of residual material pumped from the tank(s): Approximately 9.10 gallons of waste oil/sludge.

C. Describe the storage, sampling and disposal of the residual material: P&W Oil Services of Leland, NC transported the 9.10 gallons of waste oil/sludge to their disposal facility in Leland, NC.

D. Excavation

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" on limiting excavations. The Trust Fund will not pay for excessive excavation unless it is justified and verified by laboratory results.

1. Describe excavation procedures noting the condition of the soils and the dimensions of the excavation in relation to the tanks, piping and/or pumps:

Excavation was conducted with the backhoe, and the top of the excavation extended laterally about 1'6" from the edge of the tank. There was no piping associated with the UST. Field observations indicated petroleum odors.

2. Note the depth of tank burial(s) (from land surface to top of tank): Top of the tank, 0 feet below ground surface.

3. Quantity of soil removed: 3.38 tons

4. Describe soil type(s): Excavated materials in the tank excavation consisted of silty SAND (SM).

5. Type and source of backfill used: Medium grain sand from military base designated borrow site.

E. Contaminated Soil

Note: Suspected contaminated soil should be segregated from soil that appears to be uncontaminated and should be treated as contaminated until proven otherwise. It should not be used as backfill.

1. Describe how it was determined to what extent to excavate the soil:

The OVM detected no contamination; however, there was soil staining and petroleum odors in the immediate vicinity of the tank. Soils were only excavated enough to sufficiently remove the tank and the contaminated soil was stockpiled on site.

2. Describe method of temporary storage, sampling and treatment/disposal of soil:

Soils were temporarily stored on plastic on site. The stockpile was not sampled pending analytical results from the closure sample, due to OVM readings not indicating contaminant impact.

III. Site Investigation

A. Provide information on field screening and observations, include methods used to calibrate field screening instrument(s): Soils excavated appeared to have petroleum staining or odor in the immediate vicinity of the tank. The OVM did not detect any contamination in the soils. The TEI 580B Organic Vapor Meter was calibrated with isobutylene gas.

B. Describe soil sampling points and sampling procedures used, including:

Note: Refer to the "Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater" for information about sampling requirements.

One closure sample (S-1B) was taken 1-2' beneath the tank.

The sample was analyzed for Total Petroleum Hydrocarbon content as gasoline (5030) and diesel (3550). The sample was also analyzed by EPA Methods 9071 and 8021 and a TCLP RCRA Metals scan was also conducted on the S-1B. The sample was collected with a hand auger. Drawing No. 2 shows the location of the sample.

C. Describe groundwater or surface water sampling procedures used:

Note: Refer to the "Groundwater Section Guidelines for the Investigations and Remediation of Soils and Groundwater" for information about sampling requirements.

No groundwater was encountered.

D. Quality control measures

The hand auger sampling equipment was deconned using analconox-deionized water solution followed by a deionized water rinse. This procedure was conducted before each sampling event. New surgical gloves were also used for each sampling event. The sample was properly labeled, packed and placed on ice, and delivered to GeoChem, Inc. in Morrisville, NC, along with proper chain-of-custody documentation. The closure sample was collected at 1005 on January 23, 1996 and was delivered to the laboratory at 1645 on January 24, 1996.

E. Investigation results

During excavation of the tank, the excavated materials had no OVM reading, however, there was petroleum staining and odor evident. Laboratory analyses by EPA Methods 3550 and 5030 returned results of below detectable limits. Laboratory analyses by EPA Method 9071 indicated oil and grease content of 1700 ppm for the closure sample (S-1B). Analyses by EPA Method 8021 detected dissolved compounds Tetrachloroethene, 1,3,5, Trimethylbenzene, 1,2,4 Trimethylbenzene, sec-Butylbenzene, n-Butylbenzene, and Naphthalene all above the NCAC 2L limits. The TCLP RCRA metals scan returned results below detectable limits.

Note: Laboratory analyses of samples S-1A and S-1C are included in Appendix E but do not apply to site 118-3.

IV. Conclusions and Recommendations

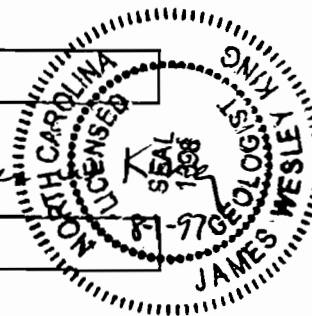
Include probable sources of contamination, further investigation or remediation tasks, or whether no further action is required.

The closure sample exceeded the NC Reportable Concentrations for EPA Method 9071 NCAC 2L limits for EPA Method 8021. Further evaluation and remediation work appears warranted.

V. Signature of Professional Engineer or Licensed Geologist

Licensed Geologist License #: 1398

James

**VI. Enclosures****A. Drawings**

Area Map (No. 1)

Site Map (No. 2)

B. Tables

Soil Analyses Results

C. Appendices

Appendix A: Notification of Intent to Close (GW/UST-3)

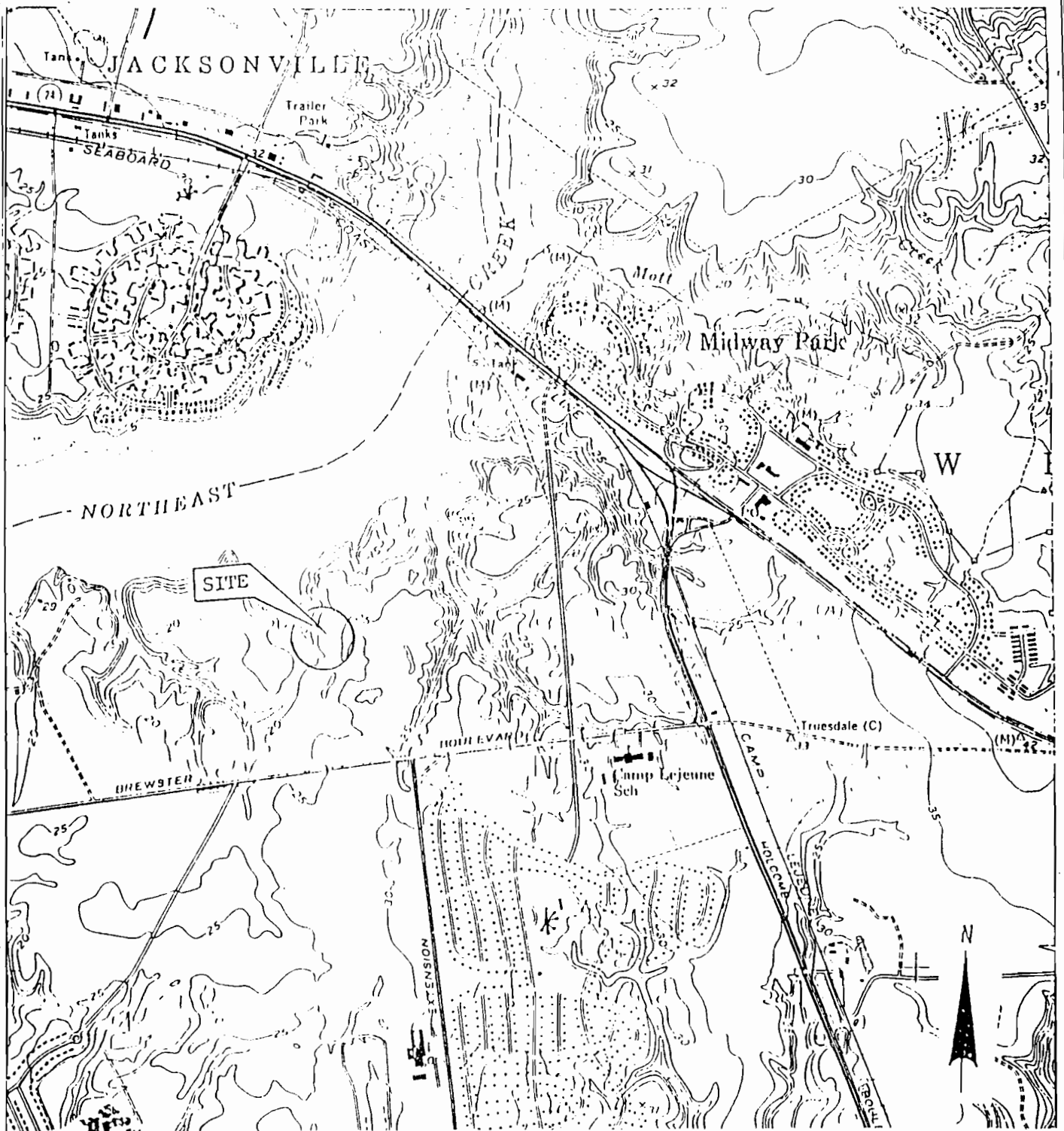
Appendix B: Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

Appendix C: Certificate of Tank Disposal

Appendix D: Sludge Disposal Manifest

Appendix E: Complete Chain-of-Custody Records and Analytical Results

Appendix F: Photographs



CLEAN-EAST Associates, Inc.

P.O. Box 189
 Kinston, NC 20501
 Fax: (919) 523-8191
 1-800-849-1145
 24 Hour Phone: (919) 523-9090

AREA MAP

Camp Lejeune
 Building #118-3
 Jacksonville, NC

SCALE:

1:24000

DRAWN BY:

USGS

CHECKED BY:

HKJ

DATE:

1971

PROJECT NO.

96-04SB

DRAWING NO.

1

Table 1
Sample Analyses Results-Soil (ppm)

Sample ID	Location	Depth	Date	EPA Method 5030	EPA Method 3550	EPA 9071	Field Screenings OVM
S-1B	1.0' beneath UST	46"	1-23-96	BDL	BDL	1700*	0 ppm
NC Reportable Concentration (RC)				10	40	250	---

“ppm” denotes parts per million

“*” exceeds NC Reportable Concentration

EPA Method 8021
Sample Analyses Results - Soil (ppb)
1-23-96

Sample ID	Compound	Concentration	NCAC 2L
S-1B	Tetrachloroethene	1.1*	.7
	1,3,5 trimethylbenzene	1.0*	.5
	1,2,4 trimethylbenzene	2.1*	.5
	sec-butylbenzene	.7*	.5
	n-butylbenzene	3.5*	.5
	Naphthalene	12.4*	21

“ppb” denotes parts per billion

“*” exceeds NCAC 2L limits

Appendix A

Notification of Intent to Close (GW/UST-3)

GW/UST-3

Notice of Intent: UST Permanent Closure or Change-In-Service

FOR
TANKS
IN
NCReturn Completed Form To:
The appropriate DEM Regional Office according to the county of the facility's
location. [SEE REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I. D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return five (5) working days prior to closure or change-in-service.

I. OWNERSHIP OF TANK(S)

II. LOCATION OF TANK(S)

Tank Owner Name: Marine Corps Base

(Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004County: OnslowCity: Camp Lejeune State: NC Zip Code: 28542-0004Tele. No. (Area Code) (910) 451-5063Facility Name or Company: Bldg. NH-118Facility ID # (if available): not available

Street Address or State Road: _____

County: Onslow City: _____ Zip Code: _____Tele. No. (Area Code): not available

III. CONTACT PERSON

Name: Greg Fitzpatrick Job Title: _____ Telephone Number: (910) 451-5063

IV. TANK REMOVAL, CLOSURE IN PLACE, CHANGE-IN-SERVICE

1. Contact Local Fire Marshall.
2. Plan the entire closure event.
3. Conduct Site Soil Assessments.
4. If Removing Tanks or Closing in Place refer to API Publications 2015 "Cleaning Petroleum Storage Tanks" & 1604 "Removal & Disposal of Used
- Underground Petroleum Storage Tanks".
5. Provide a sketch locating piping, tanks and soil sampling locations.
6. Fill out form GW/UST-2 "Site Investigation Report for Permanent Closure" and return within 30 days following the site investigation.
7. The site assessment portion of the tank closure must be conducted under the supervision of a Professional Engineer or Licensed Geologist. After January 1, 1994, all closure site assessment reports must be signed and sealed by a P.E. or L.G.
8. Keep closure records for 3 years.

V. WORK TO BE PERFORMED BY:

(Contractor) Name: Onslow Environmental ContractorsAddress: 3104 Gum Branch Rd, Jacksonville State: NC Zip Code: 28540Contact: Ed Jones Phone: (910) 347-9010Primary Consultant: ECS Phone: (919) 781-7798

VI. TANK(S) SCHEDULED FOR CLOSURE OR CHANGE-IN-SERVICE

TANK ID#	TANK CAPACITY	LAST CONTENTS	PROPOSED ACTIVITY		
			CLOSURE		CHANGE-IN-SERVICE
			Removal	Abandonment In Place	New Contents Stored
<u>1</u>	<u>10,000 g</u>	<u>gasoline</u>	☒	☐	
<u>2</u>	<u>2,000 g</u>	<u>water</u>	☒	☐	
<u>3</u>	<u>200 g</u>	<u>used oil</u>	☒	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	
			☐	☐	

VII. OWNER OR OWNER'S AUTHORIZED REPRESENTATIVE

Print name and official title:

Jeff PIERCE, LTJG, CEC, USN*Scheduled Removal Date: 10 JAN 96Signature: Jeff PierceDate Submitted: 18 Dec 95

*If scheduled work date changes, notify your appropriate DEM Regional Office 48 hours prior to originally scheduled date

Appendix B

Site Investigation Report for Permanent Closure or Change-in-Service of UST (GW/UST-2)

FOR
TANKS
IN
NC

Return Completed Form To:

The appropriate DWQ Regional Office according to the county of the facility's location.
[SEE MAP ON REVERSE SIDE OF OWNER'S COPY (PINK) FOR REGIONAL
OFFICE ADDRESS].

State Use Only

I.D. Number _____

Date Received _____

INSTRUCTIONS

Complete and return within (30) days following completion of site investigation.

I. Ownership of Tank(s)

Owner Name: Marine Corps Base

Corporation, Individual, Public Agency, or Other Entity)

Street Address: PSC Box 20004County: OnslowCity: Camp Lejeune State: NC Zip Code: 28542-0004Telephone Number: (910) 451-5063

(Area Code)

II. Location of Tank(s)

Facility Name: NH-118-3

(or Company)

Facility ID # (if available): 0-002740

Street Address

(or State Road)

County: Onslow City: C. Lejeune Zip Code: 28542Telephone Number: ()

(Area Code)

III. Contact Person

Name: Mr. Greg FitzpatrickJob Title: Commanding GeneralTel. No.: (910) 451-5063Closure Contractor: North American Resource Address: 6145 W. Sundust Rd., Chandler, AZ 85226 Tel. No.: (520) 796-4054Primary Consultant: CEA Address: P.O. Box 189, Kinston, NC 28501 Tel. No.: (919) 939-1600Lab: GeoChem, Inc. Address: 2500 Gateway Blvd., Morrisville, NC 27560 Tel. No.: (919) 460-8093

IV. U.S.T. Information

V. Excavation Condition

VI. Additional Information Required

Tank No.	Size in Gallons	Tank Dimensions	Last Contents	Water in Excavation		Free Product		Notable Odor or Visible Soil Contamination	
				Yes	No	Yes	No	Yes	No
1	280	36" x 5'	Waste oil		X		X		X

See reverse side of pink copy (owner's copy) for additional information required by N.C. - DWQ in the written report and sketch.

NOTE: If a release from the tank(s) has occurred, the site assessment portion of the tank closure must be conducted under the supervision of a P.E. or L.G., with all closure site assessment reports bearing the signature and seal of the P.E. or L.G.

VII. Check List (Check the activities completed)

PERMANENT CLOSURE (For Removing or Abandoning-In-place)

- ☒ Contact local fire marshal.
☒ Notify DWQ Regional Office before abandonment.
☒ Drain & flush piping into tank.
☒ Remove all product and residuals from tank.
☒ Excavate down to tank.
☒ Clean and inspect tank.
☒ Remove drop tube, fill pipe, gauge pipe, vapor recovery tank connections, submersible pumps and other tank fixtures.
☒ Cap or plug all lines except the vent and fill lines.
☒ Purge tank of all product & flammable vapors.
☒ Cut one or more large holes in the tanks.
☒ Backfill the area.
 Date Tank(s) Permanently closed: 1/23/96
 Date of Change-In-Service: _____

ABANDONMENT IN PLACE

- ☐ Fill tank until material overflows tank opening.
☐ Plug or cap all openings.
☐ Disconnect and cap or remove vent line.
☐ Solid inert material used - specify: _____

REMOVAL

- ☒ Create vent hole.
☒ Label tank.
☒ Dispose of tank in approved manner.
 Final tank destination: Carolina Welding & Salvage
7250 Hwy. 70 E., New Bern, NC 28560

VIII. Certification (Read and Sign)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Print name and official title of owner or owner's authorized representative

Signature

Date Signed

Appendix C

Certificate of Tank Disposal

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION
6145 West Sundust Road, Box 5073 Chandler, Arizona 85226

Underground Storage Tank

- UST -

D E A T H C E R T I F I C A T E
Disposal Document

PROJECT NO: N62470-93-C-5310 DATE: 3-7-96

CLIENT: Department of the Navy
Camp Lejeune, NC

ADDRESS: 1005 Michael Rd.

CITY: Jacksonville STATE: NC ZIP: 28546

PROJECT LOCATION

NAME: Site #118-3

ADDRESS: Naval Hospital - Camp Lejeune

CITY: Jacksonville STATE: NC ZIP: 25846

UNDERWRITERS LABORATORY INC. LABEL NO: G895628

CONSTRUCTION AND MANAGEMENT, INC. I.D. NO: _____

UST SIZE: 280 Gallon PRODUCT: Waste Oil

UST MATERIAL: Steel

DEFUEL DATE: 1/23/96 TIME: _____

PURGE DATE: 1/23/96 TIME: _____

REMOVAL DATE: 1/23/96 TIME: _____

DATE OF DEATH (DISPOSAL): January 30, 1996

RESPECTFULLY,

NORTH AMERICAN RESOURCES
CONSTRUCTION AND MANAGEMENT DIVISION

*Linda King Hee, Notary
Linston, NC
Commission Expires Nov. 21, 2001*

Appendix D

Sludge Disposal Manifest

P & W OIL CO., INC. WASTE MATERIAL MANIFEST

Generators US EPA ID No.		Page 1 of		01359	
Generator's Name and Mailing Address North American Resources Camp LeJune, NC					
Generator's Phone					
Transporter 1 Company Name		US EPA ID No.			
P&W oil Co.					
Transporter 2 Company Name		US EPA ID No.			
P & W OIL CO., INC. P.O. Box 656 Leland, NC 28451 (910) 371-5792		US EPA ID No.: NCD986215242			
US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	Circle Form	Containers No.	Type	Total Quantity	Circle Units
Waste Oil	Solid	1	T _T	9.10	Pounds
	Sludge				Cu. Yds.
	Liquid				Gallons
	Gas				Tons
	Solid				Pounds
	Sludge				Cu. Yds.
	Liquid				Gallons
	Gas				Tons
TIME IN _____		P & W EMERGENCY		(910) 791-1724	
TIME OUT _____		N.C. ENVIRONMENTAL		1-800-662-7956	
		N.C. NATURAL RESOURCES		(910) 395-3900	
Vehicle License Tag Number(s):		Profile #:			
Lab:		Invoice #:			
Analysis #:		Broker:			
Special Handling Instructions, Additional Information, and Discrepancy Indication: North American Resources 6145 South Sundust Road Chandler, AZ 85226 <i>Lin da King Hill, Notary</i> <i>Roxboro, NC</i> <i>Commission expires Nov. 21, 2001</i>					
GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.					
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.					
Printed/Typed Name		Signature		Date:	
Joe Osborne					
Transporter #1: Acknowledgement of Receipt of Materials		Signature		Date:	
Printed/Typed Name					
John Boyer					
Transporter #2: Acknowledgement of Receipt of Materials		Signature		Date:	
Printed/Typed Name					
Mark Greenleaf					
P & W OIL CO., INC. CERTIFICATION OF RECEIPT		Signature		Date:	
Printed/Typed Name					
Mark Greenleaf				7-31-97	



Appendix E

1. Chain-of-Custody
2. Analytical Results

Report To:

David Jones

CEA

PO Box 189 Kinston

NC 28502

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560

Bill To:

NORTH American Refiners

6145 West Sunset Road

Box 5073

Charlotte, North Carolina 28502

Chain of Custody Record

Page 1 of

PROJECT SITE NUMBER 96-045 A		PO#	GEOCHEM PROJECT # 9601-044	
SITE NAME Camp Lejeune			DATE DUE 1-26-96	
COLLECTED BY (Signature) David Jones			VERBAL/FAX/HARD COPY	
FIELD SAMPLE ID	TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED	NO. OF CONTAINERS PER LOCATION
S-1 A	N	Soil	1-23-96 2:15	1
S-1 B	N	Soil	1-23-96 10:05	1
S-1 C	N	Soil	1-23-96 12:35	1
ANALYSES				
Soil 30				
*9071				
*8021				
REMARKS				
* Additional Analysis				
per Ken Jordan				
run TCLP 1311 (metals only)				
if 9071 7250 or				
hits on 8021. Data				
RELINQUISHED BY: <i>Ken W King</i>				
RECEIVED BY: <i>T. Barlett</i>				
DATE 1-24-96	TIME 4:40 pm	DATE 1-24-96	TIME 4:40 pm	DATE 1-24-96
DATE	TIME	DATE	TIME	DATE
DATE	TIME	DATE	TIME	DATE

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Mr. David Jones

Site Name:

Camp LeJeune

96-045A

Clean East Assoc.

P.O. Box 189

Kinston NC

28501

Report Date

Wednesday, February 28, 1996

PO #

Date Received in lab:

Thursday, January 25, 1996

GCI Project #: 9601-044

Summary of requested analytical work

Sample type code #s:

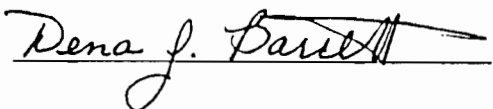
1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: S-1 A	Lab ID 157	Sample Type: 1	Date Analyzed: 1/25/96 for 5030 mve 3550
Date Sampled 1/23/96	at 2:15		
Field Number: S-1 A	Lab ID 157	Sample Type: 1	Date Analyzed: 2/19/96 for 8021 soil
Date Sampled 1/23/96	at 2:15		
Field Number: S-1 A	Lab ID 157	Sample Type: 1	Date Analyzed: 2/19/96 for 9071 soil
Date Sampled 1/23/96	at 2:15		
Field Number: S-1 A	Lab ID 157	Sample Type: 2	Date Analyzed: 2/23/96 for TCLP RCRA Metals
Date Sampled 1/23/96	at 2:15		
Field Number: S-1 B	Lab ID 158	Sample Type: 1	Date Analyzed: 1/25/96 for 5030 mve 3550
Date Sampled 1/23/96	at 10:05		
Field Number: S-1 B	Lab ID 158	Sample Type: 1	Date Analyzed: 2/19/96 for 8021 soil
Date Sampled 1/23/96	at 10:05		
Field Number: S-1 B	Lab ID 158	Sample Type: 1	Date Analyzed: 2/19/96 for 9071 soil
Date Sampled 1/23/96	at 10:05		
Field Number: S-1 B	Lab ID 158	Sample Type: 2	Date Analyzed: 2/23/96 for TCLP RCRA Metals
Date Sampled 1/23/96	at 10:05		
Field Number: S-1 C	Lab ID 159	Sample Type: 1	Date Analyzed: 1/25/96 for 5030 mve 3550
Date Sampled 1/23/96	at 12:35		



Here by certify that I have Reviewed and approve this data set

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, February 28, 1996

GCI Project 9601-044

Site Name: Camp Lejeune

Field ID S-1 A

Lab ID 157

Date Analyzed: 1/25/96

Dry Wt %: 0.79

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	6.31
TPH Diesel	BDL	6.31

Field ID S-1 B

Lab ID 158

Date Analyzed: 1/25/96

Dry Wt %: 0.88

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	5.65
TPH Diesel	BDL	5.65

Field ID S-1 C

Lab ID 159

Date Analyzed: 1/25/96

Dry Wt %: 0.85

	Conc. in mg/kg	PQL in mg/kg
TPH Gas	BDL	5.85
TPH Diesel	BDL	5.85

GeoChem Incorporated Certified Analytical Laboratory

NC# 37745, NC# 336, NC# 461, EPA ID# 155

Wednesday, February 28, 1996

Site Name:
Camp LeJeune

GCI Project# 9601-044

Conc. in mg/kg

lowest detect on sample

PQL in
mg/kg

Dilution
Factor

Field ID S-1 A

Date Analyzed:

Lab ID 157

2/19/96

Oil and Grease

1,530

5

1.0

End of 9071 roll

Field ID S-1 B

Date Analyzed:

Lab ID 158

2/19/96

Oil and Grease

1,700

5

1.0

End of 9071 roll

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, February 28, 1996

Site Name:

Camp LeJeune

GCI Project # 9601-044

Cone. In
ug/kg

lowest detect on sample

PQL in
ug/kg

Dilution
Factor

NCAC 2L
in ug/l

Field ID S-1 A Date Analyzed:
Lab ID 157 2/19/96

8021 soil

Dichlorodifluoromethane	BDL	.5	1.0	1,400.0
Chloromethane	BDL	.5	1.0	N/A
Vinyl Chloride	BDL	.5	1.0	0.015
Bromomethane	BDL	.5	1.0	N/A
Chloroethane	BDL	.5	1.0	N/A
Trichlorofluoromethane	BDL	.5	1.0	2,100.0
1,1-Dichloroethene	BDL	.5	1.0	7.0
Methylene Chloride	BDL	.5	1.0	5.0
trans-1,2-Dichloroethene	BDL	.5	1.0	70.0
1,1-Dichloroethane	BDL	.5	1.0	700.0
2,2-Dichloropropane	BDL	.5	1.0	N/A
cis-1,3-Dichloropropene	BDL	.5	1.0	0.2
Chloroform	BDL	.5	1.0	0.19
Bromochloromethane	BDL	.5	1.0	N/A
1,1,1-Trichloroethane	BDL	.5	1.0	200.0
1,1-Dichloropropene	BDL	.5	1.0	N/A
Carbon Tetrachloride	BDL	.5	1.0	0.3
Benzene	BDL	.5	1.0	1.0
1,2-Dichloroethane	BDL	.5	1.0	0.38
Trichloroethene	BDL	.5	1.0	2.8
1,2-Dichloropropane	BDL	.5	1.0	0.56
Bromodichloromethane	BDL	.5	1.0	0.6
Dibromomethane	BDL	.5	1.0	N/A
Toluene	0.9	.5	1.0	1,000.0
1,1,2-Trichloroethane	BDL	.5	1.0	N/A
Tetrachloroethene	BDL	.5	1.0	0.7
1,3-Dichloropropane	BDL	.5	1.0	N/A
Dibromochloromethane	BDL	.5	1.0	N/A
1,2-Dibromoethane	BDL	.5	1.0	N/A
Chlorobenzene	BDL	.5	1.0	50.0
Ethylbenzene	BDL	.5	1.0	29.0
1,1,1,2-Tetrachloroethane	BDL	.5	1.0	N/A
m,p-Xylene	BDL	1.0	1.0	530.0
o-Xylene	BDL	.5	1.0	530.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, February 28, 1996

Site Name:

Camp LeJeune

lowest detect on sample

GCI Project # 9601-044

	Conc. in ug/kg	PQL in ug/kg	Dilution Factor	NCAC 2L in ug/l
Styrene	BDL	.5	1.0	100.0
Isopropylbenzene	BDL	.5	1.0	N/A
Bromoform	BDL	.1	1.0	0.19
1,1,2,2-Tetrachloroethane	BDL	.5	1.0	N/A
1,2,3-Trichloropropane	BDL	.5	1.0	N/A
n-Propylbenzene	BDL	.5	1.0	N/A
Bromobenzene	BDL	.5	1.0	N/A
1,3,5-Trimethylbenzene	BDL	.5	1.0	N/A
2-Chlorotoluene	BDL	.5	1.0	N/A
4-Chlorotoluene	BDL	.5	1.0	N/A
trans-1,3-Dichloropropene	BDL	.5	1.0	0.2
1,2,4-Trimethylbenzene	BDL	.5	1.0	N/A
sec-Butylbenzene	BDL	.5	1.0	N/A
p-Isopropyltoluene	BDL	.5	1.0	N/A
1,3-Dichlorobenzene	BDL	.5	1.0	620.0
1,4-Dichlorobenzene	BDL	.5	1.0	75.0
n-Butylbenzene	1.1	.5	1.0	N/A
1,2-Dichlorobenzene	BDL	.5	1.0	620.0
1,2-Dibromo-3-Chloropropa	BDL	.5	1.0	0.025
1,2,4-Trichlorobenzene	BDL	.5	1.0	N/A
Hexachlorobutadiene	BDL	.5	1.0	N/A
Naphthalene	BDL	.5	1.0	21.0
1,2,3-Trichlorobenzene	BDL	.5	1.0	N/A
cis-1,2-Dichloroethene	BDL	.5	1.0	70.0
tert-Butylbenzene	BDL	.5	1.0	N/A

End of 8021 soil

End S-1 A

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, February 28, 1996

Site Name:

Camp LeJeune

GCI Project # 9601-044

Field ID S-1 B Date Analyzed:

Lab ID 158 2/19/96

lowest detect on sample

8021 soil

	Conc. in ug/kg	PQL in ug/kg	Dilution Factor	NCAC 2L in ug/l
Dichlorodifluoromethane	BDL	.5	1.0	1,400.0
Chloromethane	BDL	.5	1.0	N/A
Vinyl Chloride	BDL	.5	1.0	0.015
Bromomethane	BDL	.5	1.0	N/A
Chloroethane	BDL	.5	1.0	N/A
Trichlorofluoromethane	BDL	.5	1.0	2,100.0
1,1-Dichloroethene	BDL	.5	1.0	7.0
Methylene Chloride	BDL	.5	1.0	5.0
trans-1,2-Dichloroethene	BDL	.5	1.0	70.0
1,1-Dichloroethane	BDL	.5	1.0	700.0
2,2-Dichloropropane	BDL	.5	1.0	N/A
cis-1,3-Dichloropropene	BDL	.5	1.0	0.2
Chloroform	BDL	.5	1.0	0.19
Bromochloromethane	BDL	.5	1.0	N/A
1,1,1-Trichloroethane	BDL	.5	1.0	200.0
1,1-Dichloropropene	BDL	.5	1.0	N/A
Carbon Tetrachloride	BDL	.5	1.0	0.3
Benzene	BDL	.5	1.0	1.0
1,2-Dichloroethane	BDL	.5	1.0	0.38
Trichloroethene	BDL	.5	1.0	2.8
1,2-Dichloropropane	BDL	.5	1.0	0.56
Bromodichloromethane	BDL	.5	1.0	0.6
Dibromomethane	BDL	.5	1.0	N/A
Toluene	BDL	.5	1.0	1,000.0
1,1,2-Trichloroethane	BDL	.5	1.0	N/A
Tetrachloroethene	1.1	.5	1.0	0.7
1,3-Dichloropropane	BDL	.5	1.0	N/A
Dibromochloromethane	BDL	.5	1.0	N/A
1,2-Dibromoethane	BDL	.5	1.0	N/A
Chlorobenzene	BDL	.5	1.0	50.0
Ethylbenzene	BDL	.5	1.0	29.0
1,1,1,2-Tetrachloroethane	BDL	.5	1.0	N/A
m,p-Xylene	BDL	1.0	1.0	530.0
o-Xylene	BDL	.5	1.0	530.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, February 28, 1996

Site Name:

Camp LeJeune

lowest detect on sample

GCI Project # 9601-044

	Conc. in ug/kg	PQL in ug/kg	Dilution Factor	NCAC 2L in ug/l
Styrene	BDL	.5	1.0	100.0
Isopropylbenzene	BDL	.5	1.0	N/A
Bromoform	BDL	.1	1.0	0.19
1,1,2,2-Tetrachloroethane	BDL	.5	1.0	N/A
1,2,3-Trichloropropane	BDL	.5	1.0	N/A
n-Propylbenzene	BDL	.5	1.0	N/A
Bromobenzene	BDL	.5	1.0	N/A
1,3,5-Trimethylbenzene	1.0	.5	1.0	N/A
2-Chlorotoluene	BDL	.5	1.0	N/A
4-Chlorotoluene	BDL	.5	1.0	N/A
trans-1,3-Dichloropropene	BDL	.5	1.0	0.2
1,2,4-Trimethylbenzene	2.1	.5	1.0	N/A
sec-Butylbenzene	0.7	.5	1.0	N/A
p-Isopropyltoluene	BDL	.5	1.0	N/A
1,3-Dichlorobenzene	BDL	.5	1.0	620.0
1,4-Dichlorobenzene	BDL	.5	1.0	75.0
n-Butylbenzene	3.5	.5	1.0	N/A
1,2-Dichlorobenzene	BDL	.5	1.0	620.0
1,2-Dibromo-3-Chloropropa	BDL	.5	1.0	0.025
1,2,4-Trichlorobenzene	BDL	.5	1.0	N/A
Hexachlorobutadiene	BDL	.5	1.0	N/A
Naphthalene	12.4	.5	1.0	21.0
1,2,3-Trichlorobenzene	BDL	.5	1.0	N/A
cis-1,2-Dichloroethene	BDL	.5	1.0	70.0
tert-Butylbenzene	BDL	.5	1.0	N/A

End of 8021 soil

End S-1 B

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, February 28, 1996

Site Name:

Camp LeJeune

GCI Project # 9601-044

Field ID S-1 A

Date Analyzed:

Lab ID 157

2/23/96

TCLP RCRA Metals

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Arsenic	BQL	0.025	1.	0.05
Barium	BQL	2.5	100.	2.0
Cadmium	BQL	0.5	1.	0.005
Chromium	BQL	0.01	1.	0.05
Lead	BQL	0.5	1.	0.015
Mercury	BQL	0.001	1.	0.0011
Selenium	BDL	0.02	1.	0.05
Silver	BQL	0.5	1.	0.018

Field ID S-1 B

Date Analyzed:

Lab ID 158

2/23/96

TCLP RCRA Metals

Arsenic	BDL	0.025	1.	0.05
Barium	BQL	2.5	100.	2.0
Cadmium	BQL	0.5	1.	0.005
Chromium	BDL	0.01	1.	0.05
Lead	BQL	0.5	1.	0.015
Mercury	BQL	0.001	1.	0.0011
Selenium	BDL	0.02	1.	0.05
Silver	BQL	0.5	1.	0.018

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Wednesday, February 28, 1996

Camp Lejeune

GCI Project # 9601-044

1/23/96	Dry Wt %: 0.86	Percent Recovery	Lab Blank:	MDL in mg/kg
TPH Gas		92.2	0	2.43
1/26/96	Dry Wt %: 0.79	Percent Recovery	Lab Blank:	MDL in mg/kg
TPH Diesel		98.1	0	2.43

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Wednesday, February 28, 1996

Camp LeJeune

GCI Project # 9601-044

	Percent Recovery	Lab Blank:	lowest detection limit @ ideal conditions MDL in mg/kg
Oil and Grease	102	0	1.57

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Site Name:

Wednesday, February 28, 1996

Camp LeJeune

GCI Project # 9601-044

		Lab Blank:	lowest detection limit @ ideal conditions
	Percent Recovery		MDL in mg/kg
Vinyl Chloride	95	0	0.14
Bromomethane	86	0	0.07
Trichlorofluoromethane	97	0	0.33
1,1-Dichloroethene	90	0	0.37
Methylene Chloride	98	0	0.19
trans-1,2-Dichloroethene	79	0	0.23
2,2-Dichloropropane	92	0	0.46
cis-1,3-Dichloropropene	91	0	0.13
Chloroform	95	0	0.18
Bromochloromethane	91	0	0.16
1,1,1-Trichloroethane	97	0	0.2
1,1-Dichloropropene	106	0	0.28
Carbon Tetrachloride	106	0	0.38
Benzene	81	0	0.22
1,2-Dichloroethane	87	0	0.37
Trichloroethene	102	0	0.36
1,2-Dichloropropane	95	0	0.3
Bromodichloromethane	90	0	0.3
Dibromomethane	93	0	0.22
Toluene	81	0	0.2
1,1,2-Trichloroethane	97	0	0.18
Tetrachloroethene	82	0	0.19
1,3-Dichloropropane	112	0	0.39
Dibromochloromethane	92	0	0.24
1,2-Dibromoethane	95	0	0.28
Chlorobenzene	89	0	0.13
Ethylbenzene	81	0	0.26

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Wednesday, February 28, 1996

Camp LeJeune

GCI Project # 9601-044

1,1,1,2-Tetrachloroethane	94	0	0.31
m,p-Xylene	93	0	0.35
o-Xylene	88	0	0.18
Styrene	88	0	0.18
Isopropylbenzene	80	0	0.28
Bromoform	89	0	0.22
1,1,2,2-Tetrachloroethane	92	0	0.28
1,2,3-Trichloropropane	93	0	0.24
n-Propylbenzene	80	0	0.22
Bromobenzene	93	0	0.18
1,3,5-Trimethylbenzene	81	0	0.19
2-Chlorotoluene	81	0	0.2
4-Chlorotoluene	77	0	0.22
trans-1,3-Dichloropropene	93	0	0.17
1,2,4-Trimethylbenzene	82	0	0.22
sec-Butylbenzene	80	0	0.26
p-Isopropyltoluene	77	0	0.23
1,3-Dichlorobenzene	85	0	0.21
1,4-Dichlorobenzene	83	0	0.23
n-Butylbenzene	81	0	0.47
1,2-Dichlorobenzene	102	0	0.25
1,2-Dibromo-3-Chloropropane	94	0	0.16
1,2,4-Trichlorobenzene	80	0	0.17
Hexachlorobutadiene	87	0	0.17
Naphthalene	77	0	0.15
1,2,3-Trichlorobenzene	76	0	0.12
cis-1,2-Dichloroethene	92	0	0.15
tert-Butylbenzene	80	0	0.23 ^r

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Site Name:

Wednesday, February 28, 1996

Camp LeJeune

ICI Project # 9601-044

lowest detection limit @ ideal conditions

Percent
Recovery

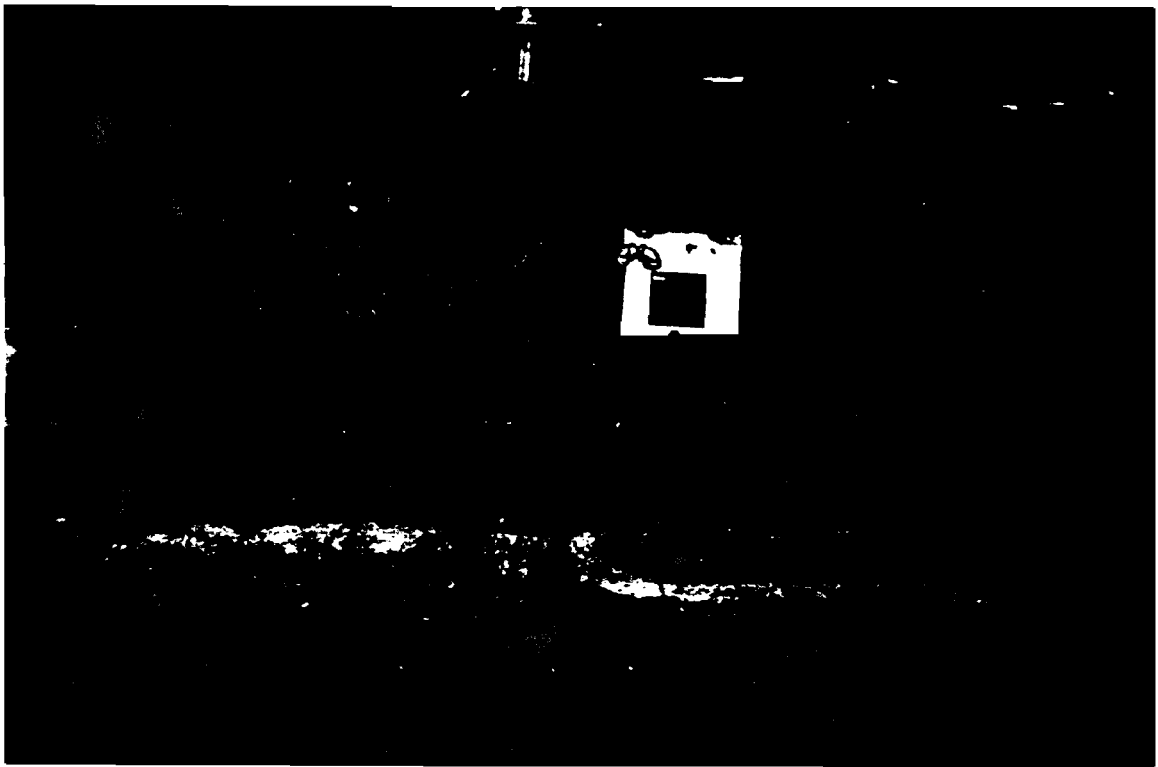
Lab Blank:

MDL in
mg/l

Arsenic	94	0	0.005
Barium	88	0	0.005
Cadmium	90	0	0.02
Chromium	103	0	0.0005
Lead	91	0	0.5
Mercury	96	0	0.0004
Selenium	88	0	0.005
Silver	93	0	0.05

Appendix F

Photographs



280 gallon waste oil tank in the ground at site NH118-3

Waste oil tank removed from ground at site NH118-3



APPENDIX C
BORING LOGS

TOTAL DEPTH 12.0'

MCB Camp Lejeune, NC

LOGGED BY E. CANDLER

DRILLING DATE 8/08/97

PAGE_1_ OF_1_

DRILLING DATE 8/11/97[illegible]

BORING NUMBER TT48MW01B
TOTAL DEPTH 5.0'

SITE LOCATION **Building TT-48**
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/11/97

PAGE 1 OF 1

BORING NUMBER SBB94MW01
TOTAL DEPTH 12.0'

SITE LOCATION Building SBB-94
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/13/97

REMARKS Grab = Grab Sample; HP = Hydraulic Push

PAGE 1 OF 1

BORING LOG

BORING NUMBER HP250MW01
TOTAL DEPTH 15.0'

SITE LOCATION Building HP-250
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/14/97

SAMPLE DEPTH (FT.)		SAMPLE DESCRIPTION	USCS	WATER CONTENT	ODOR	PID/ FID PPM	BLOW COUNT
0	3	Overburden of asphalt, underlain by light brown/yellowish-orange, SILTY SAND, very loose.	SM	Low	No	30	Grab
3	5	Light brown/yellowish-orange, very fine grained SAND, mixed with low percent of yellowish-orange and greenish-gray CLAY, loose.	SM/ CL	Low	No	0	HP
5	7	Yellowish-orange, CLAY mixed with low percent of light gray, very fine grained sand.	CL	Low	No	0	HP
7	9	Yellowish-orange, CLAY, low plasticity.	CL	Low	No	0	HP
9	11	Yellowish-orange, CLAY, low plasticity, underlain by dark gray silty clay.	CL	Medium	No	0	HP
11	13	Dark gray, SILTY CLAY, medium plasticity.	CL	Medium	No	0	HP
13	15	Dark gray, SILTY CLAY, medium plasticity.	CL	High	No	0	HP

REMARKS Grab = Grab Sample; HP = Hydraulic Push

PAGE 1 OF 1

BORING LOG

BORING NUMBER FC280MW01A
TOTAL DEPTH 12.0'

SITE LOCATION Building FC-280
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/15/97

[illegible]REMARKS Grab = Grab Sample; HP = Hydraulic Push; - = No Data RecordedPAGE 1 OF 1

BORING LOG

BORING NUMBER FC280MW01B

TOTAL DEPTH 7.0'

SITE LOCATION Building FC-280

MCB Camp Lejeune, NC

DRILLED BY B. FOWLER

LOGGED BY E. CANDLER

DRILLING DATE 8/15/97[illegible]REMARKS HP = Hydraulic Push; - = No Data Recorded

PAGE_1_ OF_1_

BORING LOG

BORING NUMBER 575MW01A
TOTAL DEPTH 20.0'

SITE LOCATION Building 575-2
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/18/97

SAMPLE DEPTH (FT.)		SAMPLE DESCRIPTION	USCS	WATER CONTENT	ODOR	PID/ FID PPM	BLOW COUNT
0	3	Overburden of concrete (pad), underlain by PEA GRAVEL.	GP	Low	No	0	Grab
3	5	PEA GRAVEL.	GP	Low	No	0	HP
5	7	PEA GRAVEL.	GP	Low	No	0	HP
7	9	PEA GRAVEL.	GP	Low	No	0	HP
9	11	PEA GRAVEL.	GP	Low	No	70	HP
11	13	Pea gravel mixed with light gray, fine grained SAND, loose.	SM	Low	Yes	70	HP
13	15	Light gray, fine grained SAND, loose.	SM	High	No	35	HP
15	17	Light gray/yellowish-orange, fine grained SAND, loose.	SM	High	No	2	HP
17	20	Light gray/yellowish-orange, fine grained SAND.	SM	High	No	2	HP

REMARKS Grab = Grab Sample; HP = Hydraulic Push

PAGE 1 OF 1

DRILLING DATE 8/18/97



BORING LOG

BORING NUMBER NH118MW01
TOTAL DEPTH 20.0'

SITE LOCATION Building NH-118-3
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/13/97

SAMPLE DEPTH (FT.)		SAMPLE DESCRIPTION	USCS	WATER CONTENT	ODOR	PID/ FID PPM	BLOW COUNT
0	2	Overburden of grass and topsoil.	MH	Low	No	0	Grab
2	4	Dark gray, CLAYEY SAND.	SC	Low	No	0	HP
4	6	Dark gray, CLAYEY SAND.	SC	Low	No	3	HP
6	8	Light brown, SILTY SAND.	SM	Low	No	3	HP
8	10	Light gray, fine grained SAND, loose.	SM	Low	No	3	HP
10	12	Light gray, fine grained SAND, loose.	SM	Low	No	8	HP
12	14	Light gray, fine grained SAND, loose, mixed with low percentage of yellowish-orange CLAY.	SM/ CL	Medium	No	5	HP
14	16	Yellowish-orange, CLAY, mixed with low percentage of light gray, fine grained SAND.	CL/ SM	High	No	3	HP
16	18	Yellowish-orange, CLAY, medium plasticity.	CL	High	No	3	HP
18	20	Yellowish-orange, CLAY, medium plasticity.	CL	High	No	3	HP

REMARKS Grab = Grab Sample; HP = Hydraulic Push

PAGE 1 OF 1

BORING LOG

BORING NUMBER AS1011MW01TOTAL DEPTH 10.0'SITE LOCATION Building AS-1011

MCB Camp Lejeune, NC

DRILLED BY B. FOWLER

LOGGED BY E. CANDLER

DRILLING DATE 8/14/97[illegible]REMARKS Grab = Grab Sample; HP = Hydraulic Push

PAGE 1 OF 1

BORING LOG

BORING NUMBER 1817MW01
TOTAL DEPTH 25.0'

SITE LOCATION Building 1817
MCB Camp Lejeune, NC

DRILLED BY B. FOWLER
LOGGED BY E. CANDLER

DRILLING DATE 8/14/97

SAMPLE DEPTH (FT.)		SAMPLE DESCRIPTION	USCS	WATER CONTENT	ODOR	PID/ FID PPM	BLOW COUNT
0	3	Overburden of crushed gravel underlain by greenish-gray, SILTY SAND.	SM	Low	No	6	Grab
3	5	Yellowish-orange/greenish-gray, SILTY SAND, loose.	SM	Low	No	0	HP
5	7	Yellowish-orange/greenish-gray, SILTY SAND, loose.	SM	Low	No	0	HP
7	9	Yellowish-orange/greenish-gray, SILTY SAND, loose.	SM	Low	No	0	HP
9	11	Yellowish-orange, SANDY CLAY, low plasticity.	CL	Low	No	0	HP
11	13	Yellowish-orange, SANDY CLAY, low plasticity.	CL	Low	No	0	HP
13	15	Yellowish-orange, SANDY CLAY, low plasticity.	CL	Low	No	0	HP
15	17	Light gray, fine grained CLAYEY SAND.	SC	Low	Strong	0	HP
17	19	Light gray, fine grained CLAYEY SAND.	SC	Low	Strong	0	HP
19	21	Yellowish-orange, SILTY CLAY, underlain by yellowish-orange clay.	CL	Medium	Strong	0	HP
21	23	Yellowish-orange CLAY.	CL	Medium	Strong	0	HP
23	25	Yellowish-orange CLAY.	CL	Medium	Strong	0	HP

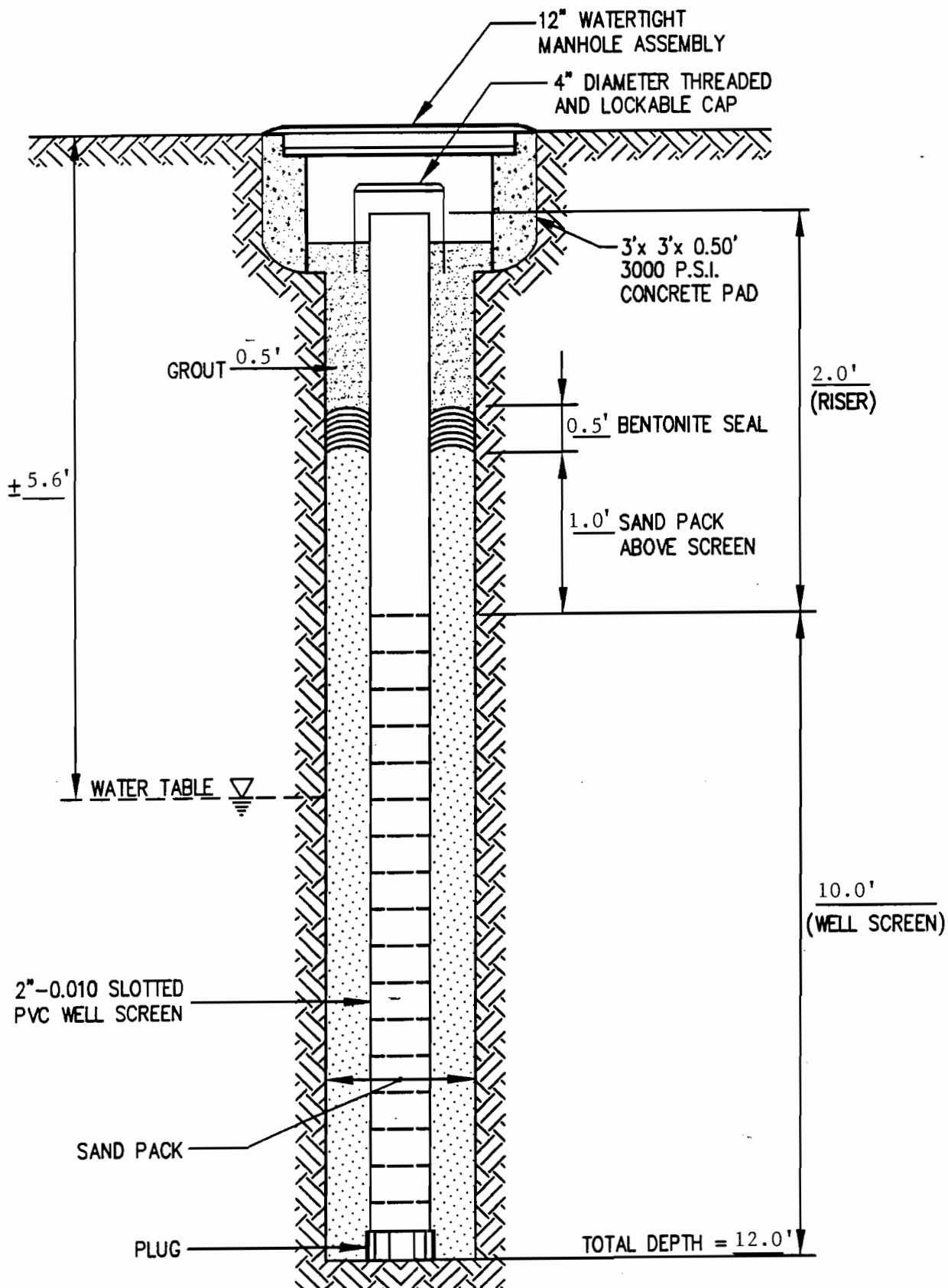
REMARKS Grab = Grab Sample; HP = Hydraulic Push

PAGE 1 OF 1

APPENDIX D

AS-BUILT WELL DETAILS, NORTH CAROLINA WELL CONSTRUCTION RECORDS, AND WELL ABANDONMENT RECORDS

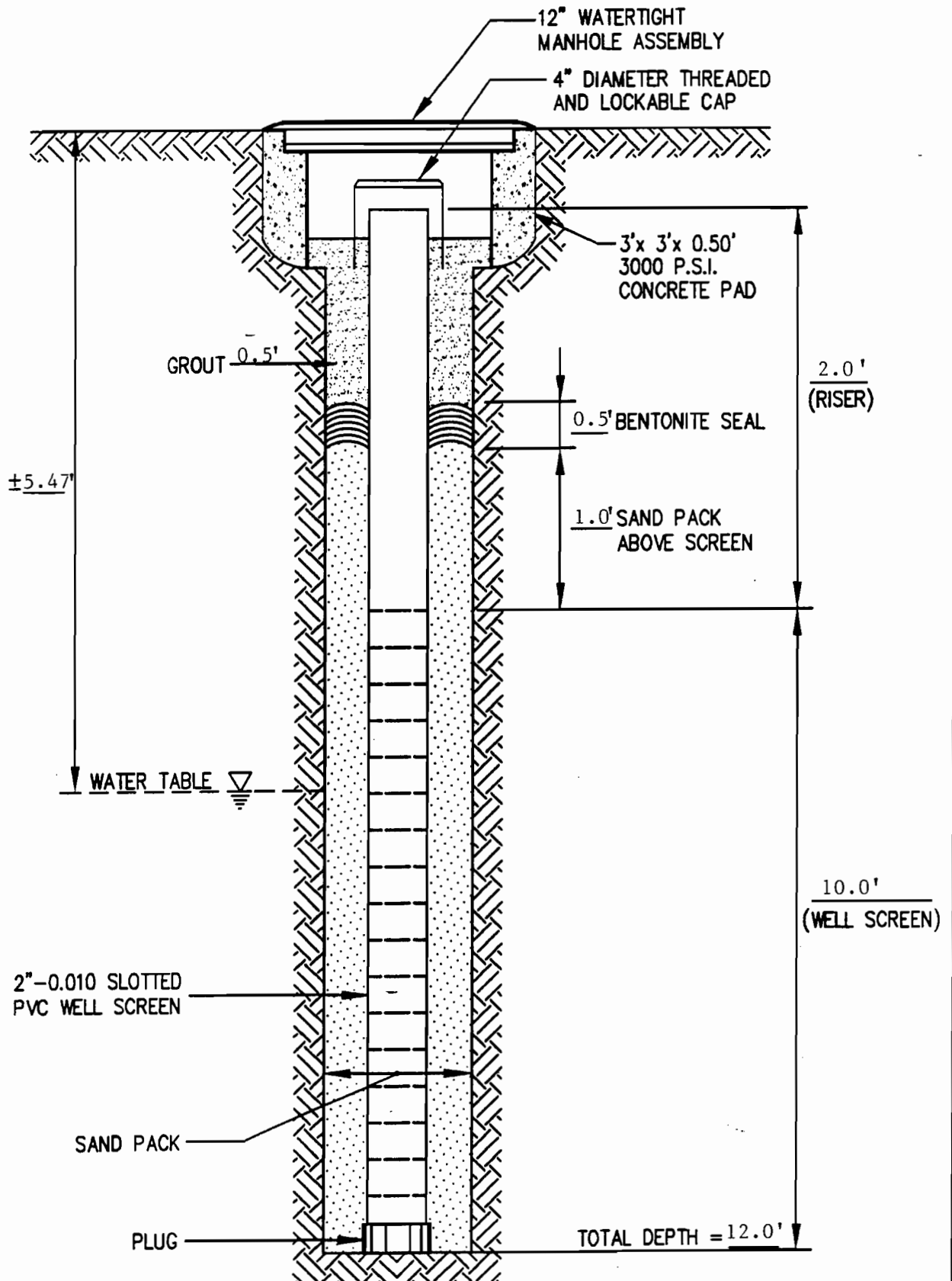
TT60MW01



Richard Catlin & Associates, Inc. ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC	PROJECT BUILDING TT-60 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE FLUSH TYPE II MONITORING WELL DETAIL			FIGURE 1 OF 9
	JOB NO: 97147	DATE: SEPT 97	SCALE:	DRAWN BY:	CHECKED BY: EAC

CAMP LEJEUNE ONLY (FLUSH-#)

SBB94MW01



CAMP LEJEUNE ONLY (FLUSH-II)

Richard Catlin & Associates, Inc.

ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS

RC&A

WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

PROJECT

BUILDING SBB-94
MARINE CORPS BASE
CAMP LEJEUNE, NC

JOB NO: 97147

DATE: SEPT 97

TITLE

FLUSH TYPE II
MONITORING WELL DETAIL

SCALE:

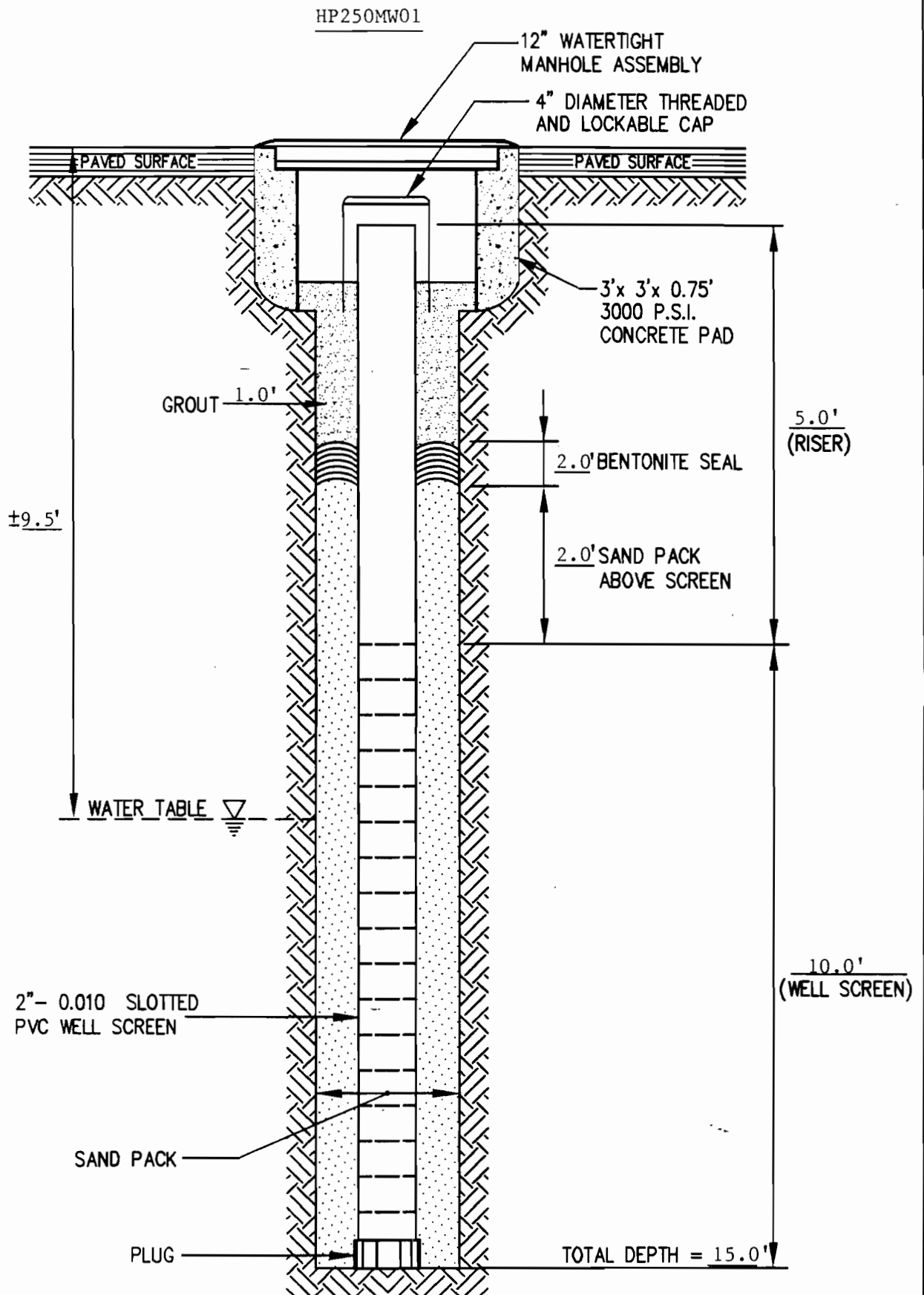
DRAWN BY:

CHECKED BY:

EAC

FIGURE

2 OF
9



Richard Collin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS
 WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

PROJECT
 BUILDING HP-250
 MARINE CORPS BASE
 CAMP LEJEUNE, NC

TITLE
 PAVED SURFACE TYPE II
 MONITORING WELL DETAIL

FIGURE
 3 OF
 9

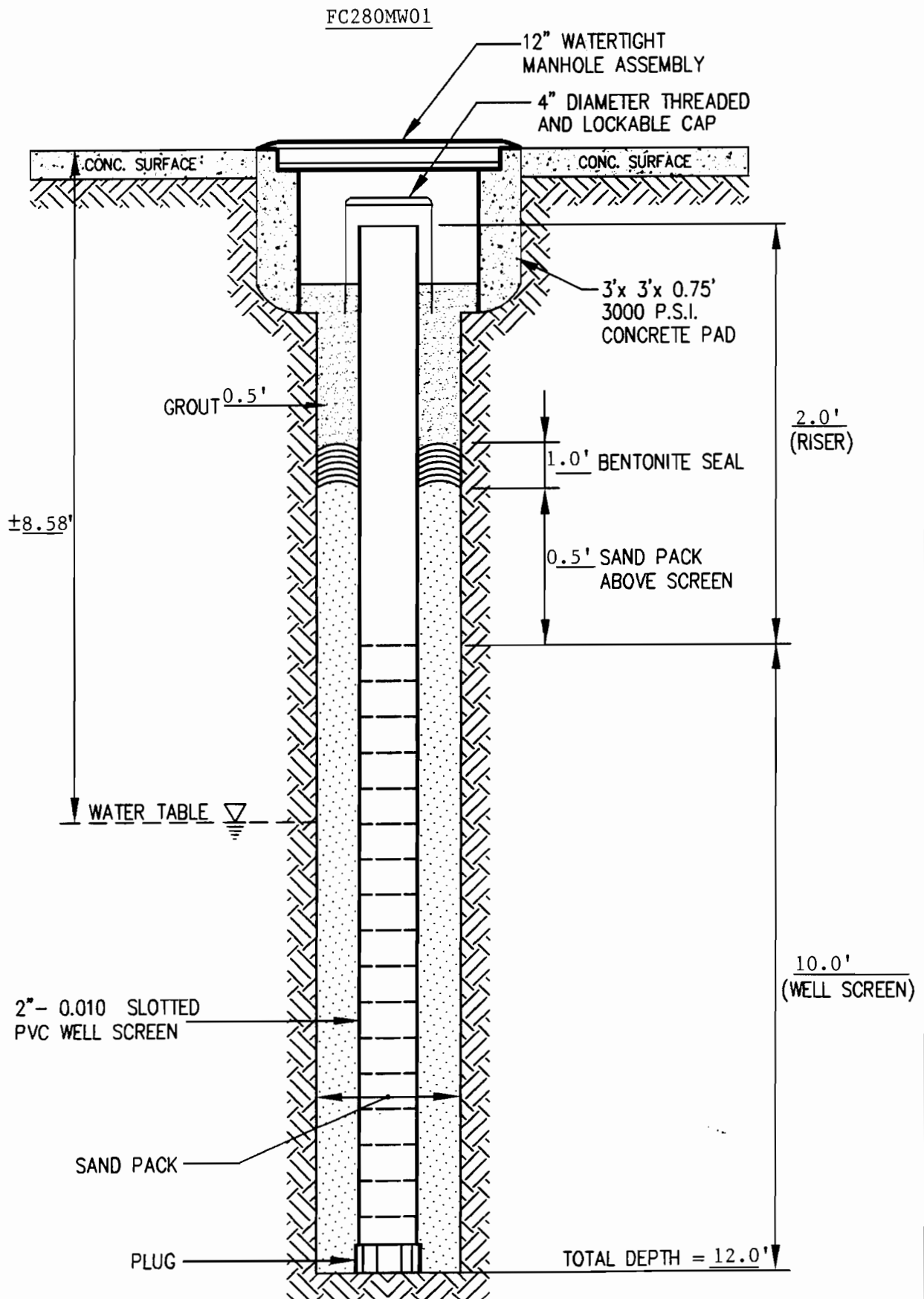
JOB NO: 97147

DATE: SEPT 97

SCALE:

DRAWN BY:

CHECKED BY: EAC



Richard Catlin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS

PROJECT
 BUILDING FC-280
 MARINE CORPS BASE
 CAMP LEJEUNE, NC

TITLE
 PAVED SURFACE TYPE II
 MONITORING WELL DETAIL

FIGURE
 4 OF
 9

WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

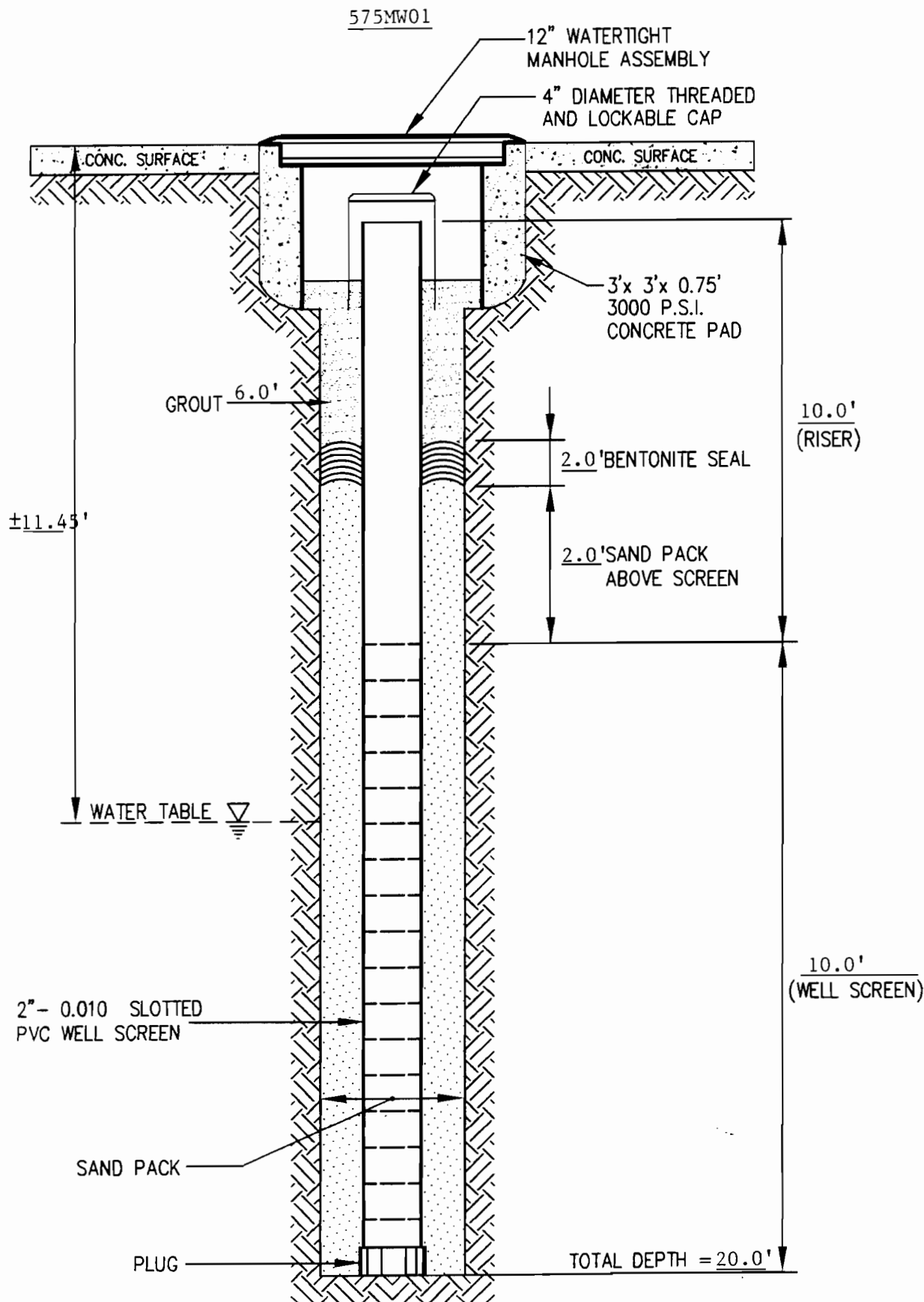
JOB NO: 97147

DATE: SEPT 97

SCALE:

DRAWN BY:

CHECKED BY: EAC



Richard Catlin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS
 WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

PROJECT
 BUILDING 575-2
 MARINE CORPS BASE
 CAMP LEJEUNE, NC

TITLE
 PAVED SURFACE TYPE II
 MONITORING WELL DETAIL

FIGURE
 5 OF
 9

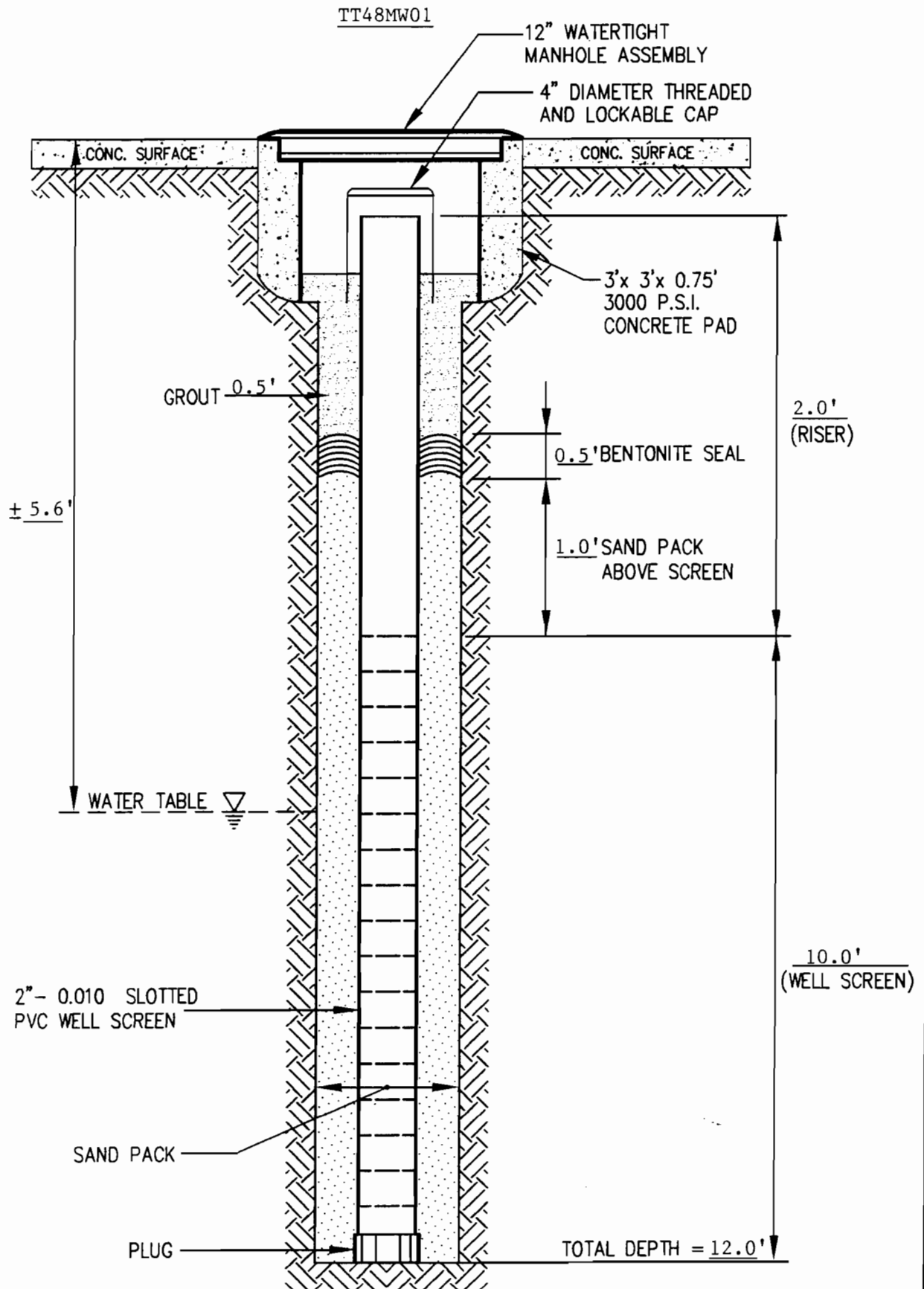
JOB NO: 97147

DATE: SEPT 97

SCALE:

DRAWN BY:

CHECKED BY: EAC



Richard Catlin & Associates, Inc.
 ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS

RC&A

WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC

PROJECT
 BUILDING TT-48
 MARINE CORPS BASE
 CAMP LEJEUNE, NC

JOB NO: 97147

DATE: SEPT 97

TITLE

PAVED SURFACE TYPE II
 MONITORING WELL DETAIL

SCALE:

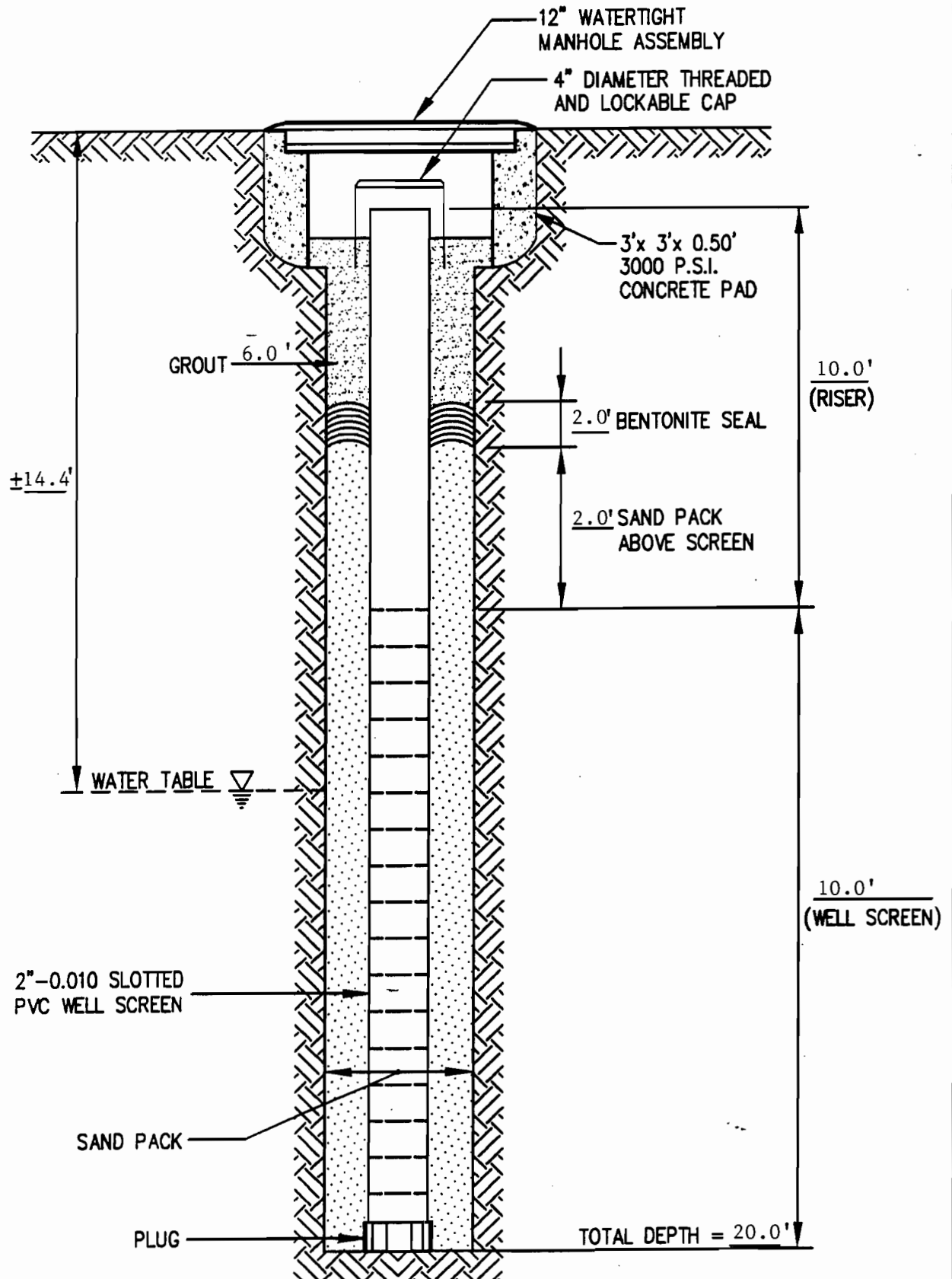
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CHECKED BY: EAC

FIGURE

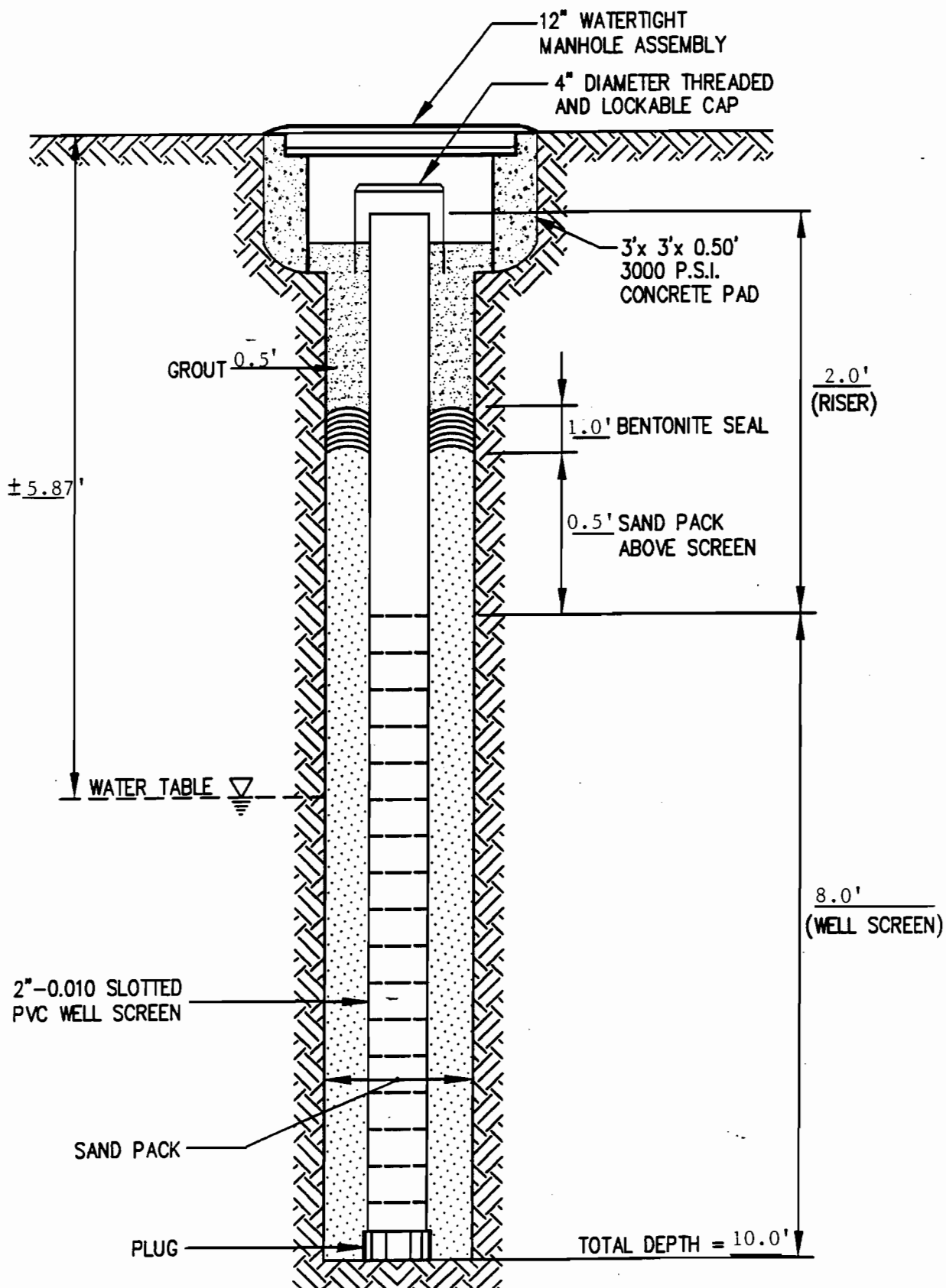
6 OF
 9

NH118MW01



CAMP LEJEUNE ONLY (FLUSH-II) Richard Catlin & Associates, Inc. ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC	PROJECT BUILDING NH118-3 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE FLUSH TYPE II MONITORING WELL DETAIL	FIGURE	
			7 OF 9	
JOB NO: 97147	DATE: SEPT 97	SCALE:	DRAWN BY:	CHECKED BY: EAC

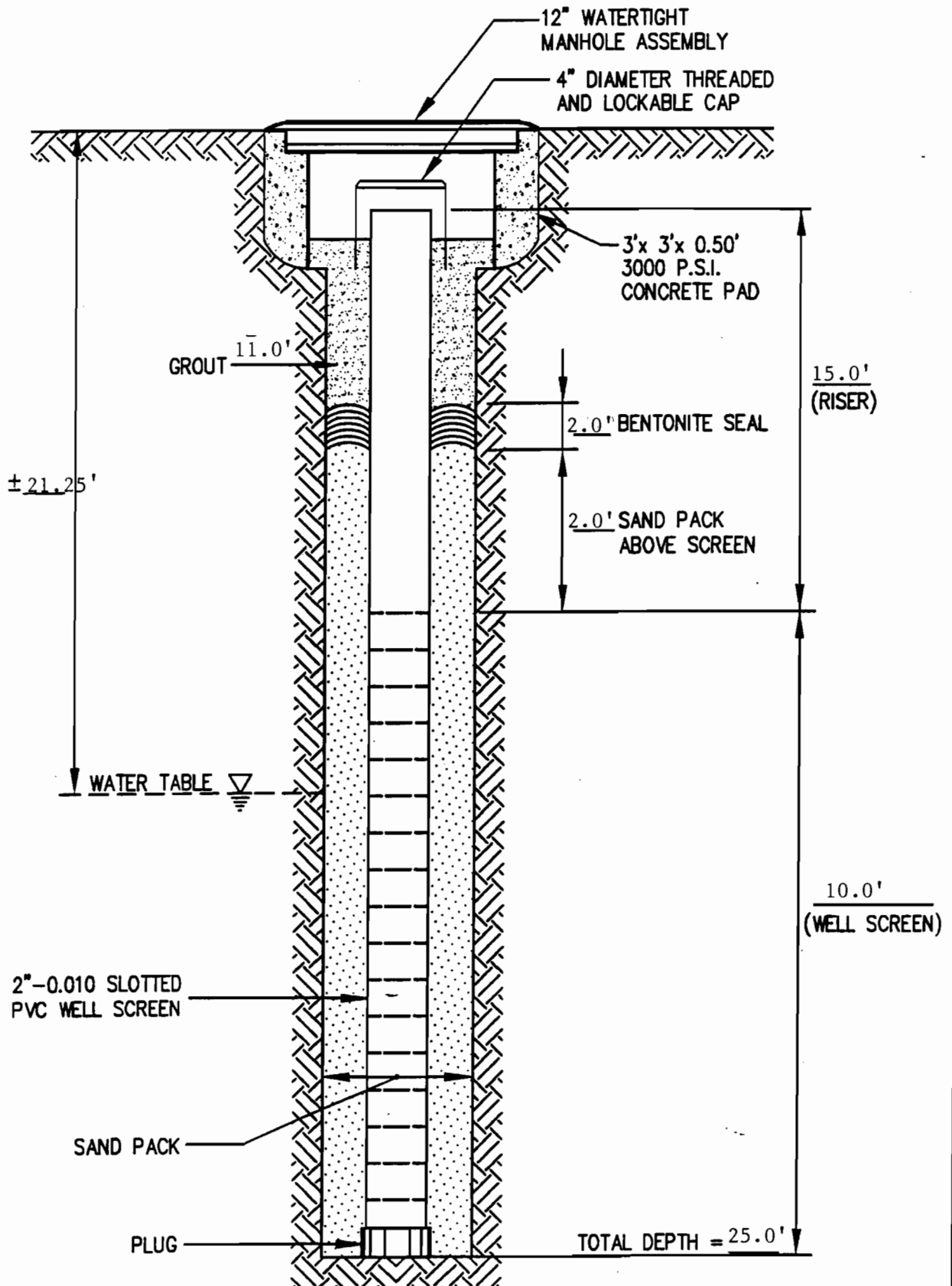
AS1011MW01



Richard Catlin & Associates, Inc. ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC	PROJECT BUILDING AS1011 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE FLUSH TYPE II MONITORING WELL DETAIL	FIGURE	
			8 OF	9
JOB NO: 97147	DATE: SEPT 97	SCALE:	DRAWN BY:	CHECKED BY: EAC

CAMP LEJEUNE ONLY (FLUSH-II)

1817MW01



CAMP LEJEUNE ONLY (FLUSH-II) Richard Callin & Associates, Inc. ENVIRONMENTAL ENGINEERS AND HYDROGEOLOGISTS WILMINGTON, NC CHARLESTON, SC ATLANTA, GA CHARLOTTE, NC	PROJECT BUILDING 1817 MARINE CORPS BASE CAMP LEJEUNE, NC	TITLE FLUSH TYPE II MONITORING WELL DETAIL		FIGURE 9 OF 9
	JOB NO: 97147	DATE: SEPT 97	SCALE:	CHECKED BY: EAC
	DRAWN BY:			

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR TT60MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Jacksonville

County: Onslow

Building TT 60
(Road, Community, or Subdivision and Lot No.)

Depth DRILLING LOG
From To Formation Description

2. 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

3. DATE DRILLED 8/08/97 USE OF WELL Monitoring

4. TOTAL DEPTH 12.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

SEE ATTACHED

6. STATIC WATER LEVEL: ±5.6 FT. ABOVE/BELOW TOP OF CASING.

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

8. WATER ZONES (depth): Surficial Aquifer

9. CHLORINATION: Type: N/A Amount N/A

If additional space is needed use back of form.

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u> <u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 2 Ft.		2 in.	SCH40	PVC
From		To Ft.		in.		

LOCATION SKETCH
(Show direction and distance from at least two State
Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 0.5 Ft.		CEMENT	TREMIE
From	0.5	To 1 Ft.		BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	2	To 12 Ft.		2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	1	To 12 Ft.		TORPEDO	SAND

14. REMARKS: _____

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

Jim M. Pura

SIGNATURE OF CONTRACTOR OR AGENT

9/30/97

DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR SBB94MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

County: Onslow

Nearest Town: Jacksonville

Building SBB 94
(Road, Community, or Subdivision and Lot No.)

Depth DRILLING LOG
From To Formation Description

2. 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

3. DATE DRILLED 8/13/97 USE OF WELL Monitoring

4. TOTAL DEPTH 12.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

SEE ATTACHED

6. STATIC WATER LEVEL: ± 5.47 FT. ABOVE/BELOW TOP OF CASING.

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

8. WATER ZONES (depth): Surficial Aquifer

9. CHLORINATION: Type: N/A Amount N/A

If additional space is needed use back of form.

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u> <u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 2	Ft.	2 in.	SCH40	PVC
From		To	Ft.	in.		

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 0.5	Ft.	CEMENT	TREMIE
From	0.5	To 1	Ft.	BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	2	To 12	Ft.	2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	1	To 12	Ft.	TORPEDO	SAND

14. REMARKS: _____

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

Sei M. Piv 9/30/97
SIGNATURE OF CONTRACTOR OR AGENT DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR HP250MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

Nearest Town: Jacksonville

County: Onslow

Building HP 250

(Road, Community, or Subdivision and Lot No.)

Depth

From To

DRILLING LOG

Formation Description

2. 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

3. DATE DRILLED 8/14/97 USE OF WELL Monitoring

4. TOTAL DEPTH 15.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: $\pm$ 9.5 FT. ABOVE/BELOW TOP OF CASING.

SEE ATTACHED

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

8. WATER ZONES (depth): Surficial Aquifer

9. CHLORINATION: Type: N/A Amount N/A

10. CASING:

Wall Thickness

		<u>Depth</u>		<u>Diameter</u>	<u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 5	Ft.	2 in.	SCH40	PVC
From		To	Ft.	in.		

If additional space is needed use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 1	Ft.	CEMENT	TREMIE
From	1	To 3	Ft.	BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	5	To 15	Ft.	2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	3	To 15	Ft.	TORPEDO	SAND

14. REMARKS: _____

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

Teri M. Power

SIGNATURE OF CONTRACTOR OR AGENT

9/30/97

DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR FC280MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

County: Onslow

Nearest Town: Jacksonville

Building FC 280
(Road, Community, or Subdivision and Lot No.)

Depth DRILLING LOG
From To Formation Description

2. 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

3. DATE DRILLED 8/15/97 USE OF WELL Monitoring

4. TOTAL DEPTH 12.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: +8.58 FT. ABOVE/BELOW TOP OF CASING.

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

8. WATER ZONES (depth): Surficial Aquifer

SEE ATTACHED

9. CHLORINATION: Type: N/A Amount N/A

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u> <u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 2 Ft.		2 in.	SCH40	PVC
From		To Ft.		in.		

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State
Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 0.5 Ft.		CEMENT	TREMIE
From	0.5	To 1.5 Ft.		BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	2	To 12 Ft.		2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	1.5	To 12 Ft.		TORPEDO	SAND

14. REMARKS: _____

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

Teri M. Poirer 9/30/97
SIGNATURE OF CONTRACTOR OR AGENT DATE
Submit original to Division of Environmental Management and copy to well owner.

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR 575MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

Nearest Town: Jacksonville

County: Onslow

Building 575

(Road, Community, or Subdivision and Lot No.)

Depth

From To

DRILLING LOG

Formation Description

2. 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

3. DATE DRILLED 8/18/97 USE OF WELL Monitoring

4. TOTAL DEPTH 20.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: ±11.45 FT. ABOVE/BELOW TOP OF CASING.

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

8. WATER ZONES (depth): Surficial Aquifer

SEE ATTACHED

9. CHLORINATION: Type: N/A Amount N/A

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u> <u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 10	Ft.	2 in.	SCH40	PVC
From		To	Ft.	in.		

If additional space is needed use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 6	Ft.	CEMENT	TREMIE
From	6	To 8	Ft.	BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	10	To 20	Ft.	2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	8	To 20	Ft.	TORPEDO	SAND

14. REMARKS: _____

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

Tim M. Davis
SIGNATURE OF CONTRACTOR OR AGENT

9/30/97

DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR TT48MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

Nearest Town: Jacksonville

County: Onslow

Building TT 48

(Road, Community, or Subdivision and Lot No.)

Depth

From To

DRILLING LOG

Formation Description

2. 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

3. DATE DRILLED 8/11/97 USE OF WELL Monitoring

4. TOTAL DEPTH 12.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: $\pm$ 5.6 FT. ABOVE/BELOW TOP OF CASING.

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

8. WATER ZONES (depth): Surficial Aquifer

SEE ATTACHED

9. CHLORINATION: Type: N/A Amount N/A

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u> <u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 2	Ft.	2 in.	SCH40	PVC
From		To	Ft.	in.		

If additional space is needed use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 0.5	Ft.	CEMENT	TREMIE
From	0.5	To 1	Ft.	BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	2	To 12	Ft.	2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	1	To 12	Ft.	TORPEDO	SAND

14. REMARKS: _____

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

Teri M. Piver
SIGNATURE OF CONTRACTOR OR AGENT

9/30/97
DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc. _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR NH118MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

County: Onslow

Nearest Town: Jacksonville

Building NH 118
(Road, Community, or Subdivision and Lot No.)

Depth DRILLING LOG
From To Formation Description

2. 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

3. DATE DRILLED 8/13/97 USE OF WELL Monitoring

4. TOTAL DEPTH 20.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: ±14.4 FT. ABOVE/BELOW TOP OF CASING.

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

8. WATER ZONES (depth): Surficial Aquifer

SEE ATTACHED

9. CHLORINATION: Type: N/A Amount N/A

10. CASING:
From 0 To 10 Ft. Depth Diameter Wall Thickness Material
From To Ft. 2 in. or Weight/Ft. SCH40 PVC

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:
From 0 To 6 Ft. Depth Material Method
From 6 To 8 Ft. CEMENT TREMIE
BENTONITE CHIPS

12. SCREEN:
From 10 To 20 Ft. Depth Diameter Slot Size Material
2 in. .010 in. PVC

SEE ATTACHED

13. GRAVEL PACK:
From 8 To 20 Ft. Depth Size Material
TORPEDO SAND

14. REMARKS: _____

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

Jim M. Pava 9/30/97
SIGNATURE OF CONTRACTOR OR AGENT DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR AS1011MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

Nearest Town: Jacksonville

County: Onslow

Building AS 1011
(Road, Community, or Subdivision and Lot No.)

Depth DRILLING LOG
From To Formation Description

2. 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

3. DATE DRILLED 8/14/97 USE OF WELL Monitoring

4. TOTAL DEPTH 10.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: ± 5.87 FT. ABOVE/BELOW TOP OF CASING.

SEE ATTACHED

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

8. WATER ZONES (depth): Surficial Aquifer

9. CHLORINATION: Type: N/A Amount N/A

If additional space is needed use back of form.

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u> <u>or Weight/Ft.</u>	<u>Material</u>
From	0	To 2 Ft.		2 in.	SCH40	PVC
From		To Ft.		in.		

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	0	To 0.5 Ft.		CEMENT	TREMIE
From	0.5	To 1.5 Ft.		BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	2	To 10 Ft.		2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	1.5	To 10 Ft.		TORPEDO	SAND

14. REMARKS: _____

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

Jim M. Pinner
SIGNATURE OF CONTRACTOR OR AGENT

9/30/97

DATE

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD FOR 1817MW01

DRILLING CONTRACTOR Richard Catlin & Associates, Inc.

DRILLER REGISTRATION NUMBER 1142

STATE WELL CONSTRUCTION

PERMIT NUMBER: N/A

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

Nearest Town: Jacksonville

County: Onslow

Building 1817
(Road, Community, or Subdivision and Lot No.)

Depth DRILLING LOG
From To Formation Description

2. 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

3. DATE DRILLED 8/14/97 USE OF WELL Monitoring

4. TOTAL DEPTH 25.0' CUTTINGS COLLECTED X YES NO

5. DOES WELL REPLACE EXISTING WELL? YES X NO

6. STATIC WATER LEVEL: ±21.25 FT. ABOVE/BELOW TOP OF CASING.

SEE ATTACHED

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

8. WATER ZONES (depth): Surficial Aquifer

9. CHLORINATION: Type: N/A Amount N/A

If additional space is needed use back of form.

10. CASING:

		<u>Depth</u>		<u>Diameter</u>	<u>Wall Thickness</u>	<u>Material</u>
From	To	Ft.		in.	or Weight/Ft.	
0	15	Ft.		2 in.	SCH40	PVC
From	To	Ft.		in.		

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

11. GROUT:

		<u>Depth</u>		<u>Material</u>	<u>Method</u>
From	To	Ft.			
0	11	Ft.		CEMENT	TREMIE
From	To	Ft.		BENTONITE	CHIPS

12. SCREEN:

		<u>Depth</u>		<u>Diameter</u>	<u>Slot Size</u>	<u>Material</u>
From	To	Ft.		in.		
15	25	Ft.		2 in.	.010 in.	PVC

SEE ATTACHED

13. GRAVEL PACK:

		<u>Depth</u>		<u>Size</u>	<u>Material</u>
From	To	Ft.			
13	25	Ft.		TORPEDO	SAND

14. REMARKS: _____

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

Jim M. Power 9/30/97
SIGNATURE OF CONTRACTOR OR AGENT DATE
Submit original to Division of Environmental Management and copy to well owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT
RECORD FOR TT60MW01

P. O. Box 27687 - Raleigh, N. C. 27611

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE

County ONSLOW

BUILDING TT60

Quadrangle No.

(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

PSC Box 20004, Camp Lejeune, NC

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 12.0' DIAMETER: 2"

7. CASING REMOVED:

feet

diameter

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

SEE AS-BUILT WELL DETAIL

8. SEALING MATERIAL:

Neat cement

Sand cement

bags of cement 1

bags of cement

gals. of water 7

yds. of sand

gals. of water

Other

Type material

Amount

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.

Signature of Contractor or Agent Date

Submit original to the Division of Environmental Management, one copy to the Driller,
and one copy to the Owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT

P. O. Box 27687 - Raleigh, N. C. 27611

RECORD FOR SBB94MW01

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE

County ONslow

BUILDING SBB94

Quadrangle No.

(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

PSC Box 20004, Camp Lejeune, NC

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 12.0' DIAMETER: 2"

7. CASING REMOVED:

<u>feet</u>	<u>diameter</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

8. SEALING MATERIAL:

<u>Neat cement</u>	<u>Sand cement</u>
bags of cement <u>1</u>	bags of cement <u> </u>
gals. of water <u>7</u>	yds. of sand <u> </u>
	gals. of water <u> </u>

Other
Type material
Amount

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.


Signature of Contractor or Agent Date

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

SEE AS-BUILT WELL DETAIL

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT
RECORD FOR HP250MW01

P. O. Box 27687 - Raleigh, N. C. 27611

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE County ONslow
BUILDING HP250 Quadrangle No.
(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

PSC Box 20004, Camp Lejeune, NC

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 15.0' DIAMETER: 2"

7. CASING REMOVED:

<u>feet</u>	<u>diameter</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

8. SEALING MATERIAL:

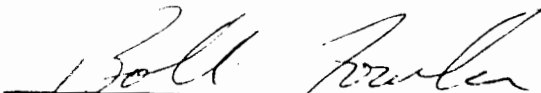
<u>Neat cement</u>	<u>Sand cement</u>
bags of cement <u>1</u>	bags of cement <u> </u>
gals. of water <u>7</u>	yds. of sand <u> </u>
	gals. of water <u> </u>

Other
Type material
Amount

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.


Signature of Contractor or Agent Date

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

SEE AS-BUILT WELL DETAIL

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT
RECORD FOR FC280MW01

P. O. Box 27687 - Raleigh, N. C. 27611

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE

County ONSLOW

BUILDING FC280

Quadrangle No.

(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 12.0' DIAMETER: 2"

7. CASING REMOVED:

feet

diameter

8. SEALING MATERIAL:

Neat cement

Sand cement

bags of cement 1

bags of cement

gals. of water 7

yds. of sand

gals. of water

Other

Type material

Amount

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.

Signature of Contractor or Agent Date

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

SEE AS-BUILT WELL DETAIL

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT
RECORD FOR 575MW01

P. O. Box 27687 - Raleigh, N. C. 27611

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE

County ONSLOW

BUILDING 575

Quadrangle No.

(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

PSC Box 20004, Camp Lejeune, NC

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 20.0' DIAMETER: 2"

7. CASING REMOVED:

feet diameter

8. SEALING MATERIAL:

Neat cement

Sand cement

bags of cement 1

bags of cement _____

gals. of water 7

yds. of sand _____

gals. of water _____

Other

Type material _____

Amount _____

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.


Signature of Contractor or Agent Date

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

SEE AS-BUILT WELL DETAIL

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT
RECORD FOR TT48MW01

P. O. Box 27687 - Raleigh, N. C. 27611

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE County ONSLOW
BUILDING TT48 Quadrangle No.
(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

PSC Box 20004, Camp Lejeune, NC

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 12.0' DIAMETER: 2"

7. CASING REMOVED:

<u>feet</u>	<u>diameter</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

8. SEALING MATERIAL:

<u>Neat cement</u>	<u>Sand cement</u>
bags of cement <u>1</u>	bags of cement <u> </u>
gals. of water <u>7</u>	yds. of sand <u> </u>
	gals. of water <u> </u>

Other
Type material
Amount

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL.

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.

Scott Fowler
Signature of Contractor or Agent Date

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

SEE AS-BUILT WELL DETAIL

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

North Carolina
Department of Natural Resources and Community Development
Division of Environmental Management

WELL ABANDONMENT
RECORD FOR AS1011MW01

P. O. Box 27687 - Raleigh, N. C. 27611

CONTRACTOR CATLIN ENGINEERS AND SCIENTISTS

REG. NO. 1142

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

Nearest Town: JACKSONVILLE County ONSLow
BUILDING AS1011 Quadrangle No.
(Road, Community, Subdivision, Lot No.)

2. OWNER: LANTDIV NAVFACENGCOM, COMMANDING GENERAL

3. ADDRESS: AC/S EMD, Marine Corps Base

PSC Box 20004, Camp Lejeune, NC

4. TOPOGRAPHY: draw, slope, hilltop, valley, flat

5. USE OF WELL: MONITORING DATE: 10/01/97

6. TOTAL DEPTH: 10.0' DIAMETER: 2"

7. CASING REMOVED:

<u>feet</u>	<u>diameter</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

8. SEALING MATERIAL:

<u>Neat cement</u>	<u>Sand cement</u>
bags of cement <u>1</u>	bags of cement <u> </u>
gals. of water <u>7</u>	yds. of sand <u> </u>
	gals. of water <u> </u>

Other
Type material
Amount

9. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL

TREMIE GROUT

I do hereby certify that this well
abandonment record is true and exact.


Signature of Contractor or Agent Date

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

SEE AS-BUILT WELL DETAIL

Submit original to the Division of Environmental Management, one copy to the Driller, and one copy to the Owner.

APPENDIX E
SAMPLING FIELD DATA WORKSHEETS

APPENDIX E

SAMPLING FIELD DATA WORKSHEETS

SUBJECT: 10 UST Sites, MCB Camp Lejeune
PROJECT NO.: 97147-A

PAGE 1 OF 2
SAMPLED BY: EAC/MWW

WELL NO.	TT60MW01	SBB94MW01	HP250MW01	FC280MW01	575MW01
DATE SAMPLED	8/25/97	8/25/97	8/25/97	8/25/97	8/25/97
WELL DIAMETER	2.0"	2.0"	2.0"	2.0"	2.0"
WELL DEPTH - A	12.0'	12.0'	15.0'	12.0'	20.0'
DEPTH TO WATER - B	5.6'	5.5'	9.5'	8.6'	11.5'
(A-B) FT. H ₂ O IN WELL - C	6.4	6.5	5.5	3.4	8.5
GALLONS/FT. - D	.163	.163	.163	.163	.163
(CxD) ONE VOLUME - E	1.04	1.06	0.897	0.557	1.39
(Ex3) THREE VOLUMES - F	3.12	3.18	2.69	1.67	4.17
VOLUME OF BAILER - G	.24	.24	.24	.24	.24
(F/G) NO. BAILS REQUIRED - H	13	13	11	7	17
NO. BAILS TAKEN - I	13	14	12	8	18
VOLUMES REMOVED IN GALLONS - J	3.12	3.36	2.88	1.92	4.32

VOLUMES:

1-1/4" WELL = 0.064 GAL/FT
2" WELL = 0.163 GAL/FT
4" WELL = 0.653 GAL/FT

6" WELL = 1.42 GAL/FT
3' x 1.5" BAILER = 0.24 GAL/BAIL
4' x 1.5" BAILER = 0.37 GAL/BAIL

APPENDIX E

SAMPLING FIELD DATA WORKSHEETS

SUBJECT: 10 UST Sites, MCB Camp Lejeune
PROJECT NO.: 97147-A

PAGE 2 OF 2
SAMPLED BY: EAC/MWW

WELL NO.	TT48MW01	NH118MW01	AS1011MW01	1817MW01
DATE SAMPLED	8/26/97	8/26/97	8/26/97	8/26/97
WELL DIAMETER	2.0"	2.0"	2.0"	2.0"
WELL DEPTH - A	12.0'	20.0'	10.0'	25.0'
DEPTH TO WATER - B	5.6'	14.4'	5.87'	21.25'
(A-B) FT. H ₂ O IN WELL - C	6.4	5.6	4.13	3.75
GALLONS/FT. - D	.163	.163	.163	.163
(Cx D) ONE VOLUME - E	1.04	0.913	0.673	0.611
(Ex 3) THREE VOLUMES - F	3.12	2.74*	2.02	1.83*
VOLUME OF BAILER - G	.24	.24	.24	.24
(F/G) NO. BAILS REQUIRED - H	13		8	
NO. BAILS TAKEN - I	14		9	
VOLUMES REMOVED IN GALLONS - J	3.36	3.00	2.16	2.00

VOLUMES:

1-1/4" WELL = 0.064 GAL/FT
2" WELL = 0.163 GAL/FT
4" WELL = 0.653 GAL/FT

6" WELL = 1.42 GAL/FT
3' x 1.5" BAILER = 0.24 GAL/BAIL
4' x 1.5" BAILER = 0.37 GAL/BAIL

* Sampled using low-flow purge techniques.

APPENDIX F
LABORATORY ANALYTICAL REPORTS

GeoChem, Incorporated

Environmental Laboratories

7147-C
FILE COPY**Certified Analytical Laboratory**

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

CAMP LEJUENE, 10 USTS

97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC

28405

Report Date

Friday, August 22, 1997

PO #**Date Received in lab:**

Thursday, August 14, 1997

GCI Project #: 9708-026**Summary of requested analytical work****Sample type code #s :**

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: NH118MW01

Date Sampled 8/13/97

Lab ID 2110

at 10:30

Sample Type: 1

Date Analyzed: 8/20/97

for 8021 soil

Field Number: NH118MW01

Date Sampled 8/13/97

Lab ID 2110

at 10:30

Sample Type: 1

Date Analyzed: 8/20/97

for 9071 soil

Field Number: NH118MW01

Date Sampled 8/13/97

Lab ID 2110

at 10:30

Sample Type: 2

Date Analyzed: 8/18/97

for TCLP RCRA Metals

Field Number: SBB94MW01

Date Sampled 8/13/97

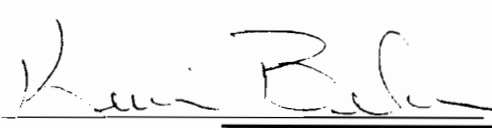
Lab ID 2111

at 13:00

Sample Type: 1

Date Analyzed: 8/21/97

for 5030

 Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560

Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

Site Name:

CAMP LEJUENE, 10 USTS

GCI Project # 9708-026

lowest detection on sample

Field ID NH118MW01

Date Analyzed: 8/20/97

Conc. in
ug/kg

PQL in
ug/kg

Dilution
Factor

Dry wt % 92.9

Lab ID 2110

8021 soil

Dichlorodifluoromethane	BDL	.5	1.0
Chloromethane	BDL	.5	1.0
Vinyl Chloride	BDL	.5	1.0
Bromomethane	BDL	.5	1.0
Chloroethane	BDL	.5	1.0
Trichlorofluoromethane	BDL	.5	1.0
1,1-Dichloroethene	BDL	.5	1.0
Methylene Chloride	BDL	.5	1.0
trans-1,2-Dichloroethene	BDL	.5	1.0
1,1-Dichloroethane	BDL	.5	1.0
2,2-Dichloropropane	BDL	.5	1.0
cis-1,3-Dichloropropene	BDL	.5	1.0
Chloroform	BDL	.5	1.0
Bromochloromethane	BDL	.5	1.0
1,1,1-Trichloroethane	BDL	.5	1.0
1,1-Dichloropropene	BDL	.5	1.0
Carbon Tetrachloride	BDL	.5	1.0
Benzene	BDL	.5	1.0
1,2-Dichloroethane	BDL	.5	1.0
Trichloroethene	BDL	.5	1.0
1,2-Dichloropropane	BDL	.5	1.0
Bromodichloromethane	BDL	.5	1.0
Dibromomethane	BDL	.5	1.0
Toluene	BDL	.5	1.0
1,1,2-Trichloroethane	BDL	.5	1.0
Tetrachloroethene	BDL	.5	1.0
1,3-Dichloropropane	BDL	.5	1.0
Dibromochloromethane	BDL	.5	1.0
1,2-Dibromoethane	BDL	.5	1.0
Chlorobenzene	BDL	.5	1.0
Ethylbenzene	BDL	.5	1.0
1,1,1,2-Tetrachloroethane	BDL	.5	1.0
m,p-Xylene	BDL	1.0	1.0
o-Xylene	BDL	.5	1.0
Styrene	BDL	.5	1.0
Isopropylbenzene	BDL	.5	1.0
Bromoform	BDL	.2	1.0
1,1,2,2-Tetrachloroethane	BDL	.5	1.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

Site Name:

CAMPLEJUENE, 10 USTS

GCI Project # 9708-026

lowest detection on sample

	Conc. in ug/kg	PQL in ug/kg	Dilution Factor
1,2,3-Trichloropropane	BDL	.5	1.0
n-Propylbenzene	BDL	.5	1.0
Bromobenzene	BDL	.5	1.0
1,3,5-Trimethylbenzene	1.4	.5	1.0
2-Chlorotoluene	BDL	.5	1.0
4-Chlorotoluene	BDL	.5	1.0
trans-1,3-Dichloropropene	BDL	.5	1.0
1,2,4-Trimethylbenzene	6.5	.5	1.0
sec-Butylbenzene	0.9	.5	1.0
p-Isopropyltoluene	BDL	.5	1.0
1,3-Dichlorobenzene	BDL	.5	1.0
1,4-Dichlorobenzene	BDL	.5	1.0
n-Butylbenzene	3.9	.5	1.0
1,2-Dichlorobenzene	BDL	.5	1.0
1,2-Dibromo-3-Chloropropa	BDL	.5	1.0
1,2,4-Trichlorobenzene	BDL	.5	1.0
Hexachlorobutadiene	BDL	.5	1.0
Naphthalene	10.0	.5	1.0
1,2,3-Trichlorobenzene	BDL	.5	1.0
cis-1,2-Dichloroethene	BDL	.5	1.0
tert-Butylbenzene	0.9	.5	1.0

End of 8021 soil

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

Site Name: CAMP LEJUENE, 10 USTS

GCI Project # 9708-026

Field ID NH118MW01 Lab ID 2110

Date Analyzed: 8/18/97

TCLP RCRA Metals

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Arsenic	BQL	0.01	1.0	0.05
Barium	BQL	2.5	100.0	2.0
Cadmium	BQL	0.5	1.0	0.005
Chromium	BQL	0.5	1.0	0.05
Lead	BQL	0.5	1.0	0.015
Mercury	BQL	0.001	1.0	0.0011
Selenium	BQL	0.02	1.0	0.05
Silver	BQL	0.5	1.0	0.018

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

Site Name:

CAMP LEJUENE, 10 USTS

GCI Project # 9708-026

**Conc. in
mg/kg**

lowest detect on sample

**PQL in
mg/kg**

**Dilution
Factor**

Field ID **NH118MW01**

Date Analyzed:

Lab ID 2110

8/20/97

9071 soil

Oil and Grease

34.341

5.

1.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project 9708-026

Site Name:

CAMP LEJUENE, 10 USTS

Conc. in mg/kg

PQL in mg/kg

Field ID SBB94MW01

Lab ID 2111

Date Analyzed: 8/21/97

Dry Wt %: 0.93

Gasoline

BDL

6.0

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project # 9708-026

lowest detection @ ideal conditions

	Percent Recovery	Lab Blank:	MDL. in ug/l
8021 soil			
Dichlorodifluoromethane	92	0	0.22
Chloromethane	88	0	0.16
Vinyl Chloride	92	0	0.14
Bromomethane	102	0	0.07
Chloroethane	88	0	0.25
Trichlorofluoromethane	96	0	0.33
1,1-Dichloroethene	94	0	0.37
Methylene Chloride	120	0	0.19
trans-1,2-Dichloroethene	97	0	0.23
1,1-Dichloroethane	101	0	0.33
2,2-Dichloropropane	96	0	0.46
cis-1,3-Dichloropropene	96	0	0.13
Chloroform	100	0	0.18
Bromochloromethane	100	0	0.16
1,1,1-Trichloroethane	99	0	0.2
1,1-Dichloropropene	100	0	0.28
Carbon Tetrachloride	100	0	0.38
Benzene	95	0	0.22
1,2-Dichloroethane	96	0	0.37
Trichloroethene	123	0	0.36
1,2-Dichloropropane	99	0	0.3
Bromodichloromethane	97	0	0.3
Dibromomethane	97	0	0.22
Toluene	99	0	0.2
1,1,2-Trichloroethane	93	0	0.18

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project # 9708-026

Tetrachloroethene	101	0	0.19
1,3-Dichloropropane	101	0	0.39
Dibromochloromethane	96	0	0.24
1,2-Dibromoethane	95	0	0.28
Chlorobenzene	95	0	0.13
Ethylbenzene	107	0	0.26
1,1,1,2-Tetrachloroethane	98	0	0.31
m,p-Xylene	101	0	0.35
o-Xylene	95	0	0.18
Styrene	95	0	0.18
Isopropylbenzene	94	0	0.28
Bromoform	94	0	0.22
1,1,2,2-Tetrachloroethane	106	0	0.28
1,2,3-Trichloropropane	86	0	0.24
n-Propylbenzene	88	0	0.22
Bromobenzene	86	0	0.18
1,3,5-Trimethylbenzene	92	0	0.19
2-Chlorotoluene	95	0	0.2
4-Chlorotoluene	93	0	0.22
trans-1,3-Dichloropropene	90	0	0.17
1,2,4-Trimethylbenzene	91	0	0.22
sec-Butylbenzene	94	0	0.26
p-Isopropyltoluene	88	0	0.23
1,3-Dichlorobenzene	91	0	0.21
1,4-Dichlorobenzene	88	0	0.23
n-Butylbenzene	89	0	0.47
1,2-Dichlorobenzene	86	0	0.25
1,2-Dibromo-3-Chloropropane	103	0	0.16
1,2,4-Trichlorobenzene	105	0	0.17

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project # 9708-026

Hexachlorobutadiene	103	0	0.17
Naphthalene	103	0	0.15
1,2,3-Trichlorobenzene	102	0	0.12
cis-1,2-Dichloroethene	96	0	0.15
tert-Butylbenzene	101	0	0.23

End of 8021 soil

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project # 9708-026

**Percent
Recovery**

Lab Blank:

lowest detection limit @ ideal conditions

**MDL in
mg/l**

TCLP RCRA Metals

Arsenic	94	0	0.005
Barium	116	0	0.005
Cadmium	91	0	0.02
Chromium	96	0	0.0005
Lead	98	0	0.5
Mercury	106	0	0.0004
Selenium	88	0	0.005
Silver	98	0	0.05

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project # 9708-026

9071 soil

	Percent Recovery	Lab Blank:	lowest detection limit @ ideal conditions MDL. in mg/kg
Oil and Grease	89	0	1.57

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Friday, August 22, 1997

GCI Project # 9708-026

<i>Date Analyzed: 8/21/97</i>	<i>Dry Wt %: 0.93</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	Gasoline	108.3	0	2.43

Report To:

Bill To:

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Chain of Custody Record

Page 1 of 1

PROJECT SITE NUMBER 97147-15		PO#		GEOCHEM PROJECT # 9708-026	
SITE NAME 100515		COLLECTED BY (Signature) Elizabeth A. Candler		DATE DUE 08-20-97	
FIELD SAMPLE ID		TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED	NO. OF CONTAINERS PER LOCATION
100515	Std.	8/13/97	10:30	2	9671 5030/5580 8015 8021 1311
100515	Soil	8/13/97	1:00	2	2 802. Jars (10-12') 2 802. Jars (2-4')
REMARKS		LAB ID NO. (for lab use only)			
RECEIVED BY: [Signature]		DATE: 8-14	TIME: 1123	RELINQUISHED BY:	DATE: 8-14
RELINQUISHED BY: Julie W. Carver		DATE: 8-14	TIME: 1123		

GeoChem, Incorporated

Environmental Laboratories

FILE COPY

97147-6

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

CAMP LEJEUNE 10 USTS

97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC

28405

Report Date

Wednesday, August 27, 1997

PO # 970815-1

Date Received in lab:

Friday, August 15, 1997

GCI Project #: 9708-030**Summary of requested analytical work****Sample type code #s :**

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: 1817MW01

Lab ID 2123

Sample Type: 1

Date Analyzed: 8/21/97

for 8021 soil

Date Sampled 8/14/97

at 13:00

Field Number: 1817MW01

Lab ID 2123

Sample Type: 1

Date Analyzed: 8/20/97

for 9071 Soil

Date Sampled 8/14/97

at 13:00

Field Number: 1817MW01

Lab ID 2123

Sample Type: 2

Date Analyzed: 8/19/97

for TCLP RCRA Metals

Date Sampled 8/14/97

at 13:00

Field Number: HP250MW01

Lab ID 2124

Sample Type: 1

Date Analyzed: 8/26/97

for 3550

Date Sampled 8/14/97

at 11:30

Field Number: HP250MW01

Lab ID 2124

Sample Type: 1

Date Analyzed: 8/22/97

for 5030

Date Sampled 8/14/97

at 11:30

Field Number: AS1011MW01

Lab ID 2125

Sample Type: 1

Date Analyzed: 8/26/97

for 3550

Date Sampled 8/14/97

at 9:30

Field Number: AS1011MW01

Lab ID 2125

Sample Type: 1

Date Analyzed: 8/22/97

for 5030

Date Sampled 8/14/97

at 9:30

Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560

Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

Site Name: CAMP LEJEUNE 10 USTS

GCI Project # 9708-030

Field ID **1817MW01** Lab ID **2123**

Date Analyzed: 8/19/97

TCLP RCRA Metals

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Arsenic	BDL	0.01	1.0	0.05
Barium	BQL	2.5	100.0	2.0
Cadmium	BQL	0.5	1.0	0.005
Chromium	BQL	0.5	1.0	0.05
Lead	BQL	0.5	1.0	0.015
Mercury	BQL	0.001	1.0	0.0011
Selenium	BQL	0.02	1.0	0.05
Silver	BQL	0.5	1.0	0.018

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

Site Name:

CAMP LEJEUNE 10 USTS

GCI Project # 9708-030

lowest detection on sample

Field ID 1817MW01

Date Analyzed: 8/21/97

Conc. in
ug/kg

PQL in
ug/kg

Dilution
Factor

Dry wt % 92.0

Lab ID 2123

8021 soil

Dichlorodifluoromethane	BDL	.5	1.0
Chloromethane	BDL	.5	1.0
Vinyl Chloride	BDL	.5	1.0
Bromomethane	BDL	.5	1.0
Chloroethane	BDL	.5	1.0
Trichlorofluoromethane	BDL	.5	1.0
1,1-Dichloroethene	BDL	.5	1.0
Methylene Chloride	BDL	.5	1.0
trans-1,2-Dichloroethene	BDL	.5	1.0
1,1-Dichloroethane	BDL	.5	1.0
2,2-Dichloropropane	BDL	.5	1.0
cis-1,3-Dichloropropene	BDL	.5	1.0
Chloroform	BDL	.5	1.0
Bromochloromethane	BDL	.5	1.0
1,1,1-Trichloroethane	BDL	.5	1.0
1,1-Dichloropropene	BDL	.5	1.0
Carbon Tetrachloride	BDL	.5	1.0
Benzene	BDL	.5	1.0
1,2-Dichloroethane	BDL	.5	1.0
Trichloroethene	BDL	.5	1.0
1,2-Dichloropropane	BDL	.5	1.0
Bromodichloromethane	BDL	.5	1.0
Dibromomethane	BDL	.5	1.0
Toluene	BDL	.5	1.0
1,1,2-Trichloroethane	BDL	.5	1.0
Tetrachloroethene	1.3	.5	1.0
1,3-Dichloropropane	BDL	.5	1.0
Dibromochloromethane	BDL	.5	1.0
1,2-Dibromoethane	BDL	.5	1.0
Chlorobenzene	BDL	.5	1.0
Ethylbenzene	BDL	.5	1.0
1,1,1,2-Tetrachloroethane	BDL	.5	1.0
m,p-Xylene	BDL	1.0	1.0
o-Xylene	BDL	.5	1.0
Styrene	BDL	.5	1.0
Isopropylbenzene	BDL	.5	1.0
Bromoform	BDL	.1	1.0
1,1,2,2-Tetrachloroethane	BDL	.5	1.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

Site Name:

CAMP LEJEUNE 10 USTS

GCI Project # 9708-030

lowest detection on sample

	Conc. in ug/kg	PQL in ug/kg	Dilution Factor
1,2,3-Trichloropropane	BDL	.5	1.0
n-Propylbenzene	BDL	.5	1.0
Bromobenzene	BDL	.5	1.0
1,3,5-Trimethylbenzene	BDL	.5	1.0
2-Chlorotoluene	BDL	.5	1.0
4-Chlorotoluene	BDL	.5	1.0
trans-1,3-Dichloropropene	BDL	.5	1.0
1,2,4-Trimethylbenzene	BDL	.5	1.0
sec-Butylbenzene	BDL	.5	1.0
p-Isopropyltoluene	BDL	.5	1.0
1,3-Dichlorobenzene	BDL	.5	1.0
1,4-Dichlorobenzene	BDL	.5	1.0
n-Butylbenzene	BDL	.5	1.0
1,2-Dichlorobenzene	BDL	.5	1.0
1,2-Dibromo-3-Chloropropa	BDL	.5	1.0
1,2,4-Trichlorobenzene	BDL	.5	1.0
Hexachlorobutadiene	BDL	.5	1.0
Naphthalene	BDL	.5	1.0
1,2,3-Trichlorobenzene	BDL	.5	1.0
cis-1,2-Dichloroethene	BDL	.5	1.0
tert-Butylbenzene	BDL	.5	1.0

End of 8021 soil

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

Site Name:

CAMP LEJEUNE 10 USTS

GCI Project # 9708-030

**Conc. in
mg/kg**

lowest detect on sample

**PQL in
mg/kg**

**Dilution
Factor**

Field ID **1817MW01**

Date Analyzed:

Lab ID 2123

8/20/97

9071 Soil

Oil and Grease

162.987

5.

1.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project 9708-030

Site Name:

CAMP LEJEUNE 10 USTS

Field ID **HP250MW01** Lab ID 2124
Date Analyzed: 8/26/97 Dry Wt %: 0.86

Conc. in mg/kg

PQL in mg/kg

Diesel **BDL** 5.8

Gasoline **BDL** 5.8

Field ID **AS1011MW01** Lab ID 2125
Date Analyzed: 8/26/97 Dry Wt %: 0.88

Diesel **BDL** 5.7

Gasoline **BDL** 5.7

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-030

**Percent
Recovery**

Lab Blank:

lowest detection limit @ ideal conditions

**MDL in
mg/l**

TCLP RCRA Metals

Arsenic	91	0	0.005
Barium	116	0	0.005
Cadmium	91	0	0.02
Chromium	98	0	0.0005
Lead	93	0	0.5
Mercury	106	0	0.0004
Selenium	88	0	0.005
Silver	97	0	0.05

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-030

lowest detection @ ideal conditions

	Percent Recovery	Lab Blank:	MDL in ug/l
8021 soil			
Dichlorodifluoromethane	92	0	0.22
Chloromethane	88	0	0.16
Vinyl Chloride	92	0	0.14
Bromomethane	102	0	0.07
Chloroethane	88	0	0.25
Trichlorofluoromethane	96	0	0.33
1,1-Dichloroethene	94	0	0.37
Methylene Chloride	120	0	0.19
trans-1,2-Dichloroethene	97	0	0.23
1,1-Dichloroethane	101	0	0.33
2,2-Dichloropropane	96	0	0.46
cis-1,3-Dichloropropene	92	0	0.13
Chloroform	100	0	0.18
Bromochloromethane	100	0	0.16
1,1,1-Trichloroethane	99	0	0.2
1,1-Dichloropropene	100	0	0.28
Carbon Tetrachloride	100	0	0.38
Benzene	95	0	0.22
1,2-Dichloroethane	96	0	0.37
Trichloroethene	117	0	0.36
1,2-Dichloropropane	99	0	0.3
Bromodichloromethane	97	0	0.3
Dibromomethane	97	0	0.22
Toluene	99	0	0.2
1,1,2-Trichloroethane	93	0	0.18

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-030

Tetrachloroethene	101	0	0.19
1,3-Dichloropropane	101	0	0.39
Dibromochloromethane	96	0	0.24
1,2-Dibromoethane	95	0	0.28
Chlorobenzene	95	0	0.13
Ethylbenzene	107	0	0.26
1,1,1,2-Tetrachloroethane	98	0	0.31
m,p-Xylene	101	0	0.35
o-Xylene	95	0	0.18
Styrene	95	0	0.18
Isopropylbenzene	94	0	0.28
Bromoform	94	0	0.22
1,1,2,2-Tetrachloroethane	106	0	0.28
1,2,3-Trichloropropane	86	0	0.24
n-Propylbenzene	88	0	0.22
Bromobenzene	86	0	0.18
1,3,5-Trimethylbenzene	92	0	0.19
2-Chlorotoluene	93	0	0.2
4-Chlorotoluene	93	0	0.22
trans-1,3-Dichloropropene	90	0	0.17
1,2,4-Trimethylbenzene	91	0	0.22
sec-Butylbenzene	94	0	0.26
p-Isopropyltoluene	88	0	0.23
1,3-Dichlorobenzene	91	0	0.21
1,4-Dichlorobenzene	88	0	0.23
n-Butylbenzene	89	0	0.47
1,2-Dichlorobenzene	86	0	0.25
1,2-Dibromo-3-Chloropropane	103	0	0.16
1,2,4-Trichlorobenzene	105	0	0.17

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-030

Hexachlorobutadiene	103	0	0.17
Naphthalene	103	0	0.15
1,2,3-Trichlorobenzene	102	0	0.12
cis-1,2-Dichloroethene	96	0	0.15
tert-Butylbenzene	87	0	0.23

End of 8021 soil

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-030

9071 Soil

	Percent Recovery	Lab Blank:	lowest detection limit @ ideal conditions MDL in mg/kg
Oil and Grease	89	0	1.57

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-030

<i>Date Analyzed: 8/26/97</i>	<i>Dry Wt %: 0.86</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	Diesel	94.8	0	2.43
	Gasoline	97.6	0	2.43

Report To:

Don Ver

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Bill To:

Don Ver

Chain of Custody Record

Page 1 of 1

PROJECT SITE NUMBER		PO#		GEOCHEM PROJECT #	
97147-A		970815-1		9708-030	
SITE NAME		DATE AND TIME COLLECTED		DATE DUE	
Camp Lejeune 10 USIS		8/14/97 1:00		08-21-97	
COLLECTED BY (Signature)		NO. OF CONTAINERS PER LOCATION		VERBAL/FAX/HARDCOPY	
Elizabeth Candia		2			
FIELD SAMPLE ID	TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED	ANALYSES	REMARKS
817mwd1	Std	Soil	8/14/97 1:00	9071 8021 1311 3550 5030 8015	2123
HP25Cmwd1	Std	Soil	8/14/97 11:30		2124
AS101mwd1	Std	Soil	8/14/97 9:30		2125
REMARKS					
RECEIVED BY: DATE 08-15 TIME 11:15 RELINQUISHED BY: DENA J. JONES DATE 8-15-97 TIME 11:15					
RECEIVED BY: DATE TIME RELINQUISHED BY: DATE TIME					

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 UST's
97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC
28405

Report Date

Wednesday, August 27, 1997

PO # 970818-1

Date Received in lab:

Tuesday, August 19, 1997

GCI Project #: 9708-034

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: FC280MW01

Lab ID 2136

Sample Type: 1

Date Analyzed: 8/26/97 for 3550

Date Sampled 8/15/97

at 11:30

Field Number: FC280MW01

Lab ID 2136

Sample Type: 1

Date Analyzed: 8/22/97 for 5030

Date Sampled 8/15/97

at 11:30

Field Number: 575MW01

Lab ID 2137

Sample Type: 1

Date Analyzed: 8/26/97 for 3550

Date Sampled 8/18/97

at 1:30

Field Number: 575MW01

Lab ID 2137

Sample Type: 1

Date Analyzed: 8/22/97 for 5030

Date Sampled 8/18/97

at 1:30

I  Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560

Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project 9708-034

Site Name:

Camp Lejeune 10 UST's

Field ID **FC280MW01** Lab ID 2136
Date Analyzed: 8/26/97 Dry Wt %: 0.87

Conc. in mg/kg

PQL in mg/kg

Diesel BDL 5.8

Gasoline BDL 5.8

Field ID **575MW01** Lab ID 2137
Date Analyzed: 8/26/97 Dry Wt %: 0.87

Diesel BDL 5.7

Gasoline BDL 5.7

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, August 27, 1997

GCI Project # 9708-034

<i>Date Analyzed: 8/26/97</i>	<i>Dry Wt %: 0.87</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	Diesel	94.8	0	2.43
	Gasoline	97.6	0	2.43

Report To: Teri Pivar

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Bill To:

Richard L. Catlin & Assoc.

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Chain of Custody Record

Page 1 of 1

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GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

RECEIVED
BY PA 9-8-97

Client Project Manager

Ms. Teri Piver

Site Name:

Camp Lejeune 10 UST'S
97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC
28405

Report Date

Wednesday, September 03, 1997

PO #

Date Received in lab:

Tuesday, August 12, 1997

GCI Project #: 9708-017A

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: TT60MW01

Date Sampled 8/8/97

Lab ID 2088

at 12:00

Sample Type: 1

Date Analyzed: 8/16/97

for 3550

Field Number: TT60MW01

Date Sampled 8/8/97

Lab ID 2088

at 12:00

Sample Type: 1

Date Analyzed: 8/16/97

for 5030

Field Number: TT48MW1

Date Sampled 8/11/97

Lab ID 2089

at 1:00

Sample Type: 1

Date Analyzed: 8/16/97

for 3550

Field Number: TT48MW1

Date Sampled 8/11/97

Lab ID 2089

at 1:00

Sample Type: 1

Date Analyzed: 8/16/97

for 5030

I Karen B. Catlin Here by certify that I have Reviewed and approve this data set

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-017A

Site Name:

Camp Lejeune 10 UST'S

Field ID **TT60MW01** Lab ID 2088
Date Analyzed: 8/16/97 Dry Wt %: 0.87

	Conc. in mg/kg	PQL in mg/kg
Diesel	BDL	5.8
Gasoline	BDL	5.8

Field ID **TT48MW1** Lab ID 2089
Date Analyzed: 8/16/97 Dry Wt %: 0.77

Diesel	391	6.5
Gasoline	BDL	6.5

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project # 9708-017

<i>Date Analyzed: 8/16/97</i>	<i>Dry Wt %: 0.87</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	Diesel	95.6	0	2.43
	Gasoline	97.6	0	2.43

GeoChem, Incorporated

Environmental Laboratories

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BY PA 9-8-97

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 USTS
97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC
28405

Report Date

Wednesday, September 03, 1997

PO # 970826-5

Date Received in lab:

Tuesday, August 26, 1997

GCI Project #: 9708-044

Summary of requested analytical work

Sample type code #s :	1 = solid samples;	2 = liquid samples;	3 = Air samples;	4 = sludges/unknowns
Field Number: SBB94MWO1	Lab ID 2185	Sample Type: 2	Date Analyzed: 9/2/97	for 504 EDB
Date Sampled 8/25/97	at 10:00			
Field Number: SBB94MWO1	Lab ID 2185	Sample Type: 2	Date Analyzed: 8/27/97	for 6230 D
Date Sampled 8/25/97	at 10:00			
Field Number: SBB94MWO1	Lab ID 2185	Sample Type: 2	Date Analyzed: 8/28/97	for Pb
Date Sampled 8/25/97	at 10:00			
Field Number: SBB94MWO1 Duplicate	Lab ID 2186	Sample Type: 2	Date Analyzed: 8/28/97	for Pb
Date Sampled 8/25/97	at 10:00			
Field Number: 575MWO1	Lab ID 2187	Sample Type: 2	Date Analyzed: 8/27/97	for 602
Date Sampled 8/25/97	at 11:45			
Field Number: 575MWO1	Lab ID 2187	Sample Type: 2	Date Analyzed: 8/29/97	for 625 BN
Date Sampled 8/25/97	at 11:45			
Field Number: 575MW01	Lab ID 2187	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/25/97	at 11:45			
Field Number: 575MWO1 Duplicate	Lab ID 2188	Sample Type: 2	Date Analyzed: 8/27/97	for 602
Date Sampled 8/25/97	at 11:45			
Field Number: FC280MW01	Lab ID 2189	Sample Type: 2	Date Analyzed: 9/2/97	for 602
Date Sampled 8/25/97	at 11:15			
Field Number: FC280MW01	Lab ID 2189	Sample Type: 2	Date Analyzed: 8/29/97	for 625 BN
Date Sampled 8/25/97	at 11:15			

I  Here by certify that I have Reviewed and approve this data set

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 USTS
97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC
28405

Report Date

Wednesday, September 03, 1997

PO # 970826-5

Date Received in lab:

Tuesday, August 26, 1997

GCI Project #: 9708-044

Summary of requested analytical work

Sample type code #s :

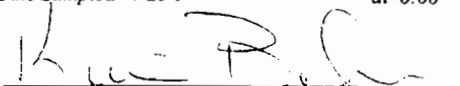
1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: FC280MW01	Lab ID 2189	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/25/97	at 11:15			
Field Number: FC280MW01 Duplicate	Lab ID 2190	Sample Type: 2	Date Analyzed: 8/29/97	for 625 BN
Date Sampled 8/25/97	at 11:15			
Field Number: FC280MW01D	Lab ID 2190	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/25/97	at 11:15			
Field Number: HP250MW01	Lab ID 2191	Sample Type: 2	Date Analyzed:	for 602
Date Sampled 8/25/97	at 13:30			
Field Number: HP250MW01	Lab ID 2191	Sample Type: 2	Date Analyzed: 8/29/97	for 625 BN
Date Sampled 8/25/97	at 13:30			
Field Number: HP250MW01	Lab ID 2191	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/25/97	at 13:30			
Field Number: TT60MW01	Lab ID 2192	Sample Type: 2	Date Analyzed: 8/27/97	for 602
Date Sampled 8/25/97	at 15:00			
Field Number: TT60MW01	Lab ID 2192	Sample Type: 2	Date Analyzed: 8/29/97	for 625 BN
Date Sampled 8/25/97	at 15:00			
Field Number: TT60MW01	Lab ID 2192	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/25/97	at 15:00			
Field Number: QCTRIIP	Lab ID 2193	Sample Type: 2	Date Analyzed: 8/27/97	for 602
Date Sampled 8/25/97	at 0:00			

 Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560
Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 USTS
97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC
28405

Report Date

Wednesday, September 03, 1997

PO # 970826-5

Date Received in lab:

Tuesday, August 26, 1997

GCI Project #: 9708-044

Summary of requested analytical work

Sample type code #s :

1 = solid samples;

2 = liquid samples;

3 = Air samples;

4 = sludges/unknowns

Field Number: QCTRIP

Date Sampled 8/25/97

Lab ID 2193

at 0:00

Sample Type: 2

Date Analyzed: 8/30/97

for 625 BN

Field Number: QCTRIP

Date Sampled 8/25/97

Lab ID 2193

at 0:00

Sample Type: 2

Date Analyzed:

for Library at analysis

J

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GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

Field ID SBB94MWO1 Date Analyzed:

Lab ID 2185

9/2/97

504 EDB

1,2-Dibromoethane

lowest detect on sample

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

BDL

0.0006

1.

.0004

End of 504 EDB

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

6230 D

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Dichlorodifluoromethane	BDL	0.5	1.	1,000.
Chloromethane	BDL	0.5	1.	N/A
Vinyl Chloride	BDL	0.5	1.	N/A
Bromomethane	BDL	0.5	1.	N/A
Chloroethane	BDL	0.5	1.	N/A
Trichlorofluoromethane	BDL	0.5	1.	2,000.
1,1-Dichloroethene	BDL	0.5	1.	N/A
Methylene Chloride	BDL	0.5	1.	N/A
trans-1,2-Dichloroethene	BDL	0.5	1.	N/A
1,1-Dichloroethane	BDL	0.5	1.	1,000.
2,2-Dichloropropane	BDL	0.5	1.	N/A
cis-1,3-Dichloropropene	BDL	0.5	1.	N/A
Chloroform	BDL	0.5	1.	N/A
Bromochloromethane	BDL	0.5	1.	N/A
1,1,1-Trichloroethane	BDL	0.5	1.	N/A
1,1-Dichloropropene	BDL	0.5	1.	N/A
Carbon Tetrachloride	BDL	0.5	1.	N/A
Benzene	BDL	0.5	1.	N/A
1,2-Dichloroethane	BDL	0.5	1.	N/A
Trichloroethene	BDL	0.5	1.	N/A
1,2-Dichloropropane	BDL	0.5	1.	N/A
Bromodichloromethane	BDL	0.5	1.	N/A
Dibromomethane	BDL	0.5	1.	N/A
Toluene	BDL	0.5	1.	1,000.
1,1,2-Trichloroethane	BDL	0.5	1.	N/A
Tetrachloroethene	BDL	0.5	1.	N/A
1,3-Dichloropropane	BDL	0.5	1.	N/A
Dibromochloromethane	BDL	0.5	1.	N/A
1,2-Dibromoethane	BDL	0.5	1.	N/A
Chlorobenzene	BDL	0.5	1.	N/A
Ethylbenzene	BDL	0.5	1.	N/A
1,1,1,2-Tetrachloroethane	BDL	0.5	1.	N/A
m,p-Xylene	1.2	1	1.	1,000.
o-Xylene	0.6	0.5	1.	1,000.
Styrene	BDL	0.5	1.	N/A

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Isopropylbenzene	BDL	0.5	1.	N/A
Bromoform	BDL	0.15	1.	N/A
1,1,2,2-Tetrachloroethane	BDL	0.5	1.	N/A
1,2,3-Trichloropropane	BDL	0.5	1.	N/A
n-Propylbenzene	BDL	0.5	1.	N/A
Bromobenzene	BDL	0.5	1.	N/A
1,3,5-Trimethylbenzene	BDL	0.5	1.	N/A
2-Chlorotoluene	BDL	0.5	1.	N/A
4-Chlorotoluene	BDL	0.5	1.	N/A
trans-1,3-Dichloropropene	BDL	0.5	1.	N/A
1,2,4-Trimethylbenzene	BDL	0.5	1.	N/A
sec-Butylbenzene	BDL	0.5	1.	N/A
p-Isopropyltoluene	BDL	0.5	1.	N/A
1,3-Dichlorobenzene	BDL	0.5	1.	1,000.
1,4-Dichlorobenzene	BDL	0.5	1.	N/A
n-Butylbenzene	BDL	0.5	1.	N/A
1,2-Dichlorobenzene	BDL	0.5	1.	1,000.
1,2-Dibromo-3-Chloropropane	BDL	0.5	1.	N/A
1,2,4-Trichlorobenzene	BDL	0.5	1.	N/A
Hexachlorobutadiene	BDL	0.5	1.	N/A
Naphthalene	BDL	0.5	1.	N/A
1,2,3-Trichlorobenzene	BDL	0.5	1.	N/A
cis-1,2-Dichloroethene	BDL	0.5	1.	N/A
tert-Butylbenzene	BDL	0.5	1.	N/A
MTBE	BDL	1	1.	200.
IPE	BDL	1	1.	N/A

End of 6230 D

End SBB94MWO

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID 575MWO1

Date Analyzed:

Lab ID 2187

8/27/97

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

ICI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End 575MWO1

Field ID 575MWO1
Duplicate

Date Analyzed:

Lab ID 2188

8/27/97

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

End 575MWO1 D

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

lowest detect on sample

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID FC280MW01

Date Analyzed:

Lab ID 2189

9/2/97

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End FC280MW01

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID FC280MWO1 Date Analyzed:

Duplicate

Lab ID 2190

8/29/97

625 BN

n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End FC280MWO

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

Field ID HP250MWO1 Date Analyzed:

Lab ID 2191

602

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End HP250MWO

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID TT60MWO1 Date Analyzed:

Lab ID 2192

8/27/97

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	15.3	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End TT60MWO1

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID QCTRIP

Date Analyzed:

Lab ID 2193

8/27/97

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project 9708-044

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End QCTRIIP

Geochem (NC #336/SC #99008)
Project#9708-044

1

Site Name Camp Lejeune 10 USTS

Library Search: *Ten Largest Identified Compounds*

Sample	Compound(s)	ug/l	Total Number of Compounds
2187 (575MW01)	None	-	0
2189 (FC280MW01)	None	-	0
2190 (FC280MW01 Duplicate)	None	-	0
2191 (HP250MW01)	Unknown	25	1
2192 (TT60MW01)	Pentadecane	10	7
	Hexadecane	18	
	Heptadecane	15	
	Unknown hydrocarbon	11	
	Unknown hydrocarbon	16	
	Unknown hydrocarbon	11	
	Unknown hydrocarbon	10	
2193 (QCTRIIP)	None	-	0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

Site Name: Camp Lejeune 10 USTS

GCI Project # 9708-044

Field ID **SBB94MWO1** Lab ID 2185

Date Analyzed: 8/28/97

Pb

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Lead	BQL	0.015	1.0	0.015

Field ID **SBB94MWO1** Lab ID 2186

Date Analyzed: 8/28/97

Pb

Lead	BQL	0.015	1.0	0.015

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project # 9708-044

	Percent Recovery	Lab Blank:	lowest detection @ ideal conditions MDL in ug/l
504 EDB			
1,2-Dibromoethane	90	0	0.0006
End of 504 EDB			
6230 D			
Dichlorodifluoromethane	87	0	0.22
Chloromethane	97	0	0.16
Vinyl Chloride	97	0	0.14
Bromomethane	105	0	0.07
Chloroethane	99	0	0.25
Trichlorofluoromethane	99	0	0.33
1,1-Dichloroethene	98	0	0.37
Methylene Chloride	99	0	0.19
trans-1,2-Dichloroethene	98	0	0.23
1,1-Dichloroethane	110	0	0.33
2,2-Dichloropropane	103	0	0.46
cis-1,3-Dichloropropene	101	0	0.13
Chloroform	101	0	0.18
Bromochloromethane	101	0	0.16
1,1,1-Trichloroethane	99	0	0.2
1,1-Dichloropropene	100	0	0.28
Carbon Tetrachloride	100	0	0.38
Benzene	94	0	0.22
1,2-Dichloroethane	102	0	0.37
Trichloroethene	99	0	0.36
1,2-Dichloropropane	99	0	0.3
Bromodichloromethane	101	0	0.3
Dibromomethane	100	0	0.22

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project # 9708-044

Toluene	96	0	0.2
1,1,2-Trichloroethane	99	0	0.18
Tetrachloroethene	99	0	0.19
1,3-Dichloropropane	99	0	0.39
Dibromochloromethane	100	0	0.24
1,2-Dibromoethane	103	0	0.28
Chlorobenzene	95	0	0.13
Ethylbenzene	99	0	0.26
1,1,1,2-Tetrachloroethane	97	0	0.31
m,p-Xylene	101	0	0.35
o-Xylene	99	0	0.18
Styrene	99	0	0.18
Isopropylbenzene	99	0	0.28
Bromoform	104	0	0.22
1,1,1,2-Tetrachloroethane	97	0	0.28
1,2,3-Trichloropropane	100	0	0.24
n-Propylbenzene	98	0	0.22
Bromobenzene	100	0	0.18
1,3,5-Trimethylbenzene	99	0	0.19
2-Chlorotoluene	99	0	0.2
4-Chlorotoluene	101	0	0.22
trans-1,3-Dichloropropene	99	0	0.17
1,2,4-Trimethylbenzene	102	0	0.22
sec-Butylbenzene	102	0	0.26
p-Isopropyltoluene	100	0	0.23
1,3-Dichlorobenzene	100	0	0.21
1,4-Dichlorobenzene	100	0	0.23
n-Butylbenzene	102	0	0.47
1,2-Dichlorobenzene	102	0	0.25

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project # 9708-044

1,2-Dibromo-3-Chloropropane	105	0	0.16
1,2,4-Trichlorobenzene	99	0	0.17
Hexachlorobutadiene	100	0	0.17
Naphthalene	105	0	0.15
1,2,3-Trichlorobenzene	100	0	0.12
cis-1,2-Dichloroethene	103	0	0.15
tert-Butylbenzene	99	0	0.23
MTBE	94	0	0.29
IPE	96	0	0.21

End of 6230 D

lowest detection @ ideal conditions

625 BN

	Percent Recovery	Lab Blank:	MDL in ug/l
1,4-Dichlorobenzene	70	0	2.96
n-Nitrosodi-n-propylamine	74	0	4.77
1,2,4-Trichlorobenzene	75	0	2.68
Acenaphthene	75	0	6.83
2,4-Dinitrotoluene	71	0	2.48
Pyrene	80	0	3.34

End of 625 BN

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project # 9708-044

	Percent Recovery	Lab Blank:	<i>lowest detection @ ideal conditions</i> MDL in ug/l
602			
Benzene	93	0	0.2
Toluene	93	0	0.13
Chlorobenzene	94	0	0.16
Ethylbenzene	95	0	0.2
Xylenes	99	0	0.6
1,3-Dichlorobenzene	95	0	0.34
1,4-Dichlorobenzene	96	0	0.14
1,2-Dichlorobenzene	95	0	0.06
End of 602			

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Wednesday, September 03, 1997

GCI Project # 9708-044

**Percent
Recovery**

Lab Blank:

lowest detection limit @ ideal conditions

**MDL in
mg/l**

Pb

Lead

99

0

0.001

Report To: TERI PIVER GeoChem, Incorporated
Environmental Laboratories
2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560

Bill To: CATLIN

Chain of Custody Record

PROJECT SITE NUMBER		PO#	GEOCHEM PROJECT #				
97147-A		970826-5	9708-044				
SITE NAME		DATE DUE					
Camp Lejeune 10 USTs							
COLLECTED BY (Signature)		VERBAL/FAX/HARD COPY					
Elizabeth Candler							
FIELD SAMPLE ID	TURNAROUND IN DAYS	SAMPLE MATRIX	DATE AND TIME COLLECTED	NO. OF CONTAINERS PER LOCATION	ANALYSES	REMARKS	LAB ID NO. (for lab use only)
5B854MWD	STD	GW	8/25/97 1000	5	✓ 1002 + Xylene ✓ 10230D + IR + MTR ✓ 504.1 EDR		2185
5B854MWD Duplicate	STD	GW	8/25/97 1000	1	✓		2186
575MWD	STD	GW	8/25/97 1145	4	✓		2187
575MWD Duplicate	STD	GW	" "	2	✓		2188
EC250MWD	"	"	" 1115	4	✓		2189
EC250MWD Duplicate	"	"	" "	2	✓		2190
HP250MWD	"	"	" 1330	4	✓		2191
HP250MWD Duplicate	"	"	" 1500	4	✓		2192
ACTRIP	"	"	"	3	✓		2193
REMARKS							
RELINQUISHED BY:							
RECEIVED BY:	DATE	TIME	RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	DATE
Elizabeth Candler	8-26-97	1:00	JMG	8-26-97	1:00		

97147-C

GeoChem, Incorporated

Environmental Laboratories

FILE 0077

Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 USTS

97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC

28405

Report Date

Monday, September 08, 1997

PO # 970827-1

Date Received in lab:

Wednesday, August 27, 1997

GCI Project #: 9708-048

Summary of requested analytical work

Sample type code #s :	1 = solid samples;	2 = liquid samples;	3 = Air samples;	4 = sludges/unknowns
Field Number: NH118MWO1	Lab ID 2205	Sample Type: 2	Date Analyzed: 9/2/97	for 6230 D
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: NH118MWO1	Lab ID 2205	Sample Type: 2	Date Analyzed: 9/4/97	for 625 BN
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: NH118MW01	Lab ID 2205	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: NH118MWO1	Lab ID 2205	Sample Type: 2	Date Analyzed: 8/28/97	for RCRA metals
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: NH118MWO1 Duplicate	Lab ID 2206	Sample Type: 2	Date Analyzed: 9/2/97	for 6230 D
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: 1817MWO1	Lab ID 2207	Sample Type: 2	Date Analyzed: 9/2/97	for 6230 D
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: 1817MWO1	Lab ID 2207	Sample Type: 2	Date Analyzed: 9/4/97	for 625 BN
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: 1817MW01	Lab ID 2207	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: 1817MWO1	Lab ID 2207	Sample Type: 2	Date Analyzed: 8/28/97	for RCRA metals
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: AS1011MWO1	Lab ID 2208	Sample Type: 2	Date Analyzed: 9/2/97	for 602
Date Sampled 8/26/97			Proper Preservation	Yes

J

Keri Bell

Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560

Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 USTS

97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC

28405

Report Date

Monday, September 08, 1997

PO # 970827-1

Date Received in lab:

Wednesday, August 27, 1997

GCI Project #: 9708-048

Summary of requested analytical work

Sample type code #s :	1 = solid samples;	2 = liquid samples;	3 = Air samples;	4 = sludges/unknowns
Field Number: AS1011MW01	Lab ID 2208	Sample Type: 2	Date Analyzed: 9/4/97	for 625 BN
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: AS1011MW01	Lab ID 2208	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: TT48MW01	Lab ID 2209	Sample Type: 2	Date Analyzed: 9/2/97	for 602
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: TT48MW01	Lab ID 2209	Sample Type: 2	Date Analyzed: 9/4/97	for 625 BN
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: TT48MW01	Lab ID 2209	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: Waste Water	Lab ID 2210	Sample Type: 2	Date Analyzed: 9/2/97	for 504 EDB
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: Waste Water	Lab ID 2210	Sample Type: 2	Date Analyzed: 9/3/97	for 6230 D
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: Waste Water	Lab ID 2210	Sample Type: 2	Date Analyzed: 9/4/97	for 625 BN
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: Waste Water	Lab ID 2210	Sample Type: 2	Date Analyzed:	for Library at analysis
Date Sampled 8/26/97			Proper Preservation	Yes
Field Number: Waste Water	Lab ID 2210	Sample Type: 2	Date Analyzed: 8/28/97	for RCRA metals
Date Sampled 8/26/97			Proper Preservation	Yes

J

Kari Behr

Here by certify that I have Reviewed and approve this data set

2500 Gate Way Centre Blvd., Suite 300 • Morrisville, NC 27560

Telephone: 919-460-8093 • FAX: 919-460-0167

GeoChem, Incorporated

Environmental Laboratories

Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Client Project Manager

Teri Piver

Site Name:

Camp Lejeune 10 USTS
97147-A

R. Catlin & Assoc.

P.O. Box 10279

Wilmington NC
28405

Report Date

Monday, September 08, 1997

PO # 970827-1

Date Received in lab:

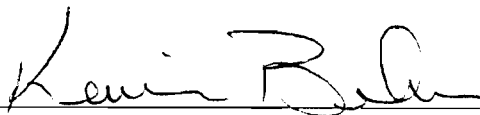
Wednesday, August 27, 1997

GCI Project #: 9708-048

Summary of requested analytical work

Sample type code #s :	1 = solid samples:	2 = liquid samples:	3 = Air samples:	4 = sludges/unknowns
Field Number: Waste Soil Date Sampled 8/26/97	Lab ID 2211	Sample Type: 1	Date Analyzed: 9/3/97 Proper Preservation	for 3550 Yes
Field Number: Waste Soil Date Sampled 8/26/97	Lab ID 2211	Sample Type: 1	Date Analyzed: 9/3/97 Proper Preservation	for 5030 Yes
Field Number: Waste Soil Date Sampled 8/26/97	Lab ID 2211	Sample Type: 1	Date Analyzed: 9/2/97 Proper Preservation	for 8021 soil Yes
Field Number: Waste Soil Date Sampled 8/26/97	Lab ID 2211	Sample Type: 1	Date Analyzed: 9/4/97 Proper Preservation	for 9071 soil Yes
Field Number: Waste Soil Date Sampled 8/26/97	Lab ID 2211	Sample Type: 2	Date Analyzed: 9/2/97 Proper Preservation	for TCLP RCRA Metals Yes

J



Here by certify that I have Reviewed and approve this data set

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Field ID NH118MWO1 Date Analyzed:

Lab ID 2205

9/2/97

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

6230 D

Dichlorodifluoromethane	BDL	0.5	1.	1,000.
Chloromethane	BDL	0.5	1.	N/A
Vinyl Chloride	BDL	0.5	1.	N/A
Bromomethane	BDL	0.5	1.	N/A
Chloroethane	BDL	0.5	1.	N/A
Trichlorofluoromethane	BDL	0.5	1.	2,000.
1,1-Dichloroethene	BDL	0.5	1.	N/A
Methylene Chloride	BDL	0.5	1.	N/A
trans-1,2-Dichloroethene	BDL	0.5	1.	N/A
1,1-Dichloroethane	BDL	0.5	1.	1,000.
2,2-Dichloropropane	BDL	0.5	1.	N/A
cis-1,3-Dichloropropene	BDL	0.5	1.	N/A
Chloroform	BDL	0.5	1.	N/A
Bromochloromethane	BDL	0.5	1.	N/A
1,1,1-Trichloroethane	BDL	0.5	1.	N/A
1,1-Dichloropropene	BDL	0.5	1.	N/A
Carbon Tetrachloride	BDL	0.5	1.	N/A
Benzene	BDL	0.5	1.	N/A
1,2-Dichloroethane	BDL	0.5	1.	N/A
Trichloroethene	BDL	0.5	1.	N/A
1,2-Dichloropropane	BDL	0.5	1.	N/A
Bromodichloromethane	BDL	0.5	1.	N/A
Dibromomethane	BDL	0.5	1.	N/A
Toluene	BDL	0.5	1.	1,000.
1,1,2-Trichloroethane	BDL	0.5	1.	N/A
Tetrachloroethene	BDL	0.5	1.	N/A
1,3-Dichloropropane	BDL	0.5	1.	N/A
Dibromochloromethane	BDL	0.5	1.	N/A
1,2-Dibromoethane	BDL	0.5	1.	N/A
Chlorobenzene	BDL	0.5	1.	N/A
Ethylbenzene	BDL	0.5	1.	N/A
1,1,1,2-Tetrachloroethane	BDL	0.5	1.	N/A
m,p-Xylene	BDL	1	1.	1,000.
o-Xylene	BDL	0.5	1.	1,000.

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Styrene	BDL	0.5	1.	N/A
Isopropylbenzene	BDL	0.5	1.	N/A
Bromoform	BDL	0.15	1.	N/A
1,1,2,2-Tetrachloroethane	BDL	0.5	1.	N/A
1,2,3-Trichloropropane	BDL	0.5	1.	N/A
n-Propylbenzene	BDL	0.5	1.	N/A
Bromobenzene	BDL	0.5	1.	N/A
1,3,5-Trimethylbenzene	BDL	0.5	1.	N/A
2-Chlorotoluene	BDL	0.5	1.	N/A
4-Chlorotoluene	BDL	0.5	1.	N/A
trans-1,3-Dichloropropene	BDL	0.5	1.	N/A
1,2,4-Trimethylbenzene	BDL	0.5	1.	N/A
sec-Butylbenzene	BDL	0.5	1.	N/A
p-Isopropyltoluene	BDL	0.5	1.	N/A
1,3-Dichlorobenzene	BDL	0.5	1.	1,000.
1,4-Dichlorobenzene	BDL	0.5	1.	N/A
n-Butylbenzene	BDL	0.5	1.	N/A
1,2-Dichlorobenzene	BDL	0.5	1.	1,000.
1,2-Dibromo-3-Chloropropane	BDL	0.5	1.	N/A
1,2,4-Trichlorobenzene	BDL	0.5	1.	N/A
Hexachlorobutadiene	BDL	0.5	1.	N/A
Naphthalene	BDL	0.5	1.	N/A
1,2,3-Trichlorobenzene	BDL	0.5	1.	N/A
cis-1,2-Dichloroethene	BDL	0.5	1.	N/A
tert-Butylbenzene	BDL	0.5	1.	N/A
MTBE	BDL	1	1.	200.
IPE	BDL	1	1.	N/A

End of 6230 D

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS	Conc: in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
625 BN				
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End NH118MWO

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID NH118MWO1 Date Analyzed:

Duplicate

Lab ID 2206

9/2/97

6230 D

Dichlorodifluoromethane	BDL	0.5	1.	1,000.
Chloromethane	BDL	0.5	1.	N/A
Vinyl Chloride	BDL	0.5	1.	N/A
Bromomethane	BDL	0.5	1.	N/A
Chloroethane	BDL	0.5	1.	N/A
Trichlorofluoromethane	BDL	0.5	1.	2,000.
1,1-Dichloroethene	BDL	0.5	1.	N/A
Methylene Chloride	BDL	0.5	1.	N/A
trans-1,2-Dichloroethene	BDL	0.5	1.	N/A
1,1-Dichloroethane	BDL	0.5	1.	1,000.
2,2-Dichloropropane	BDL	0.5	1.	N/A
cis-1,3-Dichloropropene	BDL	0.5	1.	N/A
Chloroform	BDL	0.5	1.	N/A
Bromochloromethane	BDL	0.5	1.	N/A
1,1,1-Trichloroethane	BDL	0.5	1.	N/A
1,1-Dichloropropene	BDL	0.5	1.	N/A
Carbon Tetrachloride	BDL	0.5	1.	N/A
Benzene	BDL	0.5	1.	N/A
1,2-Dichloroethane	BDL	0.5	1.	N/A
Trichloroethene	BDL	0.5	1.	N/A
1,2-Dichloropropane	BDL	0.5	1.	N/A
Bromodichloromethane	BDL	0.5	1.	N/A
Dibromomethane	BDL	0.5	1.	N/A
Toluene	BDL	0.5	1.	1,000.
1,1,2-Trichloroethane	BDL	0.5	1.	N/A
Tetrachloroethene	BDL	0.5	1.	N/A
1,3-Dichloropropane	BDL	0.5	1.	N/A
Dibromochloromethane	BDL	0.5	1.	N/A
1,2-Dibromoethane	BDL	0.5	1.	N/A
Chlorobenzene	BDL	0.5	1.	N/A
Ethylbenzene	BDL	0.5	1.	N/A
1,1,1,2-Tetrachloroethane	BDL	0.5	1.	N/A
m,p-Xylene	BDL	1	1.	1,000.

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
o-Xylene	BDL	0.5	1.	1,000.
Styrene	BDL	0.5	1.	N/A
Isopropylbenzene	BDL	0.5	1.	N/A
Bromoform	BDL	0.15	1.	N/A
1,1,2,2-Tetrachloroethane	BDL	0.5	1.	N/A
1,2,3-Trichloropropane	BDL	0.5	1.	N/A
n-Propylbenzene	BDL	0.5	1.	N/A
Bromobenzene	BDL	0.5	1.	N/A
1,3,5-Trimethylbenzene	BDL	0.5	1.	N/A
2-Chlorotoluene	BDL	0.5	1.	N/A
4-Chlorotoluene	BDL	0.5	1.	N/A
trans-1,3-Dichloropropene	BDL	0.5	1.	N/A
1,2,4-Trimethylbenzene	BDL	0.5	1.	N/A
sec-Butylbenzene	BDL	0.5	1.	N/A
p-Isopropyltoluene	BDL	0.5	1.	N/A
1,3-Dichlorobenzene	BDL	0.5	1.	1,000.
1,4-Dichlorobenzene	BDL	0.5	1.	N/A
n-Butylbenzene	BDL	0.5	1.	N/A
1,2-Dichlorobenzene	BDL	0.5	1.	1,000.
1,2-Dibromo-3-Chloropropane	BDL	0.5	1.	N/A
1,2,4-Trichlorobenzene	BDL	0.5	1.	N/A
Hexachlorobutadiene	BDL	0.5	1.	N/A
Naphthalene	BDL	0.5	1.	N/A
1,2,3-Trichlorobenzene	BDL	0.5	1.	N/A
cis-1,2-Dichloroethene	BDL	0.5	1.	N/A
tert-Butylbenzene	BDL	0.5	1.	N/A
MTBE	BDL	1	1.	200.
IPE	BDL	1	1.	N/A

End of 6230 D

End NH118MWO

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID 1817MWO1 Date Analyzed:

Lab ID 2207

9/2/97

6230 D

Dichlorodifluoromethane	BDL	0.5	1.	1,000.
Chloromethane	BDL	0.5	1.	N/A
Vinyl Chloride	BDL	0.5	1.	N/A
Bromomethane	BDL	0.5	1.	N/A
Chloroethane	BDL	0.5	1.	N/A
Trichlorofluoromethane	BDL	0.5	1.	2,000.
1,1-Dichloroethene	BDL	0.5	1.	N/A
Methylene Chloride	BDL	0.5	1.	N/A
trans-1,2-Dichloroethene	1.8	0.5	1.	N/A
1,1-Dichloroethane	BDL	0.5	1.	1,000.
2,2-Dichloropropane	BDL	0.5	1.	N/A
cis-1,3-Dichloropropene	BDL	0.5	1.	N/A
Chloroform	BDL	0.5	1.	N/A
Bromochloromethane	BDL	0.5	1.	N/A
1,1,1-Trichloroethane	4.9	0.5	1.	N/A
1,1-Dichloropropene	BDL	0.5	1.	N/A
Carbon Tetrachloride	BDL	0.5	1.	N/A
Benzene	BDL	0.5	1.	N/A
1,2-Dichloroethane	BDL	0.5	1.	N/A
Trichloroethene	320.0	100	200.	N/A
1,2-Dichloropropane	BDL	0.5	1.	N/A
Bromodichloromethane	BDL	0.5	1.	N/A
Dibromomethane	BDL	0.5	1.	N/A
Toluene	BDL	0.5	1.	1,000.
1,1,2-Trichloroethane	BDL	0.5	1.	N/A
Tetrachloroethene	3,480.0	100	200.	N/A
1,3-Dichloropropane	BDL	0.5	1.	N/A
Dibromochloromethane	BDL	0.5	1.	N/A
1,2-Dibromoethane	BDL	0.5	1.	N/A
Chlorobenzene	BDL	0.5	1.	N/A
Ethylbenzene	BDL	0.5	1.	N/A
1,1,1,2-Tetrachloroethane	BDL	0.5	1.	N/A
m,p-Xylene	BDL	1	1.	1,000.
o-Xylene	BDL	0.5	1.	1,000.

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Styrene	BDL	0.5	1.	N/A
Isopropylbenzene	BDL	0.5	1.	N/A
Bromoform	BDL	0.15	1.	N/A
1,1,2,2-Tetrachloroethane	BDL	0.5	1.	N/A
1,2,3-Trichloropropane	BDL	0.5	1.	N/A
n-Propylbenzene	BDL	0.5	1.	N/A
Bromobenzene	BDL	0.5	1.	N/A
1,3,5-Trimethylbenzene	BDL	0.5	1.	N/A
2-Chlorotoluene	BDL	0.5	1.	N/A
4-Chlorotoluene	BDL	0.5	1.	N/A
trans-1,3-Dichloropropene	BDL	0.5	1.	N/A
1,2,4-Trimethylbenzene	BDL	0.5	1.	N/A
sec-Butylbenzene	BDL	0.5	1.	N/A
p-Isopropyltoluene	BDL	0.5	1.	N/A
1,3-Dichlorobenzene	BDL	0.5	1.	1,000.
1,4-Dichlorobenzene	BDL	0.5	1.	N/A
n-Butylbenzene	BDL	0.5	1.	N/A
1,2-Dichlorobenzene	BDL	0.5	1.	1,000.
1,2-Dibromo-3-Chloropropane	BDL	0.5	1.	N/A
1,2,4-Trichlorobenzene	BDL	0.5	1.	N/A
Hexachlorobutadiene	BDL	0.5	1.	N/A
Naphthalene	BDL	0.5	1.	N/A
1,2,3-Trichlorobenzene	BDL	0.5	1.	N/A
cis-1,2-Dichloroethene	620.0	100.	200.	N/A
tert-Butylbenzene	BDL	0.5	1.	N/A
MTBE	1.7	1	1.	200.
IPE	BDL	1	1.	N/A

End of 6230 D

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

625 BN

n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End 1817MWO1

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

Field ID AS1011MWO1 Date Analyzed:

Lab ID 2208

9/2/97

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End AS1011MW

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

Field ID TT48MWO1

Date Analyzed:

Lab ID 2209

9/2/97

Conc.
in ug/l

PQL
in ug/l

Dilution
Factor

NCAC 2L
in ug/l

602

Benzene	BDL	0.5	1.	1.
Toluene	BDL	0.5	1.	1,000.
Chlorobenzene	BDL	0.5	1.	50.
Ethylbenzene	BDL	0.5	1.	29.
Xylenes	BDL	1.5	1.	530.
1,3-Dichlorobenzene	BDL	0.5	1.	620.
1,4-Dichlorobenzene	BDL	0.5	1.	75.
1,2-Dichlorobenzene	BDL	0.5	1.	620.

End of 602

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
625 BN				
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End TT48MWO1

Geochem (NC #336/SC #99008)
Project#9708-048

1

Site Name Camp Lejeune 10 USTs

Library Search: *Ten Largest Identified Compounds*

Sample	Compound(s)	ug/l	Total Number of Compounds
2205 (NH118MW01)	None	-	0
2207 (1817MW01)	Tetrachloroethene Unknown	490 13	2
2208 (AS1011MW01)	None	-	0
2209 (TT48MW01)	Unknown hydrocarbon	14	1
2210 (Waste Water)	None	-	0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 UTS

**Conc.
in ug/l**

**PQL
in ug/l**

**Dilution
Factor**

**NCAC 2L
in ug/l**

Field ID Waste Water Date Analyzed:

Lab ID 2210

9/2/97

504 EDB

1,2-Dibromoethane

BDL

0.0006

1.

.0004

End of 504 EDB

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

Site Name: Camp Lejeune 10 USTS

lowest detect on sample

6230 D

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Dichlorodifluoromethane	1.6	0.5	1.	1,000.
Chloromethane	BDL	0.5	1.	N/A
Vinyl Chloride	BDL	0.5	1.	N/A
Bromomethane	BDL	0.5	1.	N/A
Chloroethane	BDL	0.5	1.	N/A
Trichlorofluoromethane	BDL	0.5	1.	2,000.
1,1-Dichloroethene	BDL	0.5	1.	N/A
Methylene Chloride	BDL	0.5	1.	N/A
trans-1,2-Dichloroethene	BDL	0.5	1.	N/A
1,1-Dichloroethane	BDL	0.5	1.	1,000.
2,2-Dichloropropane	BDL	0.5	1.	N/A
cis-1,3-Dichloropropene	BDL	0.5	1.	N/A
Chloroform	BDL	0.5	1.	N/A
Bromochloromethane	BDL	0.5	1.	N/A
1,1,1-Trichloroethane	BDL	0.5	1.	N/A
1,1-Dichloropropene	BDL	0.5	1.	N/A
Carbon Tetrachloride	BDL	0.5	1.	N/A
Benzene	BDL	0.5	1.	N/A
1,2-Dichloroethane	BDL	0.5	1.	N/A
Trichloroethene	3.1	0.5	1.	N/A
1,2-Dichloropropane	BDL	0.5	1.	N/A
Bromodichloromethane	BDL	0.5	1.	N/A
Dibromomethane	BDL	0.5	1.	N/A
Toluene	BDL	0.5	1.	1,000.
1,1,2-Trichloroethane	BDL	0.5	1.	N/A
Tetrachloroethene	44.3	0.5	1.	N/A
1,3-Dichloropropane	BDL	0.5	1.	N/A
Dibromochloromethane	BDL	0.5	1.	N/A
1,2-Dibromoethane	BDL	0.5	1.	N/A
Chlorobenzene	BDL	0.5	1.	N/A
Ethylbenzene	BDL	0.5	1.	N/A
1,1,1,2-Tetrachloroethane	BDL	0.5	1.	N/A
m,p-Xylene	BDL	1	1.	1,000.
o-Xylene	BDL	0.5	1.	1,000.
Styrene	BDL	0.5	1.	N/A

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
Isopropylbenzene	BDL	0.5	1.	N/A
Bromoform	BDL	0.15	1.	N/A
1,1,2,2-Tetrachloroethane	BDL	0.5	1.	N/A
1,2,3-Trichloropropane	BDL	0.5	1.	N/A
n-Propylbenzene	BDL	0.5	1.	N/A
Bromobenzene	BDL	0.5	1.	N/A
1,3,5-Trimethylbenzene	BDL	0.5	1.	N/A
2-Chlorotoluene	BDL	0.5	1.	N/A
4-Chlorotoluene	BDL	0.5	1.	N/A
trans-1,3-Dichloropropene	BDL	0.5	1.	N/A
1,2,4-Trimethylbenzene	BDL	0.5	1.	N/A
sec-Butylbenzene	BDL	0.5	1.	N/A
p-Isopropyltoluene	BDL	0.5	1.	N/A
1,3-Dichlorobenzene	BDL	0.5	1.	1,000.
1,4-Dichlorobenzene	BDL	0.5	1.	N/A
n-Butylbenzene	BDL	0.5	1.	N/A
1,2-Dichlorobenzene	BDL	0.5	1.	1,000.
1,2-Dibromo-3-Chloropropane	BDL	0.5	1.	N/A
1,2,4-Trichlorobenzene	BDL	0.5	1.	N/A
Hexachlorobutadiene	BDL	0.5	1.	N/A
Naphthalene	BDL	0.5	1.	N/A
1,2,3-Trichlorobenzene	BDL	0.5	1.	N/A
cis-1,2-Dichloroethene	5.1	0.5	1.	N/A
tert-Butylbenzene	BDL	0.5	1.	N/A
MTBE	BDL	1	1.	200.
IPE	BDL	1	1.	N/A

End of 6230 D

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

625 BN

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
n-Nitrosodimethylamine	BDL	25	1.	N/A
Bis(2-chloroethyl)ether	BDL	25	1.	N/A
1,3-Dichlorobenzene	BDL	5	1.	620.
1,4-Dichlorobenzene	BDL	5	1.	75.
1,2-Dichlorobenzene	BDL	5	1.	620.
Bis-2-Chloroisopropylether	BDL	5	1.	N/A
Hexachloroethane	BDL	5	1.	N/A
n-Nitrosodi-n-propylamine	BDL	5	1.	N/A
Nitrobenzene	BDL	5	1.	N/A
Isophorone	BDL	5	1.	N/A
Bis-2-Chloroethoxymethane	BDL	5	1.	N/A
1,2,4-Trichlorobenzene	BDL	5	1.	N/A
Naphthalene	BDL	5	1.	21.
Hexachlorobutadiene	BDL	5	1.	N/A
Hexachlorocyclopentadiene	BDL	5	1.	N/A
2-Chloronaphthalene	BDL	5	1.	N/A
Acenaphthylene	BDL	5	1.	210.
Dimethylphthalate	BDL	5	1.	N/A
2,6-Dinitrotoluene	BDL	5	1.	N/A
Acenaphthene	BDL	5	1.	80.
2,4-Dinitrotoluene	BDL	5	1.	N/A
Fluorene	BDL	5	1.	280.
4-Chlorophenyl Phenyl Ether	BDL	5	1.	N/A
Diethylphthalate	BDL	5	1.	5,000.
n-Nitrosodiphenylamine	BDL	5	1.	N/A
4-Bromophenyl Phenyl Ether	BDL	5	1.	N/A
Hexachlorobenzene	BDL	5	1.	.02
Benzidine	BDL	25	1.	N/A
Phenanthrene	BDL	5	1.	210.
Anthracene	BDL	5	1.	2,100.
Di-n-Butylphthalate	BDL	5	1.	700.
Fluoranthene	BDL	5	1.	280.
Pyrene	BDL	5	1.	210.
Benzylbutylphthalate	BDL	10	1.	N/A
Benzo(a)anthracene	BDL	5	1.	.05

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

lowest detect on sample

Site Name: Camp Lejeune 10 USTS

	Conc. in ug/l	PQL in ug/l	Dilution Factor	NCAC 2L in ug/l
3,3'-Dichlorobenzidine	BDL	10	1.	N/A
Chrysene	BDL	2.5	1.	5.
Bis-2-Ethylhexylphthalate	BDL	5	1.	N/A
Di-n-Octylphthalate	BDL	5	1.	140.
Benzo(b)fluoranthene	BDL	5	1.	N/A
Benzo(k)fluoranthene	BDL	5	1.	N/A
Benzo(a)pyrene	BDL	5	1.	N/A
Indeno(1,2,3-cd)pyrene	BDL	5	1.	N/A
Dibenzo(a,h)anthracene	BDL	5	1.	N/A
Benzo(g,h,i)perylene	BDL	5	1.	N/A

End of 625 BN

End Waste Water

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

Site Name: Camp Lejeune 10 USTS

GCI Project # 9708-048

Field ID NH118MWO1 Lab ID 2205

Date Analyzed: 8/28/97

RCRA metals

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Arsenic	BQL	0.01	1.0	0.05
Barium	BQL	0.5	20.0	2.0
Cadmium	BQL	0.005	1.0	0.005
Chromium	BQL	0.01	1.0	0.05
Lead	BDL	0.015	1.0	0.015
Mercury	BQL	0.001	1.0	0.0011
Selenium	BDL	0.02	1.0	0.05
Silver	BQL	0.01	1.0	0.018

Field ID 1817MWO1 Lab ID 2207

Date Analyzed: 8/28/97

RCRA metals

Arsenic	BQL	0.01	1.0	0.05
Barium	BQL	0.5	20.0	2.0
Cadmium	BQL	0.005	1.0	0.005
Chromium	BQL	0.5	1.0	0.05
Lead	BDL	0.015	1.0	0.015
Mercury	BQL	0.001	1.0	0.0011
Selenium	BQL	0.02	1.0	0.05
Silver	BQL	0.01	1.0	0.018

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

Site Name: Camp Lejeune 10 USTS

GCI Project # 9708-048

Field ID Waste Water Lab ID 2210

Date Analyzed: 8/28/97

RCRA metals

	Conc. in mg/l	PQL in mg/l	Dilution Factor	NCAC 2L in mg/l
Arsenic	0.018	0.01	1.0	0.05
Barium	BQL	0.5	20.0	2.0
Cadmium	BQL	0.005	1.0	0.005
Chromium	0.061	0.01	1.0	0.05
Lead	BQL	0.015	1.0	0.015
Mercury	BQL	0.001	1.0	0.0011
Selenium	BQL	0.02	1.0	0.05
Silver	BQL	0.01	1.0	0.018

Field ID Waste Soil Lab ID 2211

Date Analyzed: 9/2/97

TCLP RCRA Metals

Arsenic	BQL	0.01	1.0	0.05
Barium	BQL	2.5	100.0	2.0
Cadmium	BDL	0.5	1.0	0.005
Chromium	BQL	0.5	1.0	0.05
Lead	BDL	0.5	1.0	0.015
Mercury	BQL	0.001	1.0	0.0011
Selenium	BQL	0.02	1.0	0.05
Silver	BQL	0.5	1.0	0.018

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

Site Name:

Camp Lejeune 10 USTS

GCI Project # 9708-048

Field ID Waste Soil

Lab ID 2211

8021 soil

Date Analyzed: 9/2/97

Conc. in
ug/kg

Dry wt % 87.8

lowest detection on sample

PQL in
ug/kg

Dilution
Factor

Dichlorodifluoromethane	BDL	.5	1.0
Chloromethane	BDL	.5	1.0
Vinyl Chloride	BDL	.5	1.0
Bromomethane	BDL	.5	1.0
Chloroethane	BDL	.5	1.0
Trichlorofluoromethane	BDL	.5	1.0
1,1-Dichloroethene	BDL	.5	1.0
Methylene Chloride	BDL	.5	1.0
trans-1,2-Dichloroethene	BDL	.5	1.0
1,1-Dichloroethane	BDL	.5	1.0
2,2-Dichloropropane	BDL	.5	1.0
cis-1,3-Dichloropropene	BDL	.5	1.0
Chloroform	BDL	.5	1.0
Bromochloromethane	BDL	.5	1.0
1,1,1-Trichloroethane	BDL	.5	1.0
1,1-Dichloropropene	BDL	.5	1.0
Carbon Tetrachloride	BDL	.5	1.0
Benzene	BDL	.5	1.0
1,2-Dichloroethane	BDL	.5	1.0
Trichloroethene	BDL	.5	1.0
1,2-Dichloropropane	BDL	.5	1.0
Bromodichloromethane	BDL	.5	1.0
Dibromomethane	BDL	.5	1.0
Toluene	BDL	.5	1.0
1,1,2-Trichloroethane	BDL	.5	1.0
Tetrachloroethene	BDL	.5	1.0
1,3-Dichloropropane	BDL	.5	1.0
Dibromochloromethane	BDL	.5	1.0
1,2-Dibromoethane	BDL	.5	1.0
Chlorobenzene	BDL	.5	1.0
Ethylbenzene	BDL	.5	1.0
1,1,1,2-Tetrachloroethane	BDL	.5	1.0
m,p-Xylene	BDL	1.0	1.0
o-Xylene	BDL	.5	1.0
Styrene	BDL	.5	1.0
Isopropylbenzene	BDL	.5	1.0
Bromoform	BDL	.2	1.0
1,1,2,2-Tetrachloroethane	BDL	.5	1.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

Site Name:

Camp Lejeune 10 USTS

GCI Project # 9708-048

lowest detection on sample

	Conc. in ug/kg	PQL in ug/kg	Dilution Factor
1,2,3-Trichloropropane	BDL	.5	1.0
n-Propylbenzene	BDL	.5	1.0
Bromobenzene	BDL	.5	1.0
1,3,5-Trimethylbenzene	BDL	.5	1.0
2-Chlorotoluene	BDL	.5	1.0
4-Chlorotoluene	BDL	.5	1.0
trans-1,3-Dichloropropene	BDL	.5	1.0
1,2,4-Trimethylbenzene	BDL	.5	1.0
sec-Butylbenzene	BDL	.5	1.0
p-Isopropyltoluene	BDL	.5	1.0
1,3-Dichlorobenzene	BDL	.5	1.0
1,4-Dichlorobenzene	BDL	.5	1.0
n-Butylbenzene	BDL	.5	1.0
1,2-Dichlorobenzene	BDL	.5	1.0
1,2-Dibromo-3-Chloropropa	BDL	.5	1.0
1,2,4-Trichlorobenzene	BDL	.5	1.0
Hexachlorobutadiene	BDL	.5	1.0
Naphthalene	BDL	.5	1.0
1,2,3-Trichlorobenzene	BDL	.5	1.0
cis-1,2-Dichloroethene	BDL	.5	1.0
tert-Butylbenzene	BDL	.5	1.0

End of 8021 soil

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

Site Name:

Camp Lejeune 10 USTS

GCI Project # 9708-048

**Conc. in
mg/kg**

lowest detect on sample

**PQL in
mg/kg**

**Dilution
Factor**

Field ID Waste Soil

Date Analyzed:

Lab ID 2211

9/4/97

9071 soil

Oil and Grease

594.851

5.

1.0

GeoChem Incorporated Certified Analytical Laboratory

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project 9708-048

Site Name:

Camp Lejeune 10 USTS

Conc. in mg/kg

PQL in mg/kg

Field ID Waste Soil

Lab ID 2211

Date Analyzed: 9/3/97

Dry Wt %: 0.88

Diesel

BQL

22.8

Gasoline

BDL

5.7

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project # 9708-048

lowest detection @ ideal conditions

	Percent Recovery	Lab Blank:	MDL in ug/l
6230 D			
Dichlorodifluoromethane	86	0	0.22
Chloromethane	90	0	0.16
Vinyl Chloride	102	0	0.14
Bromomethane	89	0	0.07
Chloroethane	88	0	0.25
Trichlorofluoromethane	86	0	0.33
1,1-Dichloroethene	87	0	0.37
Methylene Chloride	54	0	0.19
trans-1,2-Dichloroethene	86	0	0.23
1,1-Dichloroethane	87	0	0.33
2,2-Dichloropropane	97	0	0.46
cis-1,3-Dichloropropene	82	0	0.13
Chloroform	89	0	0.18
Bromochloromethane	95	0	0.16
1,1,1-Trichloroethane	96	0	0.2
1,1-Dichloropropene	90	0	0.28
Carbon Tetrachloride	90	0	0.38
Benzene	99	0	0.22
1,2-Dichloroethane	78	0	0.37
Trichloroethene	89	0	0.36
1,2-Dichloropropane	86	0	0.3
Bromodichloromethane	85	0	0.3
Dibromomethane	80	0	0.22
Toluene	99	0	0.2
1,1,2-Trichloroethane	80	0	0.18

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

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GCI Project # 9708-048

Tetrachloroethene	76	0	0.19
1,3-Dichloropropane	76	0	0.39
Dibromochloromethane	83	0	0.24
1,2-Dibromoethane	70	0	0.28
Chlorobenzene	84	0	0.13
Ethylbenzene	98	0	0.26
1,1,1,2-Tetrachloroethane	77	0	0.31
m,p-Xylene	102	0	0.35
o-Xylene	97	0	0.18
Styrene	97	0	0.18
Isopropylbenzene	99	0	0.28
Bromoform	71	0	0.22
1,1,1,2-Tetrachloroethane	67	0	0.28
1,2,3-Trichloropropane	72	0	0.24
n-Propylbenzene	100	0	0.22
Bromobenzene	96	0	0.18
1,3,5-Trimethylbenzene	98	0	0.19
2-Chlorotoluene	97	0	0.2
4-Chlorotoluene	98	0	0.22
trans-1,3-Dichloropropene	81	0	0.17
1,2,4-Trimethylbenzene	101	0	0.22
sec-Butylbenzene	100	0	0.26
p-Isopropyltoluene	104	0	0.23
1,3-Dichlorobenzene	81	0	0.21
1,4-Dichlorobenzene	83	0	0.23
n-Butylbenzene	98	0	0.47
1,2-Dichlorobenzene	78	0	0.25
1,2-Dibromo-3-Chloropropane	64	0	0.16
1,2,4-Trichlorobenzene	74	0	0.17

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project # 9708-048

Hexachlorobutadiene	92	0	0.17
Naphthalene	101	0	0.15
1,2,3-Trichlorobenzene	62	0	0.12
cis-1,2-Dichloroethene	98	0	0.15
tert-Butylbenzene	101	0	0.23
MTBE	99	0	0.29
IPE	#Div/0!	0	0.21

End of 6230 D

lowest detection @ ideal conditions

Percent
Recovery

Lab Blank:

MDL in
ug/l

625 BN

1,4-Dichlorobenzene	55	0	2.96
n-Nitrosodi-n-propylamine	66	0	4.77
1,2,4-Trichlorobenzene	55	0	2.68
Acenaphthene	74	0	6.83
2,4-Dinitrotoluene	53	0	2.48
Pyrene	68	0	3.34

End of 625 BN

GeoChem Incorporated Quality Control Results

NC # 37745, NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project # 9708-048

lowest detection @ ideal conditions

	Percent Recovery	Lab Blank:	MDL in ug/l
602			
Benzene	89	0	0.2
Toluene	89	0	0.13
Chlorobenzene	91	0	0.16
Ethylbenzene	91	0	0.2
Xylenes	95	0	0.6
1,3-Dichlorobenzene	90	0	0.34
1,4-Dichlorobenzene	88	0	0.14
1,2-Dichlorobenzene	90	0	0.06

End of 602

lowest detection @ ideal conditions

	Percent Recovery	Lab Blank:	MDL in ug/l
504 EDB			
1,2-Dibromooethane	90	0	0.0006

End of 504 EDB

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project # 9708-048

**Percent
Recovery**

Lab Blank:

lowest detection limit @ ideal conditions

**MDL in
mg/l**

TCLP RCRA Metals

Arsenic	104	0	0.005
Barium	96	0	0.005
Cadmium	90	0	0.02
Chromium	100	0	0.0005
Lead	96	0	0.5
Mercury	82	0	0.0004
Selenium	92	0	0.005
Silver	99	0	0.05

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project # 9708-048

9071 soil

	Percent Recovery	Lab Blank:	lowest detection limit @ ideal conditions MDL. in mg/kg
Oil and Grease	87	0	1.57

GeoChem Incorporated Quality Control Results

NC # 37745 , NC # 336, NC # 461, EPA ID # 155

Monday, September 08, 1997

GCI Project # 9708-048

<i>Date Analyzed: 9/3/97</i>	<i>Dry Wt %: 0.88</i>	<i>Percent Recovery</i>	<i>Lab Blank</i>	<i>MDL in mg/kg</i>
	Diesel	101.7	0	2.43
	Gasoline	110.4	0	2.43

Teri P. v. S.

Environmental Laboratories

**2500 Gate Way Centre Blvd., Suite 300
Morrisville, NC 27560**

Bill To:

Richard Catkin Assoc
Wilmington, NC

Chain of Custody Record

Page 1 of

[illegible]

This Chain of Custody is considered a written contract to perform the services requested in the analyses section of this document.

Piver

GeoChem, Incorporated

Environmental Laboratories

2500 Gate Way Centre Blvd., Suite 300

Morrisville, NC 27560

Bill To:

Richard Catlin

Chain of Custody Record

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