

N61165.AR.003917
CNC CHARLESTON
5090.3a

RAPID ASSESSMENT REPORT FOR SITE 32 BUILDING 54 ZONE C CNC CHARLESTON SC
1/1/2000
TETRA TECH

**Rapid Assessment Report
For
Site 32, Building 54**

**Zone C
Charleston Naval Complex
North Charleston, South Carolina**



**Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0093**

January, 2000

**RAPID ASSESSMENT REPORT
FOR
SITE 32, BUILDING 54**

**ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406**

**Submitted by:
Tetra Tech NUS
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220**

**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0093**

JANUARY 2000

PREPARED UNDER THE SUPERVISION OF:



**PAUL CALLIGAN, P.G.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
TALLAHASSEE, FLORIDA**

APPROVED FOR SUBMITTAL BY:



**DEBBIE WROBLEWSKI
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA**

CERTIFICATION PAGE

I certify that the information contained in this report and on any attachments is true, accurate, and complete to the best of my knowledge, information, and belief.



Approved By:

Gregory D. Swanson 1/24/00

Gregory D. Swanson, P.E.

South Carolina Registration No. 17132
SCDHEC UST Site Rehabilitation Contractor Class I & II No. 24

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION	1-1
1.1 SITE DESCRIPTION	1-1
1.2 SITE HISTORY	1-2
1.3 RECEPTOR SURVEY RESULTS	1-3
1.4 REGIONAL GEOLOGY AND HYDROGEOLOGY	1-4
 2.0 ASSESSMENT INFORMATION	 2-1
2.1 SITE-SPECIFIC GEOLOGY AND HYDROGEOLOGY	2-1
2.1.1 Site Geology	2-1
2.1.2 Site Hydrogeology	2-1
2.2 ASSESSMENT RESULTS	2-2
2.3 FIELD SCREENING ASSESSMENT	2-3
2.3.1 Soil Vapor Assessment	2-3
2.3.2 Soil Mobile Laboratory Results	2-4
2.3.3 Groundwater Mobile Laboratory Results	2-4
2.4 CHEMICALS OF CONCERN IN SOIL AND GROUNDWATER	2-5
2.4.1 Chemicals of Concern in Soil	2-5
2.4.2 Chemicals of Concern in Groundwater	2-6
2.5 ANALYTICAL DATA	2-6
2.6 AQUIFER CHARACTERISTICS AND EVALUATION	2-6
2.7 FATE AND TRANSPORT	2-7
2.8 PREDICTED MIGRATION AND ATTENUATION OF CHEMICALS OF CONCERN	2-8
 3.0 TIER 1 AND 2 EVALUATION	 3-1
3.1 COMPARISON OF ANALYTICAL RESULTS WITH RBSLs	3-1
3.2 SITE CONCEPTUAL EXPOSURE MODEL	3-1
3.3 EXPOSURE PATHWAY ANALYSIS	3-2
3.3.1 On-Site Commercial Worker	3-2
3.3.2 On-Site Visitor	3-2
3.3.3 On-Site Construction Worker	3-2
3.3.4 On-Site Resident	3-3
3.3.5 Off-Site Resident	3-3
3.3.6 Surface Water	3-3
3.4 INDENTIFICATION OF DATA REQUIREMENTS	3-3
3.5 SITE-SPECIFIC TARGET LEVELS	3-3
3.6 RECOMMENDATIONS	3-6
 4.0 REFERENCES	 4-1

TABLE OF CONTENTS (Continued)

TABLES

1	GROUNDWATER ELEVATIONS
2	GROUNDWATER FIELD MEASUREMENTS
3	GROUNDWATER NATURAL ATTENUATION FIELD MEASUREMENTS
4	SUMMARY OF OVA SOIL SCREENING RESULTS
5	SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR SOIL
6	SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR GROUNDWATER
7	SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
8	SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
9	COMPARISON OF MAXIMUM CONCENTRATIONS TO RBSLS
10	EXPOSURE PATHWAY ASSESSMENT – CURRENT LAND USE
11	EXPOSURE PATHWAY ASSESSMENT – FUTURE LAND USE

FIGURES

1	SITE LOCATION MAP
2	SITE VICINITY MAP
3	SITE MAP AND SAMPLING LOCATIONS
4	GEOLOGIC CROSS SECTION A TO A'
5	GEOLOGIC CROSS SECTION B TO B'
6	GROUNDWATER POTENTIOMETRIC MAP, SEPTEMBER 11, 1999
7	ETHYLBENZENE SOIL CONCENTRATION MAP
8	TOTAL XYLENES SOIL CONCENTRATION MAP
9	NAPHTHALENE SOIL CONCENTRATION MAP

APPENDICES

A	UNDERGROUND STORAGE TANK ASSESSMENT REPORT – UST BLDG 54
B	GEOLOGIC BORING LOGS
C	FIELD SAMPLING DATA SHEETS
D	SOIL AND GROUNDWATER LABORATORY ANALYTICAL DATA
E	BORING LOG OF MONITORING WELL USED IN AQUIFER CHARACTERIZATION EVALUATION
F	RBSL CALCULATION SPREADSHEETS
G	SOIL LEACHABILITY MODEL

EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (TtNUS) has completed a Rapid Assessment (RA) for Site 32 (Building 54) which contained an underground storage tank (UST) system. The UST system supplied diesel fuel to a generator which powered water pumps at the former pump house (Building 54) at Charleston Naval Complex (CNC) Zone C, in North Charleston, South Carolina. The RA was performed under the direction of the South Carolina Department of Health and Environmental Control.

TtNUS performed the following actions during the RA:

- Reviewed available Navy documents to identify potential sources and receptors for petroleum hydrocarbons in the vicinity, evaluate public and private potable wells, locate utilities, locate nearby surface water bodies, and to determine surface hydrology and drainage;
- Reviewed the previously prepared Storage Tank Assessment Report for UST BLDG 54 to determine soil boring locations and monitoring well placements;
- Conducted a site survey to identify utilities and to construct a site plan;
- Performed a direct push investigation to collect soil samples for field screening using an organic vapor analyzer and collect soil and groundwater samples for mobile lab screening analysis for benzene, toluene, ethyl benzene, total xylenes (BTEX), and diesel range organics;
- Installed three piezometers to approximately 12 feet below land surface (bls), five shallow permanent monitoring wells to approximately 13 feet bls, and one vertical delineation monitoring well to approximately 25 feet bls;
- Collected groundwater samples from the permanent monitoring wells for laboratory analysis for BTEX, methyl tert-butyl ether (MTBE), and naphthalene using U.S. Environmental Protection Agency (USEPA) Method 8260 and polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8270;
- Performed groundwater natural attenuation sampling;
- Collected soil samples for laboratory analysis for BTEX, and naphthalene using USEPA Method 8260, PAHs using USEPA Method 8270, total organic carbon (TOC) using USEPA Method 415.1, total recoverable petroleum hydrocarbon (TRPH) using USEPA Method 9071, and grain size analysis using sieve and hydrometer methods; and
- Surveyed monitoring well top of casing elevations and collected depth to groundwater measurements to evaluate the groundwater flow direction.

Conclusion

Naphthalene and ethylbenzene were the only Chemicals of Concern (CoC) detected in the onsite soils at concentrations that exceed the SCDHEC Risk Based Screening Levels (RBSLs) for clay-rich soils. PAHs consisting of benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and dibenzo(a,h)anthracene were also reported with elevated laboratory detection limits above their RBSLs. The naphthalene and ethylbenzene concentrations, and the PAHs that were reported with elevated detection limits, were identified in soil sample 32SLB020506 (boring CNC32-B02) collected from 5 to 6 feet bls at the north end of the former tank field. An estimated naphthalene concentration of 42,000 micrograms per kilogram (ug/kg) exceeded the RBSL of 52 ug/kg established for naphthalene. Ethylbenzene was detected at 1,800 ug/kg above the ethylbenzene RBSL of 364 ug/kg. Sample 32SLB020506 also contained the elevated laboratory detection limits for benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and dibenzo(a,h)anthracene at laboratory detection limits of greater than 36,000 ug/kg.

On site construction worker (utility) was identified as a potential future receptor. The RBSLs for naphthalene and ethylbenzene were evaluated for dermal, incidental ingestion, and inhalation exposures. Based on the RBSLs, Site-Specific Target Level (SSTL) were calculated for the subsurface soil for naphthalene and ethylbenzene leaching to groundwater. The soil leaching SSTL calculated for ethylbenzene is 25 milligrams per kilogram (mg/kg), which is well above the maximum ethylbenzene concentration detected (1.8 mg/kg). The soil leaching SSTL for naphthalene is 12 mg/kg, which was less than the maximum soil naphthalene concentration of 42 mg/kg. The calculated SSTL for naphthalene indicates naphthalene will leach into the groundwater at concentrations above the RSBL for a construction worker.

Groundwater analysis collected in August 1999 indicate no CoCs analytes were detected in groundwater at concentrations that exceed the SCDHEC RBSLs. No free product was detected in the groundwater.

Recommendation

Corrective action is proposed for Site 32 since naphthalene concentrations have been detected in the soil above the SSTL criteria, and the potential may or may not exist for PAHs to leach into the groundwater. It is proposed that soils be excavated and removed from the former tank pit area and groundwater be monitored for naphthalene and PAH constituents following the removal of the soils.

1.0 INTRODUCTION

Site 32 is a closed underground storage tank (UST) system which provided diesel fuel for diesel powered water pumps at Building 54 at the Charleston Naval Complex (CNC), Zone C in Charleston, South Carolina. This Rapid Assessment (RA) was performed by Tetra Tech NUS, Inc.'s (TtNUS's) Tallahassee, Florida, office, located at 1401 Oven Park Drive, Suite 102, Tallahassee, Florida 32312 (telephone number 850-385-9899) on behalf of the U.S. Navy Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFAC), 2155 Eagle Drive, North Charleston, South Carolina (telephone number 843-820-7307). Authorization to conduct the RA for the site was issued by NAVFAC under Contract Task Order (CTO) 0093. Fieldwork necessary to complete the RA was performed May 13-28, June 2-30, July 1-28, and August 7-9, 1999, by TtNUS.

1.1 SITE DESCRIPTION

The CNC is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina, as shown on Figure 1. This installation consists of two major areas: an undeveloped dredge materials area on the east bank of the Cooper River on Daniel Island in Berkley County, and a developed area on the west bank of the Cooper River. The developed portion of the base is on the peninsula bounded on the west by the Ashley River and on the east by the Cooper River. The site is located within the developed portion of the base as shown on Figure 2.

The area surrounding CNC is "mature urban," having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek. A site vicinity map, which exhibits adjacent properties and structures, vicinity roads, current utilities, and vicinity surface drainage, is included as Figure 2.

Building 54 is a former fresh water pumphouse that has since been demolished. The pumphouse was for the base water system. UST Building 54 (UST BLDG 54) provided diesel fuel to the water pumps operating in the pumphouse. UST BLDG 54 was a registered but unregulated 560-gallon steel tank installed in 1967. The tank was located on the southwest side of Building 54 (Figure 3). It is unknown when UST BLDG 54 was last in operation [Supervisor of Ship Building, Conversion and Repair, United States Navy, Portsmouth, Virginia, Environmental Detachment Charleston (SPORTENDETCNASN), 1996].

1.2 SITE HISTORY

In 1901, the U.S. Navy acquired 2,250 acres near Charleston to build a shipyard and the first naval officer was assigned duty in early 1902. Subsequently, buildings and a dry dock were constructed in the Naval Yard. The dry dock was completed in 1909 along with several other brick buildings and the main power plant, which is still in operation today. The first ship was placed in dry dock and work began on fleet vessels in 1910. World War I brought about an expansion of the yards, facilities, land area, and work force. The yard built two gunboats, several submarine chasers, and tugs in addition to performing repairs and other services to the fleet. In 1933, building activity had increased principally in construction of several Coast Guard tugs, a Coast Guard cutter, and a Navy gunboat, creating the need for more facilities and a much larger work force. In 1943 civilian work force peaked with almost 26,000 employees divided among three daily shifts. In 1956, construction began on piers, barracks, and buildings for mine warfare ships and personnel. Later in the decade, the facility became a major home port for combat ships and submarines of the U.S. Atlantic Fleet [Ensafe/Allan & Hoshall, Inc. (E/A&H), 1997].

In 1993, major cuts in defense spending, as a result in part to the end of the Cold War, caused CNC to be added to the list of bases scheduled for closure under the Defense Base Realignment and Closure Act (BRAC). BRAC regulates the closure and transition of property back to the community (E/A&H, 1997). With the scheduled closure of the base, operations were scaled back and environmental cleanup proceeded to make the property available for redevelopment after closure. As part of the environmental cleanup process, the UST at Building 54 was removed and the tank closure was completed in June 1996. Following removal of the UST system Building 54 was dismantled and the area razed.

From June 10, 1996 through June 12, 1996, UST BLDG 54 was removed, cleaned, and recycled as scrap metal. At the time UST BLDG 54 was removed, the tank was corroded and pitted and had several holes. The holes ranged from 1/4 to 1/8-inch in diameter. The holes were found in the middle of the tank and up. During excavation of the tank, heavy diesel fuel odor was present throughout the excavation. Groundwater observed in the tank pit excavation was reported to have contained a sheen (SPORTENDECHASN, 1996).

The fuel distribution piping was constructed of steel and was removed from the ground during the tank removal. The piping extended a distance below ground approximately 1 foot before entering Building 54. At the time of the piping removal, the piping was corroded but was identified as sound (SPORTENDECHASN, 1996).

During the removal of UST BLDG 54, elevated levels of polynuclear aromatic hydrocarbons (PAHs) were detected in areas of the tank pit soil and from groundwater grab samples. Naphthalene was detected in soil and groundwater at concentrations exceeding South Carolina Department of Health and Environmental Control's (SCDHEC's) action levels established in the guidance document "South Carolina Risk-Based Corrective Action for Petroleum Releases" (January 1998).

1.3 RECEPTOR SURVEY RESULTS

A survey of the site vicinity was conducted by TtNUS personnel to identify potential receptors for petroleum hydrocarbon contamination. The site plan (Figure 2) depicts the public utilities located within 250 feet of the former UST BLDG 54 study area. Specific information concerning the depth of utilities below land surface is currently unavailable. However, according to facility personnel, utility lines are typically located approximately 2 to 6 feet below land surface (bls) (SPORTENVDETCNASN, 1999). The following utility receptors were located:

- Sanitary sewer, water utility: Sanitary sewer lines are located approximately 15 feet west and 20 feet south of former UST BLDG 54. Water mains are also present on the north and east sides of where Building 54 once stood. The water main located on the southside of Building 54 transversed the south end of the UST excavation for UST BLDG 54.
- Electrical utility: The Underground Storage Tank Assessment Report (SPORTENVDETCNASN, 1996) identified multiple electrical conduit exiting Building 54 on all sides and entering the ground. Electrical utility map for Building 54 was not available and the building has since been demolished.

According to the Final RCRA Facility Investigation Report for Zone H [Ensafe/Allan & Hoshall, Inc.(E/A&H, 1996a)] a survey of groundwater users within a 7-mile radius of CNC was conducted by the South Carolina Water Resources Commission to ascertain the extent of any shallow groundwater usage. Results of the water use investigation revealed that no drinking water wells, which utilize the shallow aquifer, are located within a 4-mile radius of CNC. Irrigation wells were not identified within 1,000 feet of the site. Numerous monitoring wells are located within 2,000 feet of the site. The nearest surface water body to UST BLDG 54 is Noisette Creek located approximately 2,000 feet to the north.

There are no city, county, or state zoning ordinances as the property (CNC) is currently owned by the federal government. Information concerning zoning ordinances was obtained from the SOUTHDIV Remedial Project Manager located at 2155 Eagle Drive, North Charleston, South Carolina 29406 (telephone number 843-820-7307).

1.4 REGIONAL GEOLOGY AND HYDROGEOLOGY

CNC is located in Charleston County, South Carolina, in the Lower South Carolina Coastal Plain Physiographic Province on the Cooper River side of the Charleston Peninsula. The peninsula is formed by the confluence of the Cooper and Ashley Rivers. Topography in the area is typical of the South Carolina lower coastal plain and is characterized by having low-relief plains broken by the meandering streams and rivers, flowing toward the coast past occasional marine terrace escarpments (E/A&H, 1997).

The geology of the Charleston area is typical of the southern Atlantic Coastal Plain. Cretaceous-age and younger sediments thicken seaward and are underlain by older igneous and metamorphic basement rock. Surface exposures consist of recent or Pleistocene sands, silts, and clays of high organic content referred to as the Wando Formation (E/A&H,1997). Underlying the Wando Formation, increasing with age, are the Oligocene-age Cooper Group and the Eocene-age Santee Limestone. The Cooper Group is comprised of the Parkers Ferry, Ashley, and Harleyville Formations. The formation of particular importance in the Cooper Group is the Ashley Formation, which was formerly referred to as the Cooper Marl in most regional geologic literature. In more recent geologic nomenclature, the name "Cooper" has been given to a group of formations including the Ashley Formation, a pale green to olive-brown, sandy phosphoric limestone or marl, which is locally muddy and/or sandy. The Ashley Formation in the vicinity of Charleston is encountered at a depth of approximately 30 to 70 feet bls. The top of the Ashley Formation has been reported to be associated with an erosional basin and the entire Cooper Unit, including the Ashley Formation, is indicated to be approximately 300 feet thick (E/A&H,1997).

Groundwater occurs under water table or poorly confined conditions within the Pleistocene deposits overlying the Ashley Formation of the Cooper Group. Transmissivity in the Pleistocene aquifer is generally less than 1,000 feet per day and well yields are variable, ranging from 0 to 200 gallons per minute (gpm). This groundwater contains high concentrations of iron and is commonly acidic at shallow depths (E/A&H,1997).

The Cooper Group is hydrogeologically significant mainly because of its low permeability. In most locales, its sandy, finely granular limestone produces little or no water, but instead acts as confining material causing artesian conditions in the underlying Santee Limestone. Yields from wells in the Santee are usually less than 300 gpm (E/A&H, 1997).

2.0 ASSESSMENT INFORMATION

2.1 SITE-SPECIFIC GEOLOGY AND HYDROGEOLOGY

2.1.1 Site Geology

Nine direct push soil borings were advanced at Site 32 under the supervision of a TtNUS geologist from May 14 through May 16, 1999 (Figure 3). Eight borings advanced to 8 feet bls and one boring advanced to 30 feet bls provided soil samples to characterize the subsurface lithology. On June 17, 1999, five shallow monitoring wells were installed to a depth of 13 feet bls. During installation soil grab samples were collected to describe the subsurface lithology. On June 20 – June 22, 1999, a vertical delineation monitoring well was installed. During the drilling process, lithologic samples were collected using split-spoon samplers to characterize the subsurface lithology to a depth of 32 feet bls.

Based on lithologic descriptions from the soil borings and monitoring wells, the subsurface soil consists of sand and clay mixtures from the surface to approximately 5 feet bls. Underlying these units are tan to gray sands encountered to a depth of 26 feet bls in deep boring CNC32-B06. Olive silt and clay mixtures were present from 26 to 30 feet bls in the deep boring (Figures 4 and 5). Boring logs are presented in Appendix B.

2.1.2 Site Hydrogeology

Five shallow water table monitoring wells, CNC32-MW01, CNC32-MW02, CNC32-MW03, CNC32-MW04, and CNC32-MW05, and one deep vertical delineation monitoring well, CNC33-MW6D, were installed as part of this RA investigation (see Figure 3). The shallow monitoring wells were completed to a depth of 13 feet bls. Each shallow monitoring well was completed using 10 feet of 2-inch diameter, 0.01-inch machine-slotted Schedule 40 polyvinyl chloride (PVC) screen that bracketed the water table. Monitoring well CNC32-MW6D was completed as a Type III monitoring well with 6-inch-diameter PVC surface casing grouted to a depth of 20 feet bls. After the grout for the surface casing cured for 24 hours, the borehole was advanced to a depth of 36 feet and a 2-inch-diameter PVC monitoring well was installed with a 5-foot, 0.01-inch machine-slotted PVC screen. Well construction logs for the RA monitoring wells are presented in Appendix B. At the completion of the well installations, a South Carolina registered professional surveyor surveyed each monitoring well location and the top of casing elevation.

Three, small diameter PVC piezometers were installed on May 29, 1999 to determine the depth to groundwater and evaluate the groundwater flow direction at the site. Each piezometer was constructed of 1-inch diameter Schedule 40 PVC threaded casing and well screen. Each piezometer was completed with a 10-foot screen section installed from 2 to 12 feet bls. The screen section of each piezometer was installed to bracket the water table.

Groundwater in shallow wells at Site 32 was encountered at depths ranging from about 6 to 7 feet bls during the RA investigation. The recorded water-level data collected during the RA are presented in Table 1. Groundwater elevation measurements were recorded from the site monitoring wells on September 11, 1999 to evaluate the groundwater flow direction. Figure 6 presents the groundwater potentiometric surface recorded during the field event on September 11, 1999. The potentiometric surface maps depict a groundwater flow direction toward the east.

As part of the Final RCRA Facility Investigation Report for Zone B (E/A&H, 1996b), a tidal influence investigation was conducted to determine what effects tidal ranges in Noisette Creek and the Cooper River exhibit on groundwater flow within Zone B. The objective of the investigation was to measure water levels in the shallow aquifer during low, mid, and high tides in Zones A and B. Select wells in Zones C and E near the perimeter of Zone B were also measured to obtain additional data. Since Zone B is bordered by Noisette Creek to the north and is situated between Zone C and the Cooper River, results from the Zone B tidal influence investigation were used to evaluate effects of tidal influence on Site 32. Site 32 is located in Zone C of the RCRA Facility Investigation.

Measurements of tidal fluctuations identified that surface water elevations for Noisette Creek and the Cooper River varied greatly with tidal events; however, the tidal fluctuations produced less than 0.1 foot variations in all of the Zone B shallow wells. The results identified no significant change in groundwater flow direction resulting from tidal fluctuations in Zone B (E/A&H, 1996b). Since Site 32 is located farther inland from the Cooper River than the Zone B study area and farther inland to the Noisette Creek tributary, the impact of tidal fluctuation on the shallow groundwater flow direction at Site 32 is considered negligible.

2.2 ASSESSMENT RESULTS

Nine soil borings were completed as part of the screening portion of the soil investigation at Site 32. Five soil borings were completed to collect soil samples for analysis at a fixed base laboratory to confirm the Chemicals of Concern (CoC). The soil borings for screening evaluation were completed using a Direct Push Technology (DPT) rig. Samples were collected to evaluate subsurface soil vapors, soil contaminant

concentration (via a mobile laboratory), and groundwater contaminant concentrations (via a mobile laboratory). The soil samples for organic vapor screening were collected from a maximum depth of 6 to 7 feet bls. The soil and groundwater samples collected for mobile laboratory screening were analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX), and diesel range organics.

Soil samples for CoC evaluation were collected on May 18, 1999, and analyzed for BTEX, ethylene dibromide (EDB) and naphthalene using U.S. Environmental Protection Agency (USEPA) Method 8260; and PAHs using USEPA Method 8270. One sample was collected for total organic carbon (TOC) analysis using USEPA Method 415.1, total recoverable petroleum hydrocarbons (TRPH) using USEPA Method 9071, and grain size analysis using sieve and hydrometer analysis. The sample collection was conducted in accordance with the SCDHEC guidance document "Standard Limited Assessment" (June 1997). Lithologic logs for each soil boring are presented in Appendix B. The soil boring locations are shown on Figure 3 and the assessment results are presented in Section 2.3.1.

Groundwater sampling events were conducted on August 4, August 5, and August 21, 1999. Groundwater sampling was conducted using a peristaltic pump and low flow, quiescent techniques. The monitoring wells were sampled in accordance with SCDHEC's guidance document South Carolina Risk-Based Corrective Action for Petroleum Releases (January 1998). Each well was purged of three well volumes or until water quality parameters of pH, temperature, and conductivity stabilized. The field data sheets are included in Appendix C. A summary of the field parameter measurements is presented in Table 2. Groundwater samples were analyzed for BTEX, methyl tertiary butyl ether (MTBE), EDB, and naphthalene using USEPA Method 8260 and PAHs using USEPA Method 8270. Three of the groundwater samples were also analyzed for the following natural attenuation parameters: dissolved oxygen, alkalinity, carbon dioxide, sulfide, ferrous iron, nitrite, manganese, nitrogen/nitrate, sulfate, and methane. Groundwater natural attenuation data are summarized on Table 3.

2.3 FIELD SCREENING ASSESSMENT

2.3.1 Soil Vapor Assessment

Nine soil borings were completed to evaluate for soil vapors as part of the soil screening assessment at Site 32. Organic vapor analyzer (OVA) headspace measurements were recorded at approximately 2-foot intervals from ground surface to the top of the water table. Table 4 summarizes the soil vapor screening results. Figure 3 presents the soil boring locations.

Low levels of soil vapors were detected in the soil with vapor concentrations ranging from 1 to 27 parts per million (ppm). The highest soil vapor concentration, 27 ppm, was detected in sample collected from 6 to 7 feet bls at boring CNC32-B03.

The soil vapor assessment was used as a screening method to assist in identifying locations for collection of soil samples and groundwater monitoring wells. Soil sample and monitoring well locations were determined, in part, based on these data.

2.3.2 Soil Mobile Laboratory Results

One soil sample collected from each soil boring was analyzed in a mobile laboratory for BTEX, naphthalene, and diesel range organics using USEPA Methods 8021B and 8015M. The soil samples were selected based on the soil vapor screening results with the additional criteria that the samples originate in the vadose zone above the water table. Table 5 presents a summary of the analytical data from the mobile laboratory.

As indicated in Table 5, BTEX constituents were not detected in any of the mobile laboratory soil samples. Naphthalene and diesel range organics constituents were detected in one sample at concentrations of 260 micrograms per kilogram (ug/kg) and 49 milligrams per kilogram (mg/kg), respectively. Naphthalene and diesel range organics were reported below the laboratory detection limits in the remaining soil samples.

The mobile laboratory soil analysis was used as a screening method to assist in identifying locations for collection of soil samples for fixed base laboratory analysis and locations for groundwater monitoring wells. Soil sample and monitoring well locations were determined in part based on these data.

2.3.3 Groundwater Mobile Laboratory Results

A groundwater sample was collected from each soil boring location and was analyzed by a mobile laboratory for BTEX, naphthalene, and diesel range organics using USEPA Methods 8021B and 8015M. Table 6 presents a summary of the analytical data from the mobile laboratory.

As indicated in Table 6, benzene was detected in one sample at 2.2 micrograms per liter (ug/L). Toluene, ethylbenzene, and total xylenes were each detected in two samples. Toluene was detected at concentrations of 1.8 ug/L and 11 ug/L, ethylbenzene at 6.2 ug/L and 21 ug/L, and total xylene at 1.7 ug/L and 38 ug/L. Three samples contained naphthalene and diesel range organics. Naphthalene

concentrations of 4.1 ug/L, 65 ug/L, and 1,200 ug/L were detected in the field screening groundwater samples. Diesel range organics were reported at concentrations of 0.4 milligrams per liter (mg/L), 3.0 mg/L, and 45 mg/L. All screening detections occurred at locations CNC32-B01, CNC32-B02, and CNC32-B03.

The mobile laboratory groundwater analysis was used as a screening method to assist in identifying locations for permanent groundwater monitoring wells.

2.4 CHEMICALS OF CONCERN IN SOIL AND GROUNDWATER

2.4.1 Chemicals of Concern in Soil

Five subsurface soil samples (plus one duplicate sample) were collected from the Site 32 area for determination of CoCs. The soil boring locations are shown on Figure 3, and Table 7 summarizes the CoCs detected in the soil samples. CoCs detected in the soil included ethylbenzene, total xylenes and naphthalene. The detected CoCs were from samples collected from 5 to 6 feet bls. An ethylbenzene concentration of 1,800 micrograms per kilogram (ug/kg) and an estimated concentration of total xylenes, at 4 ug/kg, were detected in sample 32SLB020506 (boring CNC32-B02) collected at 5 to 6 feet bls. The detected ethylbenzene concentration exceeded the Risk Based Screening Level (RBSL) of 364 ug/kg for clay rich soils within 5 feet above groundwater. The total xylenes concentrations was below the RBSL of 1,119 ug/kg established for total xylenes. Naphthalene was detected in sample 32SLB020506 at an estimated concentration of 42,000 ug/kg, and estimated concentrations of naphthalene were detected in the duplicate sample 32SLB030506D (boring CNC32-B06) and sample 32SLB040506 (boring CNC32-B04), at concentrations of 6 ug/kg and 4 ug/kg, respectively. The naphthalene concentration detected in sample 32SLB020506 exceeds the RBSL for naphthalene established at 52 ug/kg. The PAHs (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene) were reported at concentrations below the laboratory detection limits and below the RBSLs in each of the soil samples except sample 32SLB020506. The laboratory analysis of sample 32SLB020506 reported an elevated detection limit of <36,000 ug/kg for benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and dibenzo(a,h)anthracene which is above the RBSLs of 17,687; 7,042; 3,146; and 21,265 ug/kg respectively. The RBSLs for a clay-rich soil were used based on a grain size analysis completed on sample 32SLB090506 indicating a clay soil matrix. Soil analytical data sheets and grain size analysis reports are provided in Appendix D.

2.4.2 Chemicals of Concern in Groundwater

Table 8 presents the analytical results for CoCs detected in the groundwater samples collected on August 4, August 5, and August 21, 1999. Groundwater analytical data sheets for the August 1999 field events are presented in Appendix D. No CoCs were detected above laboratory method detection limits in the groundwater samples. During the RA investigation, no free product was detected in any of the site monitoring wells or piezometers.

2.5 ANALYTICAL DATA

Analytical data from the Underground Storage Tank Assessment Report (SPORTENDECHASN, 1996) are presented in Appendix A. Soil analytical data generated during this RA are summarized in Table 7. Groundwater analytical data generated during this RA are summarized in Table 8. The soil and groundwater laboratory analytical data for this RA are included in Appendix D.

2.6 AQUIFER CHARACTERISTICS AND EVALUATION

Groundwater levels were measured from the site monitoring wells on September 11, 1999. The groundwater flow direction across the site is toward the east as illustrated on Figure 6. The hydraulic gradient between monitoring wells CNC32-MW01 and CNC32-MW05 on September 11 was 0.0094 feet per foot (ft/ft), respectively.

As part of the Final RCRA Facility Investigation Report for Zone C, rising and falling head slug tests were conducted on nine shallow monitoring wells throughout Zone C to determine the hydraulic conductivity of the surficial aquifer (E/A&H, 1997). Slug tests were conducted by instantaneously adding (falling head) or removing (rising head) a volume (slug) of water from the well and measuring the recovering water level with a data logger. A hydraulic conductivity value was then calculated for the rising head test and for the falling head test. The average hydraulic conductivity for each well was determined by calculating the geometric mean of the rising and falling head values. Because hydraulic conductivity data are lognormally distributed, the geometric mean was determined to be the most representative measure of central tendency.

The well construction details and boring logs for each well tested during the RCRA investigation were reviewed to determine which wells were most representative of the conditions present at Site 32. To make this determination the screened interval and proximity to the site were evaluated. Based on this evaluation, monitoring well NBCC523001 was selected as the most representative well. NBCC523001 is

approximately 450 feet west of the site and is completed to a depth of approximately 13 feet with a 10-foot screened interval. The geometric mean of the rising and falling head conductivities for NBCC523001 was 3.95 feet per day. The boring log showing well completion and soil lithology for NBCC523001 is provided in Appendix E.

Potential movement of groundwater at the site may be described in terms of transportation by natural flow system in the saturated zone, assuming groundwater flow follows Darcy's Law. Using Darcy's Law the average linear groundwater velocity may be expressed as:

$$V = \left(\frac{K}{n} \right) \times i$$

where:

- V = average velocity
- K = hydraulic conductivity = 3.95 ft/day
- n = volumetric porosity = 0.43
(from sieve results of 60% sand & 40% clay and Figure C1 in SCDHEC, 1998)
- i = most recent hydraulic gradient measurement = 0.0094 ft/ft

therefore:

$$V = \left(\frac{3.95 \text{ ft/day}}{0.43} \right) \times 0.0094 \text{ ft/ft}$$

$$V = 0.086 \text{ ft/day}$$

In summary, the seepage velocity of the surficial aquifer was calculated to be approximately 32 feet per year based on a hydraulic conductivity of 3.95 feet per day, a hydraulic gradient of 0.0094 ft/ft, and a porosity of 43% for clay-rich soil.

2.7 FATE AND TRANSPORT MODEL DESCRIPTION

No groundwater concentrations exceeded the SCDHEC RBSLs; therefore, fate and transport modeling is not required for Tier 1 evaluation.

2.8 PREDICTED MIGRATION AND ATTENUATION OF CHEMICALS OF CONCERN

Since fate and transport modeling was not performed, predicted migration and attenuation of CoCs were not evaluated.

3.0 TIER 1 AND 2 EVALUATION

3.1 COMPARISON OF ANALYTICAL RESULTS WITH RBSLs

Soil samples collected on May 18, 1999, were analyzed for BTEX and PAH constituents. CoCs detected in the soil included ethylbenzene, total xylenes, and naphthalene. An ethylbenzene concentration of 1,800 ug/kg and a naphthalene concentration of 42,000 ug/kg from sample 32SLB020506 (boring CNC32-B02), collected at 5 to 6 feet bls, exceeds the RBSLs of 364 ug/kg and 52 ug/kg for ethylbenzene and naphthalene, respectively, for clay-rich soils. Estimated concentrations of total xylenes and naphthalenes were also reported in soil samples collected at 5 to 6 feet bls; however, the reported concentrations were below the established RBSLs for total xylenes and naphthalenes. Elevated detection limits above the RBSLs for PAH constituents benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and dibenzo(a,h)anthracene were reported in the laboratory analysis of sample 32SLB020506. The detection limit for these compounds was reported at <36,000 ug/kg. Since the detection limits for these PAH compounds was elevated above the RBSLs, these constituents are assumed to be present at the reporting limit of 36,000 ug/kg in soil sample 32SLB020506.

Groundwater samples collected on August 4 and August 5, 1999, were analyzed for BTEX, MTBE, and PAHs. All CoC parameters were reported below the SCDHEC RBSL. A comparison of the maximum soil and groundwater concentrations to RBSLs is summarized in Table 9.

3.2 SITE CONCEPTUAL EXPOSURE MODEL

This section focuses on the current and future land use issues concerning the site. Figure 1 shows that the site is surrounded by the City of North Charleston and therefore is in an urban setting. The site is a former fresh water pump house that serviced CNC. The facility is included in the BRAC activities; therefore, the future use of the facility is unknown.

Drinking water at the site and surrounding properties is provided by the city of Charleston water treatment plants. The closest surface water body is the Cooper River located approximately 800 feet east of the site. Potable wells and irrigation wells were not identified within 1000 feet of the site (E/A&H, 1996a). Numerous monitoring wells are located within 1000 feet of the Site (E/A&H, 1996a). Groundwater flow is towards the north.

3.3 EXPOSURE PATHWAY ANALYSIS

This section presents the receptor characterizations of the potentially exposed populations in the vicinity of the site and identifies the potentially complete exposure pathways for those receptors. SCDHEC requires that only those exposure pathways with COC concentrations exceeding Tier 1 RBSL concentrations are examined in a Tier 2 Risk-Based Corrective Action Report. Tables 10 and 11 present the exposure pathway assessments for current and future land use scenarios.

3.3.1 On-Site Commercial Worker

An on-site commercial worker is defined as a business employee who works in a commercial capacity at the site. Commercial use of the site in the future is a possibility; therefore, an on-site commercial worker was considered as a potential receptor. Incidental ingestion, inhalation of vapors, and dermal contact with impacted soil are expected to be negligible for commercial workers because they are located inside a building. Groundwater at the site is not impacted above the RBSLs; therefore, no groundwater pathways are complete. It is unlikely that any additional exposure pathways will exist for future on-site workers; therefore, no complete pathways exist for either current or future commercial workers.

3.3.2 On-Site Visitor

An on-site visitor is defined as any person other than a worker who might come on site. Such a visitor would probably be a customer of the facility located at the site. On-site visitors would have the same exposure pathways as commercial workers, but their exposure duration would be much shorter. This receptor does not have to be quantified because a potential on-site visitor's chemical intake would not drive risk or cleanup levels at the site.

3.3.3 On-Site Construction Worker

An on-site construction worker is defined as a laborer who would be involved in intrusive activities in the soil on or around the site, particularly in the area of subsurface utilities. On-site construction workers could be exposed to constituents in soil by the following pathways: inhalation of vapors from volatiles, dermal contact, and incidental ingestion. Ethylbenzene and naphthalene concentrations in soil are not above their RBSLs for ingestion or dermal contact. Inhalation of vapors from soil typically occurs while the soil is being removed by backhoe which enhances volatilization. Therefore soil volatilization would occur before the construction worker enters the utility trench, thereby removing inhalation as a receptor.

Groundwater at the site is not impacted above the RBSLs; therefore, no groundwater pathways are complete.

3.3.4 On-Site Resident

An on-site resident is defined as any person making his or her home at the site. This site is expected to remain a commercial/industrial facility; therefore, the on-site resident receptor was not considered further.

3.3.5 Off-Site Resident

An off-site resident is defined as any person making his or her home near the site. This receptor's location is either an actual current residence near the site or is a vacant lot or property on which a residence could be built. The site is located in an area that will likely be used for commercial and industrial purposes; therefore, this potential receptor was not considered further.

3.3.6 Surface Water

There are no surface waters within 1,000 feet of the site; therefore, this potential receptor was not considered further.

3.4 IDENTIFICATION OF DATA REQUIREMENTS

No additional data are required to calculate site-specific target levels (SSTLs) for the site.

3.5 SITE-SPECIFIC TARGET LEVELS

The only identified future potential receptor is the construction (utility) worker. Site soil concentrations were compared with RBSLs for ingestion or dermal contact with surficial soil. (Surficial soil was not impact at the site; however, for the construction worker pathway, exposure to subsurface soil is evaluated as surface soil because the worker is expected to have direct contact with the subsurface soil.)

Compound of Concern	Maximum Concentration (mg/kg)	RBSL for Ingestion or Dermal Contact with Soil - Commercial (mg/kg)	Exceed RBSL
Ethylbenzene	1.8	100,000	No
Naphthalene	42	41,000	No

Municipal water is supplied to the base, so shallow groundwater is not used for drinking water. Groundwater RBSLs provided by SDCHEC are for ingestion only, therefore, RBSLs for the construction worker were calculated for three pathways: dermal contact, incidental ingestion, and inhalation of volatiles. A target cancer risk of 1×10^{-6} and a target hazard quotient of 1 were used in the calculations. Standard defaults were used when available and applicable to a construction worker. When no standard parameters were available, conservative assumptions were used. Where possible, site-specific parameters were used for site conditions. For all pathways, the exposure frequency was assumed to be 90 days/year and the exposure duration was assumed to be 1 year. These assumptions were considered conservative based on the nature of utility work.

The dermal contact RBSLs were calculated using procedures Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance (EPA Peer Consultation Workshop Draft 1998). Based on expected limited contact with groundwater, the event frequency was assumed to be 1 event/day and the event duration was assumed to be 1 hour/event. The skin surface area available for contact was 4500 cm^2 , based on one-fourth the skin surface area given in the risk assessment guidance document for a swimming adult.

The incidental ingestion RBSLs were calculated using the equation given in Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Interim Final), EPA/540/1-89/002 (EPA 1989). An incidental ingestion rate of 0.01 L/day was assumed based on a fraction (12.5%) of the incidental ingestion rate for a wading adult (0.01 L/hr), considered for an 8-hour work day. The incidental ingestion rate for wading adults is given in Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment (EPA Region 4 1995).

Utility lines in the area are typically 2 to 6 feet deep. The depth to groundwater at the site is ranges from approximately 6 to 7 feet bgs, slightly below the estimated depth of the utility lines. As utility work can be expected to excavate a few feet below the line, this pathway was considered complete. It was assumed that a construction worker might be exposed to chemicals volatilizing from standing groundwater. The inhalation RBSLs were calculated using Henry's Law:

$$\text{RBSL}_{\text{WATER}} = \text{RBSL}_{\text{AIR}}/H$$

Where H = Henry's Law constant [mg/L-air/mg/L-water]

The RBSL_{AIR} for each chemical was calculated using the equation given in the American Society for Testing and Materials (ASTM) Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites, Designation E 1739-95e1 (1997). SCDHEC values were used for Henry's Law constants.

The following table summarizes the calculated RBSLs for the analyzed pathways and tabulates the minimum RBSL regardless of the pathway.

CoC	Dermal RBSL	Incidental Ingestion RBSL	Inhalation RBSL	Selected (Minimum) RBSL
	mg/L	mg/L	mg/L	mg/L
Ethylbenzene	6.05	2838.89	14.70	6.05
Naphthalene	1.63	1135.56	2.63	1.63

Appendix F provides the parameters and results of the RBSL calculations.

SSTLs were calculated for ethylbenzene and naphthalene concentrations leaching from subsurface soil to groundwater using the SCDHEC Soil Leachability Model and Selected Minimum RBSLs. Leachability modeling for the PAHs benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and dibenzo(a,h)anthracene was considered, but not performed. Instead, naphthalene was used for modeling purposes because of its similarity to PAHs.

Input parameters for the leachability model were determined using the figures in the SCDHEC Risk Based Corrective Action Guidelines (January 1998), soil quality and grain size data, and the Selected Minimum RBSLs calculated for the site. The soil leaching SSTLs calculated for ethylbenzene and naphthalene are provided in the following table.

CoC	Concentration in CNC32-B03/32SLB020506 (mg/kg)	Soil Leaching SSTL (mg/kg)
Ethylbenzene	1.8	25
Naphthalene	42	12

The soil SSTL for ethylbenzene is 25 mg/kg, which is well above the maximum ethylbenzene concentration detected (1.8 mg/kg). The soil leaching SSTL calculated for naphthalene is 12 mg/kg. This is less than the maximum naphthalene concentration detected in subsurface soil sample at 42 mg/kg which indicates naphthalene will leach into the groundwater at concentrations above the RBSL for a construction worker. Since the naphthalene was detected at concentrations where calculations indicate it

will leach to groundwater, it is assumed the PAH constituents have the potential to leach into the groundwater.

Appendix G provides the leachability model calculations generating SSTL.

3.6 RECOMMENDATIONS

Corrective action is proposed for Site 32 since naphthalene concentrations have been detected in the soil above the SSTL criteria, and the potential may or may not exist for PAHs to leach into the groundwater. It is proposed that soils from approximately 2 to 8 feet bls at the former UST pit be excavated and groundwater be monitored for naphthalene and PAH constituents following the removal of the soils.

4.0 REFERENCES

ASTM (American Society for Testing and Materials) 1997. *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*, Designation: E 1789-95, West Conshohocken, Pennsylvania.

E/A&H (Ensafe/Allen & Hoshall, Inc.), 1996a, Final RCRA Facility Investigation Reported for Zone H, Naval Base Charleston, Charleston, South Carolina, July 5, 1996.

E/A&H (Ensafe/Allen & Hoshall, Inc.), 1996b, Final RCRA Facility Investigation Reported for Zone B, Naval Base Charleston, Charleston, South Carolina, November 21, 1996.

E/A&H (Ensafe/Allen & Hoshall, Inc.), 1997, Final RCRA Facility Investigation Reported for Zone C, Naval Base Charleston, Charleston, South Carolina, November 14, 1997.

SCDHEC (South Carolina Department of Health and Environmental Control), 1997. *Standard Limited Assessment*, June 1997.

SCDHEC, 1998. *South Carolina Risk-Based Corrective Action for Petroleum Releases*, January 1998.

SPORTENDECHASN (Supervisor of Ship Building, Conversion and Repair, United States Navy, Portsmouth Virginia, Environmental Detachment Charleston), 1997. *Underground Storage Tank (UST) Assessment Report*, Charleston Naval Base Complex, North Charleston, South Carolina, June 12, 1996.

SPORTENDECHASN, 1999, Personal Contact between Paul Calligan TtNUS and Copes Wannamacker SPORTENDECHASN, June 17, 1999.

USEPA (United States Environmental Protection Agency), 1989. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Interim Final)*, EPA/540/1-89/002.

USEPA REGION IV, 1995. *Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment, Interim*, November 1995, Atlanta, Georgia.

USEPA PEER CONSULTATION WORKSHOP DRAFT, 1998. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance*, November 1998, Washington, D.C.

TABLE 1

GROUNDWATER ELEVATIONS
 SITE 32, BUILDING 54
 ZONE C, CHARLESTON NAVAL BASE COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

Well No.	Total Depth of Well (ft)	Top of Casing Elevation, ft (MSL)	Date Measured	Depth to Free Product (BTOC)	Product Thickness, ft	Depth to Water, ft (BTOC)	Groundwater Elevation, ft (MSL)
CNC32-MW01	13	8.12	8/5/99	ND	ND	6.46	1.66
			9/11/99	ND	ND	6.63	1.49
CNC32-MW02	13	8.38	8/5/99	ND	ND	6.44	1.94
			9/11/99	ND	ND	6.61	1.77
CNC32-MW03	13	8.47	8/4/99	ND	ND	6.82	1.65
			9/11/99	ND	ND	6.96	1.51
CNC32-MW04	13	7.63	8/4/99	ND	ND	5.98	1.65
			9/11/99	ND	ND	6.14	1.49
CNC32-MW05	13	8.03	8/5/99	ND	ND	6.82	1.21
			9/11/99	ND	ND	6.90	1.13
CNC32-MW6D	25	7.95	8/2/99	ND	ND	10.12	-2.17
			9/11/99	ND	ND	8.08	-0.13

Notes:

MSL - Mean Sea Level

BTOC - Below Top of Casing

ft - feet

ND - Not Detected

NA - Not Available

TABLE 2

**GROUNDWATER FIELD MEASUREMENTS
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Well I.D.	Date Sampled	Purge method	Volume (gallons)	Temp. (° C)	pH	Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/l)
CNC32-MW01	08/05/99	PP	3.2	24.4	5.84	0.260	0	0.77
CNC32-MW02	08/05/99	PP	3.2	25.6	5.82	0.310	0	0.45
CNC32-MW03	08/04/99	PP	3.0	25.4	5.84	0.254	0	1.75
CNC32-MW04	08/04/99	PP	3.5	25.6	5.99	0.186	0	1.09
CNC32-MW05	08/05/99	PP	3.2	24.6	5.89	0.155	0	0.92
CNC32-MW6D	08/04/99	PP	12.0	24.3	7.16	1.33	10	0.98

Notes:

(° C) - Degrees Celsius

PP - Peristaltic pump, low flow technique

uMHOS/cm - Micro HOS per centimeter

NTU - Nephelometric turbidity units

mg/l - milligrams per liter

TABLE 3

**GROUNDWATER NATURAL ATTENUATION FIELD MEASUREMENTS
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Well I.D.	Date Sampled	Dissolved Oxygen (mg/l)	Alkalinity (mg/l)	Carbon Dioxide (mg/l)	Sulfide (mg/l)	Ferrous Iron (mg/l)	Nitrite (mg/l)	Manganese (mg/l)	Nitrogen/Nitrate (mg/l) *	Sulfate (mg/l) *	Methane (ug/l) *
CNC32-MW01	8/5/99	2.0	76.0	68	0.02	0.72	0.100	0.0	<0.05	29	130
CNC32-MW02	8/5/99	3.0	80	72	0.01	0.23	0.130	0.4	0.650	34	90
CNC32-MW05	8/5/99	2.0	40	43	0.03	0.66	0.064	0.0	<0.05	20	540

Notes:

mg/l - Milligrams per liter

ug/l - Micrograms per liter

E- Estimated Concentration

* Fixed base laboratory analysis

TABLE 4

**SUMMARY OF OVA SOIL SCREENING RESULTS
SITE 32, BUILDING 54
ZONE C, FORMER CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Depth (feet)	Total Organic Vapor Headspace Concentration
CNC32-B01	1-2	ND
	2-3	ND
	3-4	ND
	5-6	ND
	6-7	ND
CNC32-B02	1-2	ND
	3-4	ND
	4-5	ND
	6-7	ND
CNC32-B03	1-2	ND
	3-4	ND
	5-6	ND
	6-7	27
CNC32-B04	1-2	ND
	2-3	ND
	5-6	ND
	6-7	1
CNC32-B05	1-2	2
	2-3	ND
	4-5	ND
	6-7	ND
CNC32-B06	1-2	ND
	2-3	ND
	5-6	ND
CNC32-B07	1-2	ND
	2-3	ND
	3-4	ND
	6-7	ND
CNC32-B08	1-2	ND
	3-4	ND
	6-7	3
CNC32-B09	1-2	ND
	3-4	ND
	5-6	ND

Note:

OVA - organic vapor analyzer equipped with a flame ionization detector

TABLE 5

**SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR SOIL
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Identification	Sample Depth (feet)	Mobile Laboratory Screening Data ⁽¹⁾					
			Benzene (ug/kg)	Toluene (ug/kg)	Ethylbenzene (ug/kg)	Total Xylenes (ug/kg)	Nap-Thalene (ug/kg)	Diesel Range Organics (mg/kg)
CNC32-B01	32SFB01-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B02	32SFB02-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B03	32SFB03-0506	5-6	<5.0	<5.0	<5.0	<5.0	260	49
CNC32-B04	32SFB04-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B05	32SFB05-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B06	32SFB06-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B07	32SFB07-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B08	32SFB08-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC32-B09	32SFB09-0506	5-6	<5.0	<5.0	<5.0	<5.0	<5.0	<10

NOTES:

⁽¹⁾ Mobile laboratory screening data were analyzed using USEPA Method 8021/8015M. Compounds not detected are reported as less than the instrument detection limit.

ug/kg Micrograms per kilogram

mg/kg Milligrams per kilogram

TABLE 6

**SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR GROUNDWATER
SITE 32, BUILDING 54
ZONE C, FORMER CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Sample Location	Sample Identification	Laboratory Screening Data ⁽¹⁾					
		Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes (ug/L)	Napthalene (ug/L)	Diesel Range Organics (mg/L)
CNC32-B01	32GFB01-0608	2.2	11	6.2	38	4.1	0.4
CNC32-B02	32GFB02-0608	<1.0	<1.0	<1.0	<1.0	1200	3.0
CNC32-B03	32GFB03-0608	<1.0	1.8	21	1.7	65	45
CNC32-B04	32GFB04-0608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC32-B05	32GFB05-0608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC32-B06	32GFB06-0608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC32-B07	32GFB07-0608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC32-B08	32GFB08-0608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC32-B09	32GFB09-0608	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1

NOTES:

⁽¹⁾ Laboratory screening data were analyzed using USEPA Method 8020/8015M. Compounds not detected are reported as less than the instrument detection limit.

ug/L Micrograms per liter

mg/L Milligrams per liter

TABLE 7

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
 SITE 32, BUILDING 54
 ZONE C, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

Soil Boring / Sample No.	Sample Date	Benzene (ug/kg)	Toluene (ug/kg)	Ethyl-benzene (ug/kg)	Xylenes (total) (ug/kg)	Benzo(a) anthracene (ug/kg)	Benzo(b) fluoranthene (ug/kg)	Benzo(k) fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenzo(a,h) anthracene (ug/kg)	Naphthalene (ug/kg)
RBSL ⁽¹⁾		5	478	364	11119	17687	7042	55930	3146	21265	52
CNC32-B01 / 32SLB010506	18-May-99	< 6	< 6	< 6	< 6	< 400	< 400	< 400	< 400	< 400	< 6
CNC32-B02 / 32SLB020506	18-May-99	< 5	< 5	1800	4 ^(J)	< 36000	< 36000	< 36000	< 36000	< 36000	42000 ^(J)
CNC32-B03 / 32SLB030506	18-May-99	< 6	< 6	< 6	< 6	< 400	< 400	< 400	< 400	< 400	< 6
CNC32-B03 ⁽²⁾ / 32SLB030506D	18-May-99	< 6	< 6	< 6	< 6	< 360	< 360	< 360	< 360	< 360	6 ^(J)
CNC32-B04 / 32SLB040506	18-May-99	< 7	< 7	< 7	< 7	< 360	< 360	< 360	< 360	< 360	4 ^(J)
CNC32-B09 / 32SLB090506	18-May-99	< 6	< 6	< 6	< 6	< 400	< 400	< 400	< 400	< 400	< 6
CNC32-TL ⁽³⁾ / 3204TL00104	3-May-99	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA	< 5

All concentrations are in micrograms per kilograms (ug/kg).

NA - Not analyzed

⁽¹⁾ South Carolina Department of Health and Environmental Control Risk Based Screening Levels for clay-rich soils; depth to groundwater less than 5 feet.

⁽²⁾ Duplicate

⁽³⁾ Trip blank

^(J) Indicates the presence of an analyte at a concentration less than the reporting limit and greater than the detection limit.

TABLE 8

**SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Monitoring Well/ Sample No.	Sample Date	Benzene (ug/L)	Ethyl- benzene (ug/L)	Toluene (ug/L)	Xylenes (total) (ug/L)	MTBE (ug/L)	Naphthalene (ug/L)	Benzo(a) anthracene (ug/L)	Benzo(b) fluoranthene (ug/L)	Benzo(k) fluoranthene (ug/L)	Chrysene (ug/L)	dibenzo(a,h) anthracene (ug/L)
RBSL ⁽¹⁾		5	700	1000	10000	40	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾	10 ⁽²⁾
CNC32-MW01 / 32GLM0101	5-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32-MW01 / 32GLM0101D ⁽³⁾	5-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32-MW02 / 32GLM0201	5-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32-MW03 / 32GLM0301	4-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32-MW04 / 32GLM0401	4-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32-MW05 / 32GLM0501	5-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32-MW6D ⁽³⁾ / 32GLM0601	21-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10
CNC32TL ⁽⁴⁾ / 32TL00101	4-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA
CNC32TL ⁽⁴⁾ / 32TL00201	5-Aug-99	< 5	< 5	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA

All concentrations are in ug/L.

NA - Not analyzed

⁽¹⁾ South Carolina Department of Health and Environmental Control Risk Based Screening Levels for ground water.

⁽²⁾ The Risk based screening level for individual PAH CoC is 10 ug/l or 25 ug/l for total PAHs.

⁽³⁾ Duplicate

⁽⁴⁾ Trip blank

⁽⁵⁾ Indicates presence of analyte at a concentration less than the reporting limit and greater than the detection limit.

TABLE 9

**COMPARISON OF MAXIMUM CONCENTRATIONS TO RBSLs
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Chemical of Concern	Maximum Concentration (Soil) (ug/kg)	RBSLs (Soil) (ug/kg) ^(a)	Maximum Concentration (GW) (ug/L)	RBSLs (GW) (ug/L) ^(b)
Benzene	<7	5	<5	5
Toluene	<7	478	<5	1000
Ethylbenzene	1800	364	<5	700
Xylenes	4	11119	<5	10000
MTBE	<650	NA	<5	40
Naphthalene	42000	52	<5	10
Benzo(a)anthracene	36000	17687	<10	10
Benzo(a)pyrene	36000	NA	<10	10
Benzo(b)fluoranthene	36000	7042	<10	10
Benzo(k)fluoranthene	36000	55930	<10	10
Benzo(g,h,l)perylene	36000	NA	<10	10
Chrysene	36000	3146	<10	10
Dibenzo(a,h)anthracene	36000	21265	<10	10

Notes:

(a) - From Risk-Based Corrective Action for Petroleum Releases, Table B4, Depth to GW - <5 ft, SCDHEC RBCA Guidelines, 1998.

(b) - From Risk-Based Corrective Action for Petroleum Releases, Table B1, SCDHEC RBCA Guidelines, 1998.

GW - Groundwater

RBSLs - Risk Based Screening Levels

Bolded value indicates the concentration exceeded the RBSL.

NA = Not Available

TABLE 10

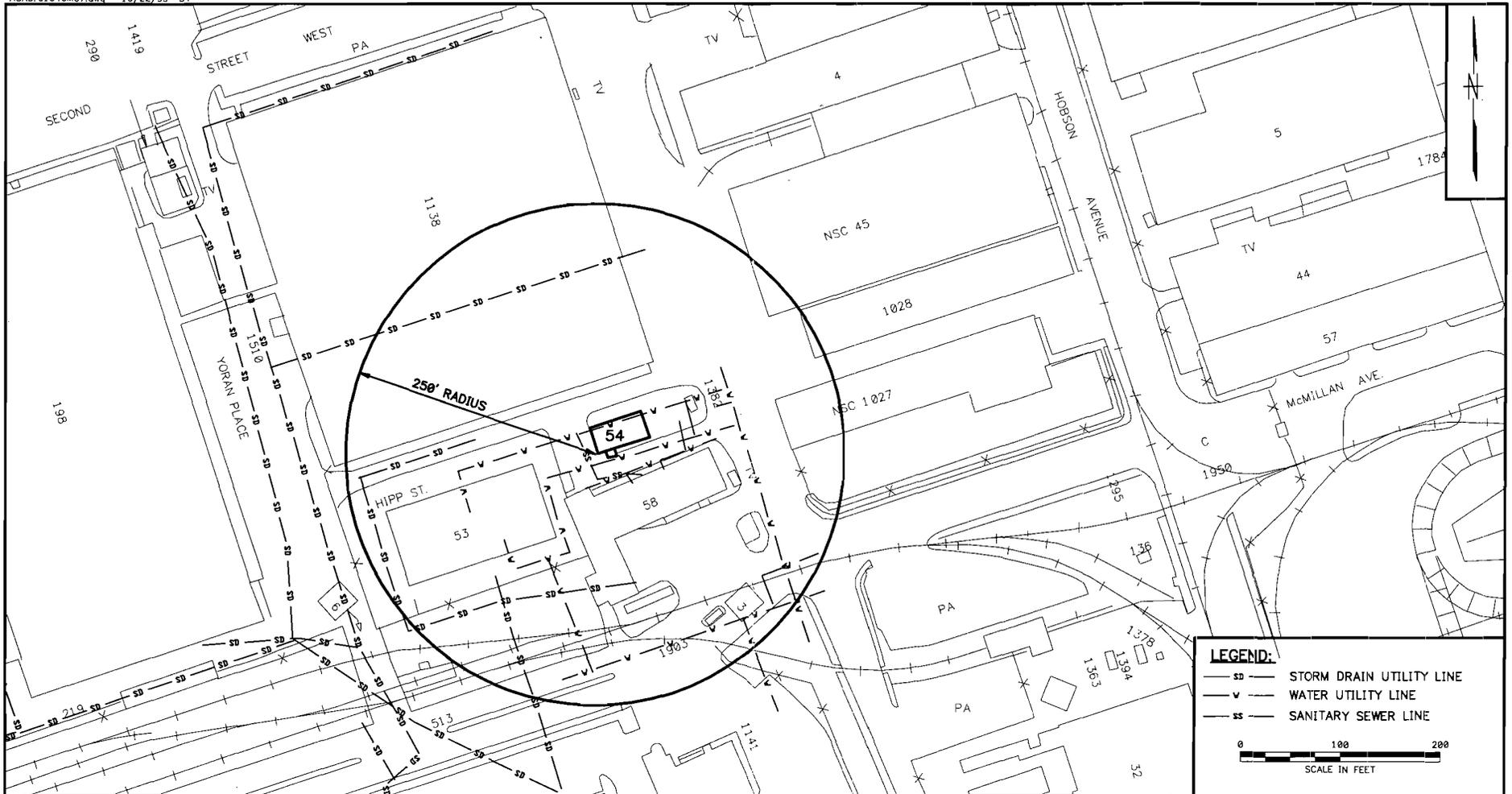
**EXPOSURE PATHWAY ASSESSMENT - CURRENT LAND USE
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Media	Exposure Route	Pathway Selected for Evaluation? (Yes or No)	Exposure point or Reason for Non-Selection	Data Requirements (if pathway selected)
Air	Inhalation	No	No volatilization to enclosed space. No explosion hazard.	
	Explosion Hazard	No		
Groundwater	Ingestion	No	No current groundwater pathways complete. Drinking water provided by city.	
	Dermal contact	No		
	Inhalation	No		
Surface Water	Ingestion	No	No surface water bodies within 1,000 feet	
	Dermal contact	No		
	Inhalation	No		
Surficial Soil	Ingestion	No	No surficial soil impact.	
	Dermal contact	No		
	Inhalation	No		
Subsurface Soil	Ingestion	No	No current complete pathways.	
	Dermal contact	No		
	Inhalation	No		

TABLE 11

**EXPOSURE PATHWAY ASSESSMENT - FUTURE USE
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

Media	Exposure Route	Pathway Selected for Evaluation? (Yes or No)	Exposure point or Reason for Non-Selection	Data Requirements (if pathway selected)
Air	Inhalation	No	No volatilization to enclosed space. No explosion hazard.	
	Explosion Hazard	No		
Groundwater	Ingestion	Yes	Groundwater exposure by potential construction worker (most likely in utility corridor). Both direct exposure and exposure by soil leaching to groundwater evaluated.	No additional data needed.
	Dermal contact	Yes		
	Inhalation	Yes		
Surface Water	Ingestion	No	No surface water bodies within 1,000 feet	
	Dermal contact	No		
	Inhalation	No		
Surficial Soil	Ingestion	No	Soil exposure by potential construction worker (most likely in utility corridor). Although there is no surficial soil impact, subsurface soil evaluated as surface soil for construction worker as direct contact likely in utility trench.	No additional data needed.
	Dermal contact	No		
	Inhalation	No		
Subsurface Soil	Ingestion	Yes	Potential exposure to construction worker through soils leaching hydrocarbons to groundwater in utility trench.	No additional data needed.
	Dermal contact	Yes		
	Inhalation	Yes		



LEGEND:

- SD — STORM DRAIN UTILITY LINE
- V — WATER UTILITY LINE
- SS — SANITARY SEWER LINE

0 100 200
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

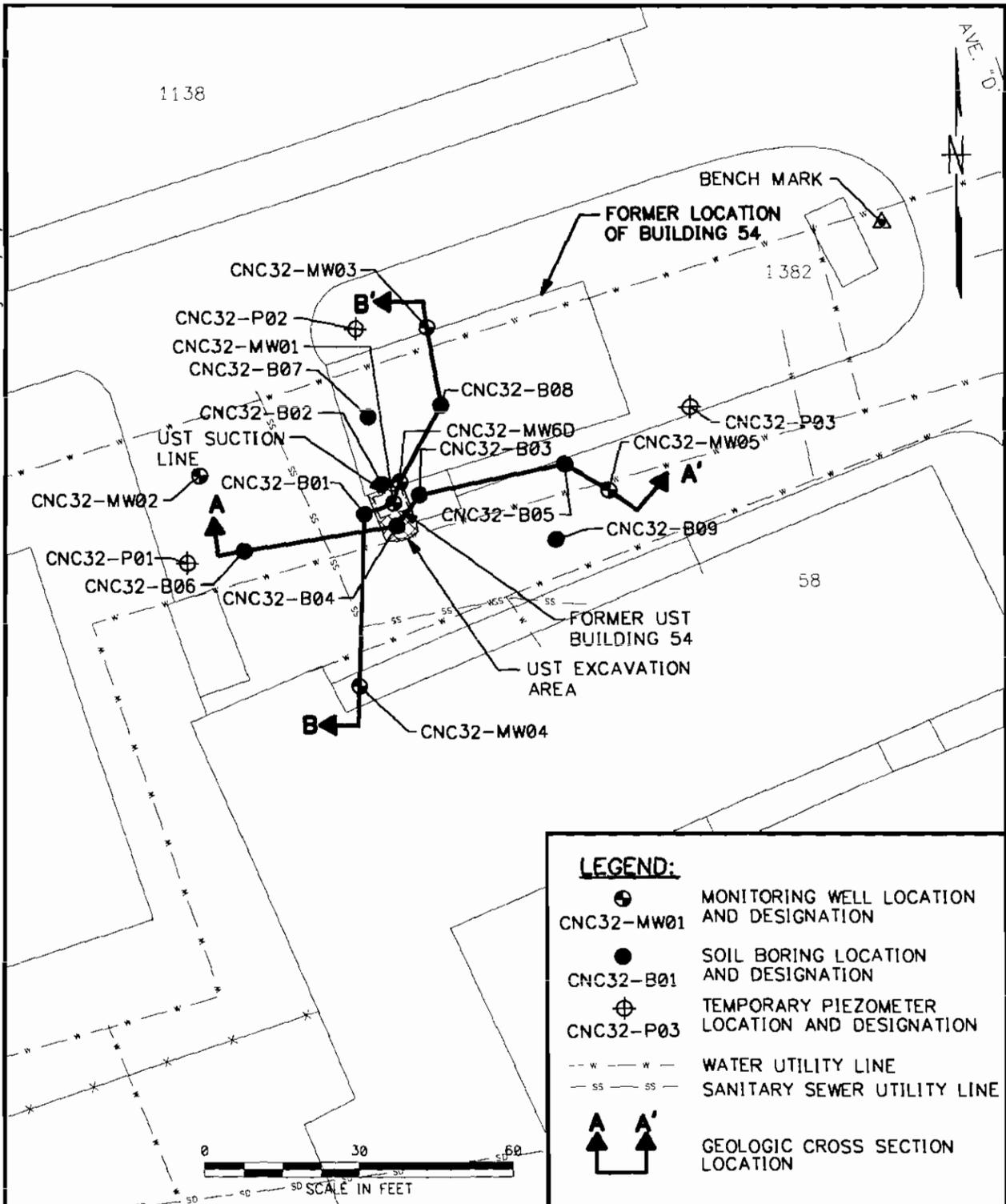
DRAWN BY HJP DATE 8/25/99
 CHECKED BY DATE
 COST/SCHED-AREA
 SCALE AS NOTED



SITE VICINITY MAP
 SITE 32, BUILDING 54
 ZONE C, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2	REV. 0

ACAD:0164CM11.dwg 10/22/99 DT



LEGEND:

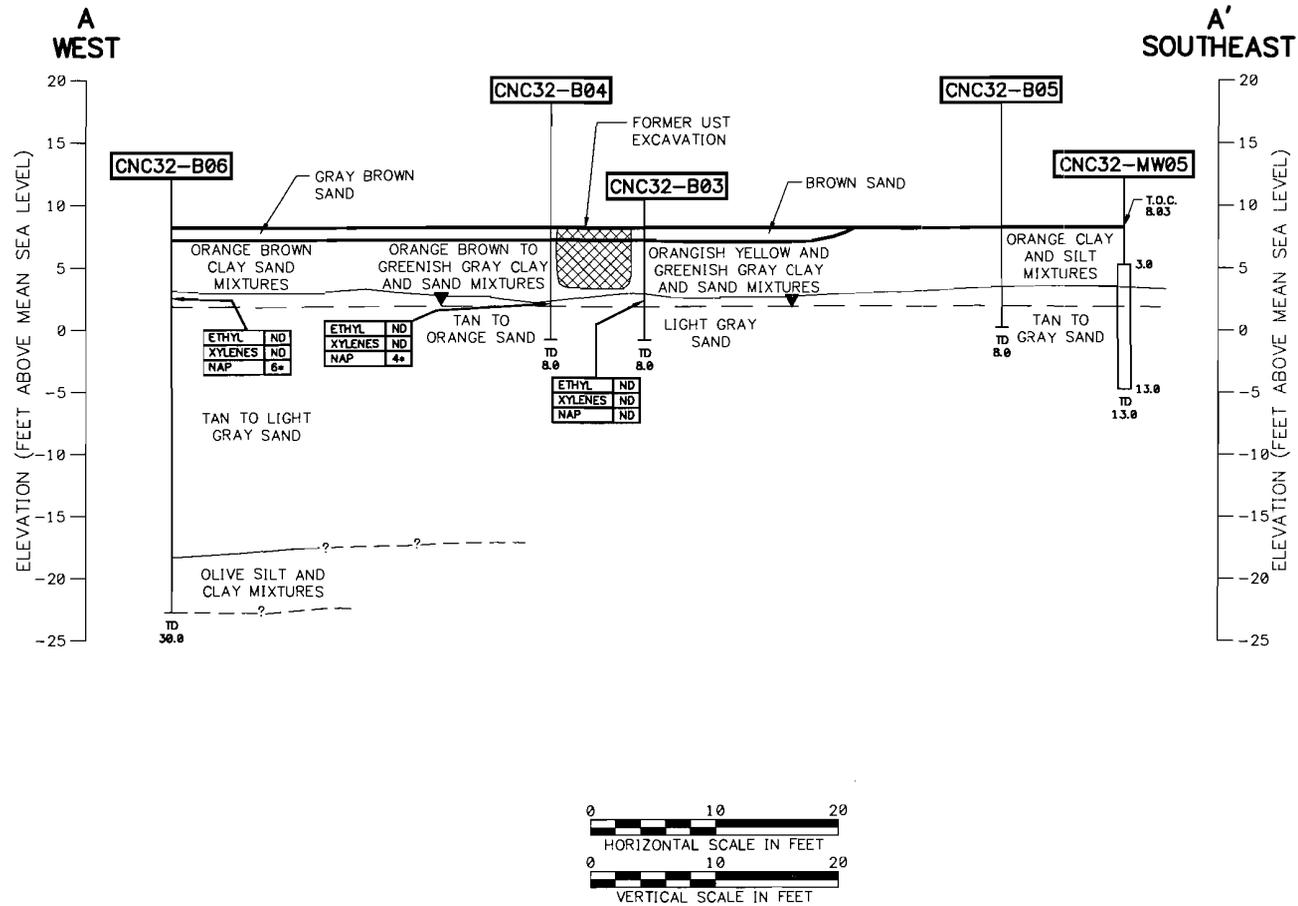
- ⊕ MONITORING WELL LOCATION AND DESIGNATION
CNC32-MW01
- SOIL BORING LOCATION AND DESIGNATION
CNC32-B01
- ⊕ TEMPORARY PIEZOMETER LOCATION AND DESIGNATION
CNC32-P03
- - w - - w - - WATER UTILITY LINE
- - ss - - ss - - SANITARY SEWER UTILITY LINE
- ↑ ↑ GEOLOGIC CROSS SECTION LOCATION

DRAWN BY DLT	DATE 10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



**SITE MAP AND SAMPLING LOCATIONS
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA**

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 3	REV. 0



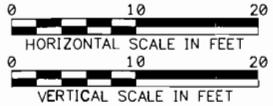
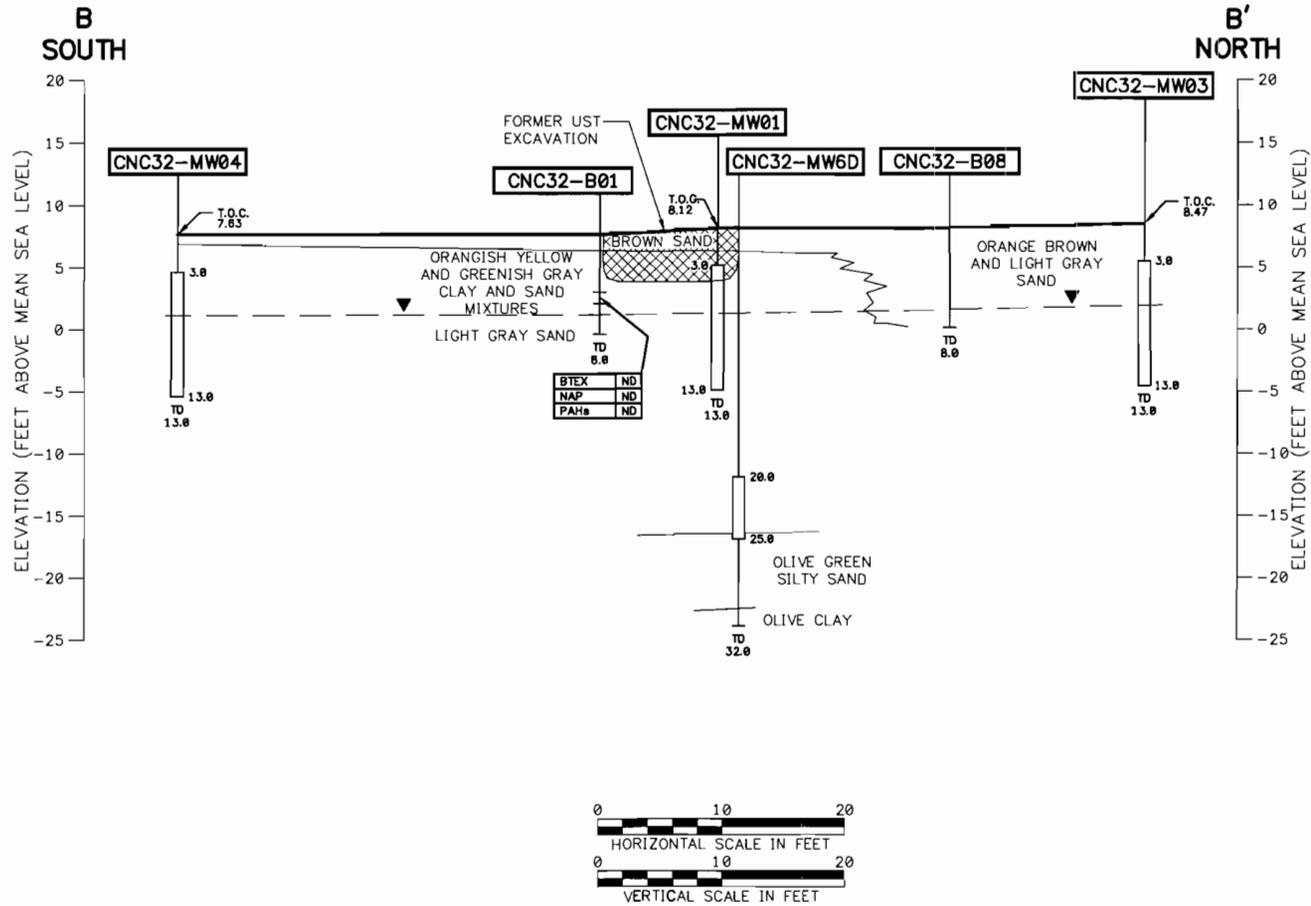
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY	DATE
DLT	10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED



GEOLOGIC CROSS SECTION A-A'
 SITE 32, BUILDING 54
 ZONE C, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 4	REV. 0



LEGEND:

MONITORING WELL OR BORING NUMBER: CNC32-MW03

GROUND SURFACE ELEVATION: T.O.C. 8.42

GROUND SURFACE

APPROXIMATE POTENTIOMETRIC SURFACE

TOP OF MONITORED INTERVAL (FT BGS): 3.0

LITHOLOGIC CONTACT (INFERRED BETWEEN BORINGS)

BOTTOM OF MONITORED INTERVAL (FT BGS): 13.0

TOTAL DEPTH OF WELL OR BORING (FT BGS): TD=13.0

DETECTED SOIL PARAMETER CONCENTRATIONS (ug/kg) AT SAMPLE DEPTH:

BTEX	ND
NAP	ND
PAHs	ND

BTEX = BENZENE, TOLUENE, ETHYLBENZENE AND TOTAL XYLENES
 NAP = NAPHTHALENES
 PAHs = POLYNUCLEAR AROMATIC HYDROCARBONS
 ND = NOT DETECTED (BELOW LABORATORY DETECTION LIMITS)

NOTE:
 GROUNDWATER BTEX, NAPHTHALENE AND PAH PARAMETERS REPORTED BELOW LABORATORY DETECTION LIMITS IN MONITORING WELLS CNC32-MW01, CNC32-MW03, CNC32-MW04 AND CNC32-MW6D

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

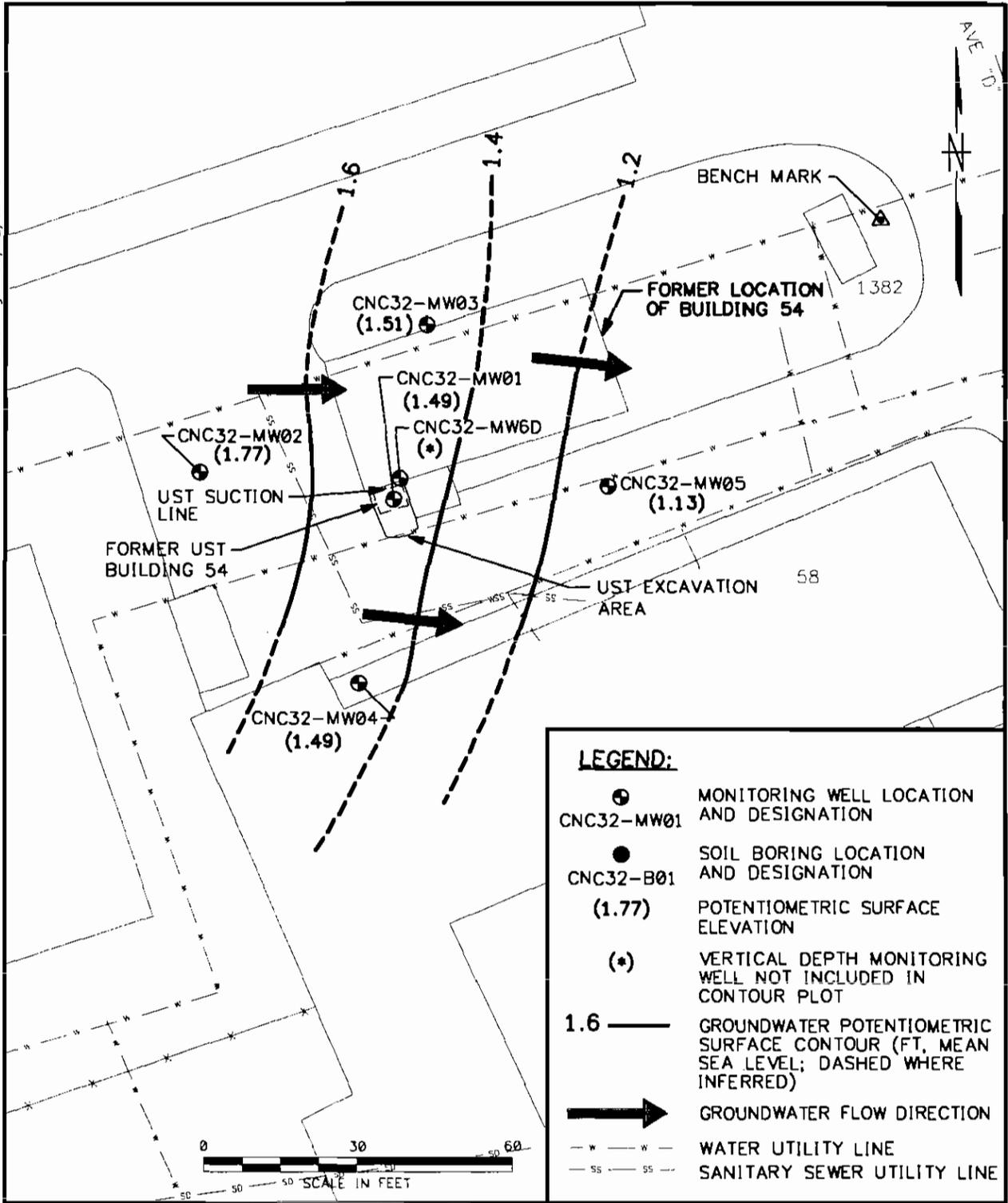
DRAWN BY	DATE
DLT	10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	AS NOTED



GEOLOGIC CROSS SECTION B-B'
 SITE 32, BUILDING 54
 ZONE C, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5	REV. 0

ACAD: 01.64CM19.dwg 10/22/99 DT



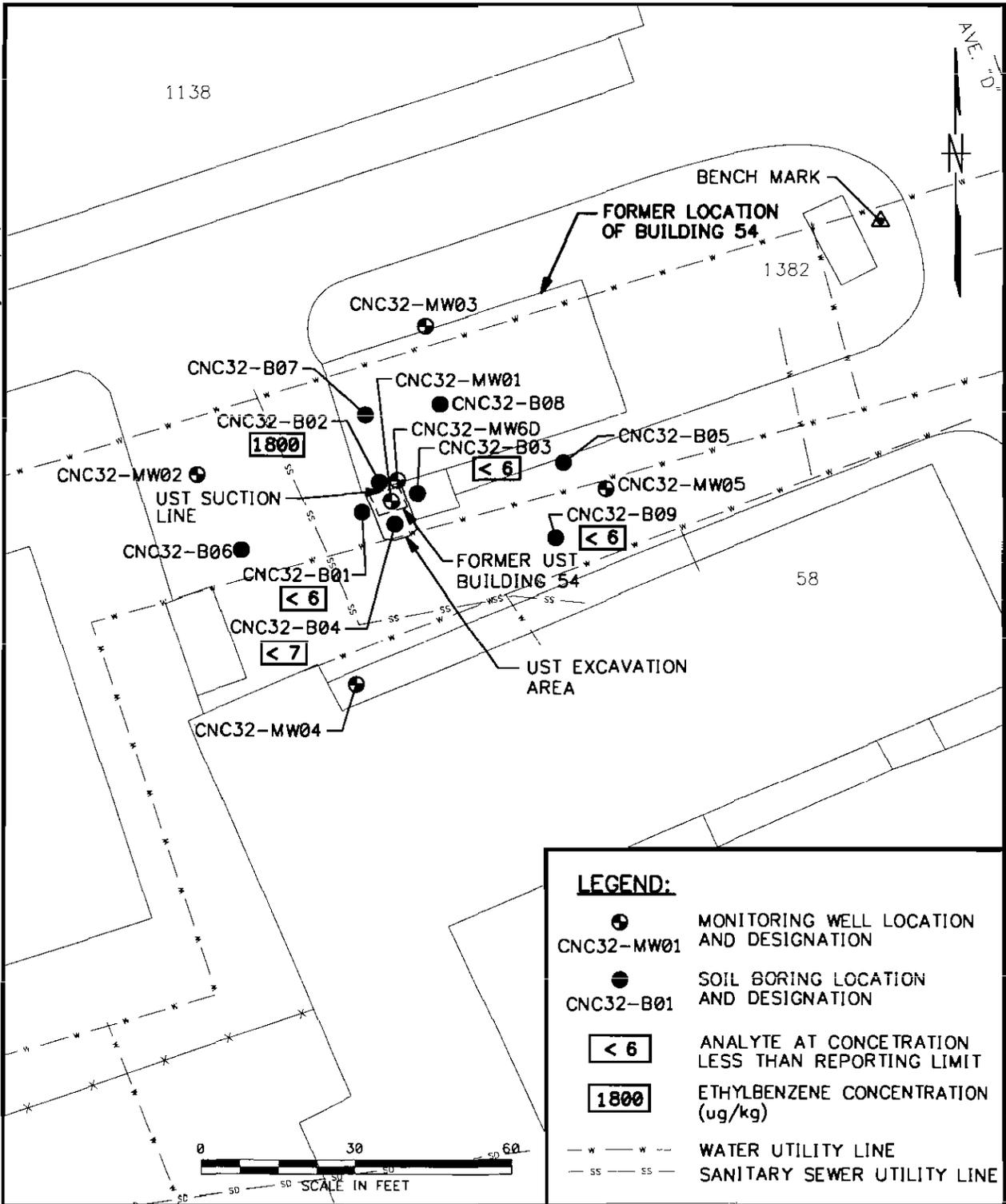
DRAWN BY	DATE
DLT	10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	
AS NOTED	



GROUNDWATER POTENTIOMETRIC MAP
 (SEPTEMBER 11, 1999)
 SITE J2, BUILDING 54
 ZONE C, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO.	
0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 6	0

ACAD:0164GM20.dwg 10/22/99 DT



LEGEND:

- CNC32-MW01 MONITORING WELL LOCATION AND DESIGNATION
- CNC32-B01 SOIL BORING LOCATION AND DESIGNATION
- < 6 ANALYTE AT CONCENTRATION LESS THAN REPORTING LIMIT
- 1800 ETHYLBENZENE CONCENTRATION (ug/kg)
- w - w - - WATER UTILITY LINE
- ss - ss - - SANITARY SEWER UTILITY LINE

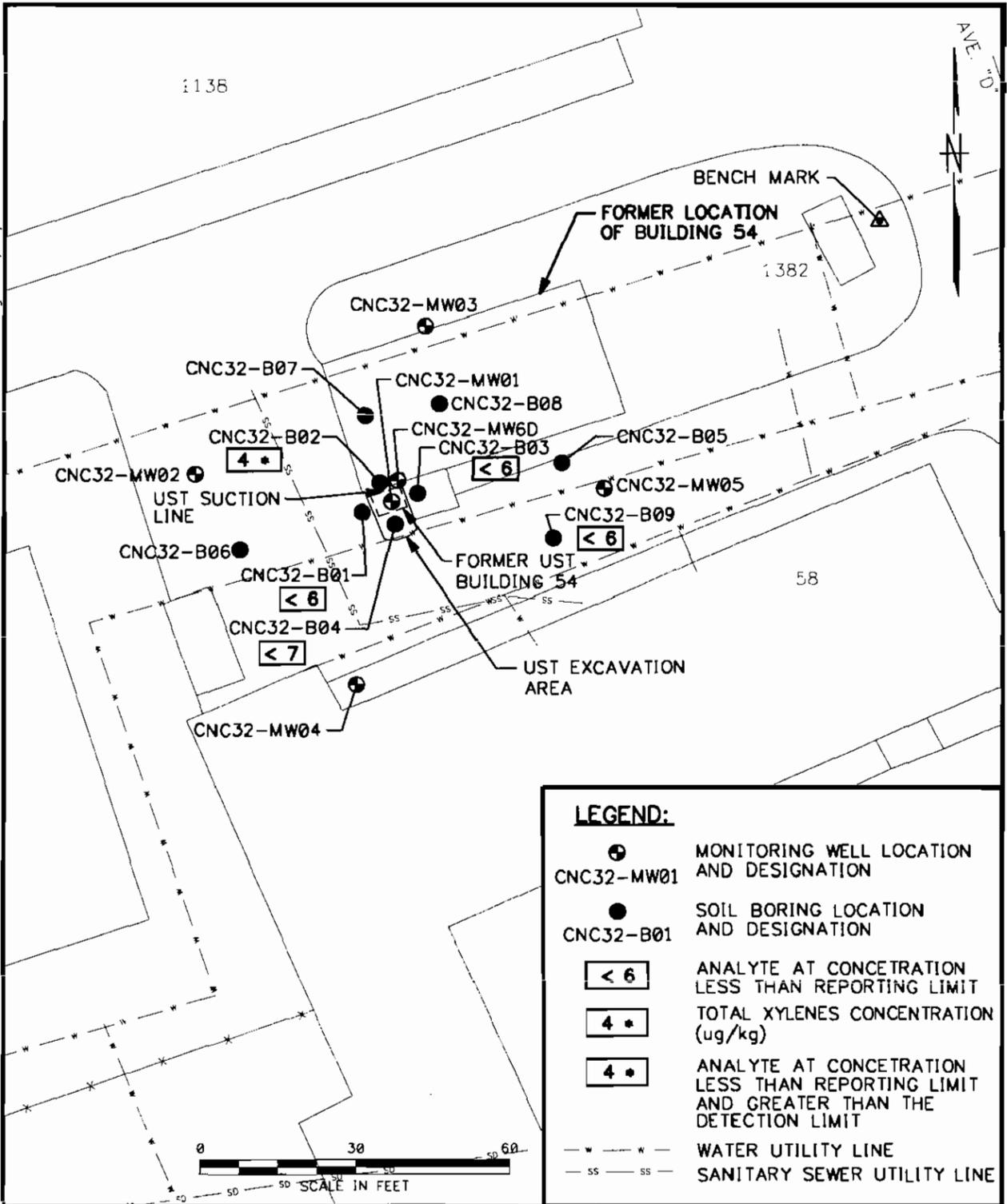
DRAWN BY DLT	DATE 10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



ETHYLBENZENE SOIL CONCENTRATION MAP
 (MAY 1999)
 SITE 32, BUILDING 54
 ZONE C, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 7	REV. 0

ACAD: 0164GM21.dwg 10/27/99 DT



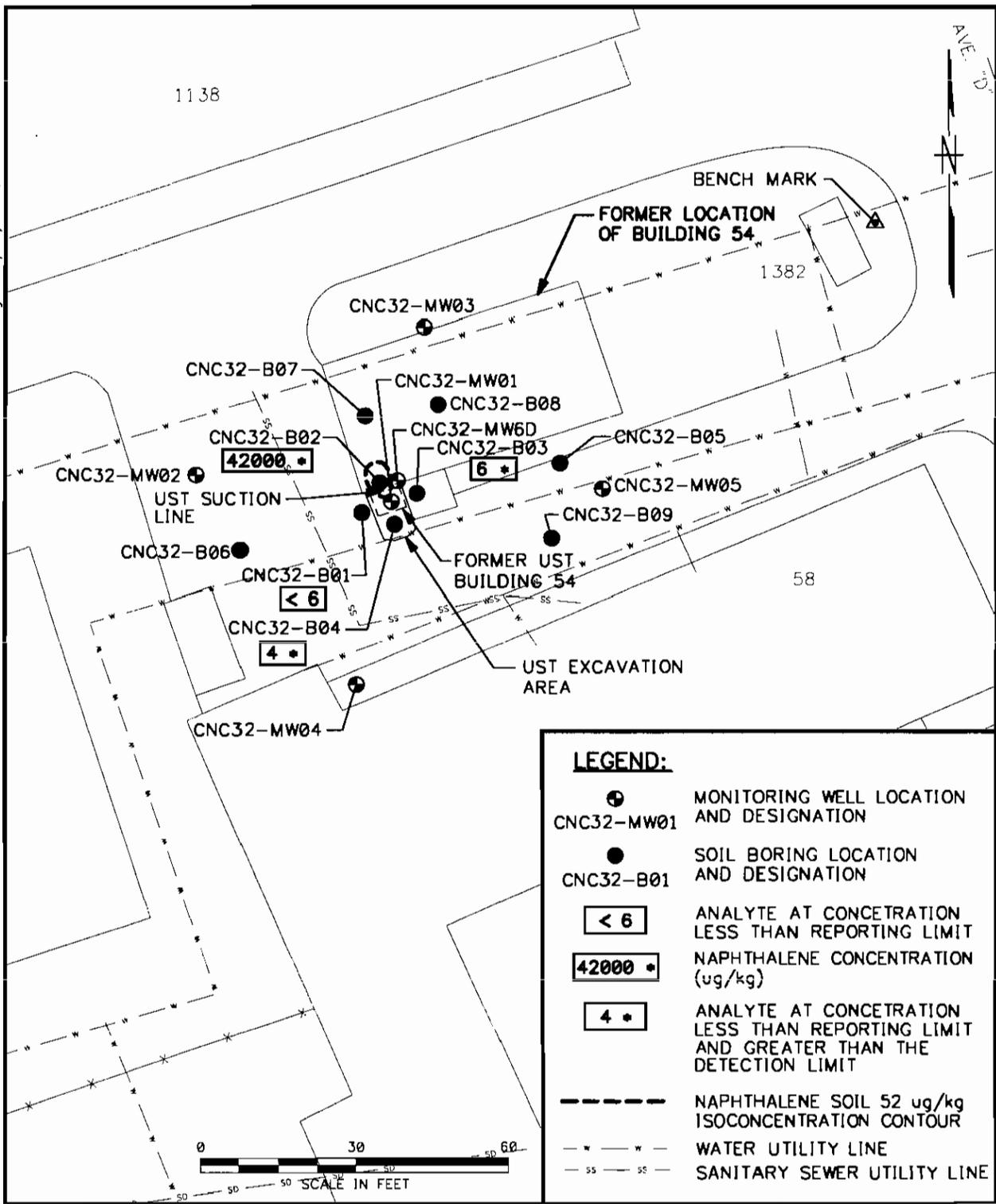
DRAWN BY DLT	DATE 10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



TOTAL XYLENES SOIL CONCENTRATION MAP
(MAY 1999)
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX,
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 8	REV. 0

ACAD:0164CM22.dwg 10/27/99 DT



LEGEND:

- CNC32-MW01 MONITORING WELL LOCATION AND DESIGNATION
- CNC32-B01 SOIL BORING LOCATION AND DESIGNATION
- < 6 ANALYTE AT CONCENTRATION LESS THAN REPORTING LIMIT
- 42000 * NAPHTHALENE CONCENTRATION (ug/kg)
- 4 * ANALYTE AT CONCENTRATION LESS THAN REPORTING LIMIT AND GREATER THAN THE DETECTION LIMIT
- NAPHTHALENE SOIL 52 ug/kg ISOCONCENTRATION CONTOUR
- - - - WATER UTILITY LINE
- - - - SANITARY SEWER UTILITY LINE

DRAWN BY DLT	DATE 10/22/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



NAPHTHALENE SOIL CONCENTRATION MAP
(MAY 1999)
SITE 32, BUILDING 54
ZONE C, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0164	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 9	REV. 0

APPENDIX A

**UNDERGROUND STORAGE TANK ASSESSMENT REPORT
UST BLDG 54**

Mr. Gabriel L. Magwood
Southern Division NFEC
P.O. Box 190010
2155 Eagle Drive
North Charleston, South Carolina 29419-9010

Re: Assessment Report dated October 17, 1996
Charleston Naval Base Building # 54 (Site Identification # 12094)
Charleston County

Date: December 31, 1996

Dear Mr. Magwood:

The author has completed technical review of the referenced document. As submitted, the report provides analytical results of environmental sampling conducted to determine if releases have occurred from operation of the referenced underground storage tank system. The results presented indicate elevated levels of polynuclear aromatic hydrocarbons (PAH) were detected in areas of the tank pit and from groundwater grab samples. The results exceed the levels proposed in the Soil Corrective Action Plan (dated July 18, 1996) and appear to necessitate additional endeavors for remedial actions (soils removal) and contamination characterization (assessment activities, including groundwater investigations), as appropriate. In this regard, assessment/corrective action activities provided in the Tank Management Plan (dated October 18, 1996) should be implemented in an appropriate and timely manner. Please be reminded that groundwater sampling (if necessary) will require construction of sampling points and will need to be submitted for prior review and approval, as appropriate.

Should you have any questions, please contact me at (803) 734-5328.

Sincerely,

Paul L. Bristol, Hydrogeologist
Groundwater Assessment and Development Section
Bureau of Water

cc: Trident District EQC

South Carolina Department of Health and Environmental Control (S.C.D.H.E.C.)
Underground Storage Tank (UST) Assessment Report

Date Received

State Use Only

Submit Completed Form to:
UST Regulatory Section
SCDHEC
2600 Bull Street
Columbia, South Carolina 29201
Telephone (803) 734-5331

I OWNERSHIP OF UST(S)

Agency/Owner: Southern Division, Naval Facilities Engineering Command, Caretaker Site Office

Mailing Address: P.O. Box 190010

City: N. Charleston State: SC Zip Code: 29419-9010

Area Code: 803 Telephone Number: 743-9985 Contact Person: LCDR Paul Rose

II SITE IDENTIFICATION AND LOCATION

Site I.D. #: 12094, Registered but not regulated

Facility Name: Charleston Naval Base Complex, BLDG 54

Street Address: South Hobson Avenue

City: North Charleston, 29405-2413 County: Charleston

III CLOSURE INFORMATION

Closure Started: 10 June 96 Closure Completed: 12 June 96

Number of USTs Closed: 1

N/A

Consultant

SPORTENVDETCNASN

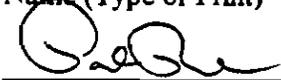
UST Removal Contractor

IV. CERTIFICATION (Read and Sign after completing entire submittal)

I certify that I have personally examined and am familiar with the information submitted on this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate and complete.

LCDR Paul Rose

Name (Type or Print)



Signature

V. UST INFORMATION

- A. Product.....
- B. Capacity.....
- C. Age.....
- D. Construction Material.....
- E. Month/Year of Last Use.....
- F. Depth (ft.) To Base of Tank.....
- G. Spill Prevention Equipment Y/N.....
- H. Overfill Prevention Equipment Y/N.....
- I. Method of Closure Removed/Filled.....
- J. Visible Corrosion or Pitting Y/N.....
- K. Visible Holes Y/N.....

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Diesel fuel						
560 gal.						
1967						
Steel						
Unknown						
6' 3"						
N						
N						
R						
Y						
Y						

- L. Method of disposal for any USTs removed from the ground (attach disposal manifests)

The UST was removed from the ground, drained, and cleaned. It was then cut up for recycling as scrap metal. See Attachment III.

- M. Method of disposal for any liquid petroleum, sludges, or waste waters removed from the USTs (attach disposal manifests)

Residual diesel fuel was recycled.

- N. If any corrosion, pitting, or holes were observed, describe the location and extent for each UST

UST BLDG 54 was corroded, pitted, and had several holes. The holes ranged from 1/4 to 1/8 inch in diameter. They were located from the middle of the tank up. See Attachment I.

VI. PIPING INFORMATION

- A. Construction Material.....
- B. Distance from UST to Dispenser.....
- C. Number of Dispensers.....
- D. Type of System P/S.....
- E. Was Piping Removed from the Ground? Y/N....
- F. Visible Corrosion or Pitting Y/N.....
- G. Visible Holes Y/N.....
- H. Age.....

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6
Steel						
• 1'						
1						
S						
Y						
N						
N						
1967						

*UST BLDG 54 was located 1' from Bldg 54. It provided diesel fuel for fresh water pumps.

- I. If any corrosion, pitting, or holes were observed, describe the location and extent for each line.

Piping was corroded, but sound.

VII. BRIEF SITE DESCRIPTION AND HISTORY

Bldg 54 of the Charleston Naval Base is a former fresh water pumphouse for the base water system. UST BLDG 54 was a registered but unregulated tank which provided diesel fuel for the diesel powered pumps. The tank was made of steel and installed in 1967.

VIII. SITE CONDITIONS

Yes No Unk

	Yes	No	Unk
<p>A. Were any petroleum-stained or contaminated soils found in the UST excavation, soil borings, trenches, or monitoring wells?</p> <p>If yes, indicate depth and location on the site map.</p>	X		
<p>B. Were any petroleum odors detected in the excavation, soil borings, trenches, or monitoring wells?</p> <p>If yes, indicate location on site map and describe the odor (strong, mild, etc.)</p>	X		
<p>C. Was water present in the UST excavation, soil borings, or trenches?</p> <p>If yes, how far below land surface (indicate location and depth)?</p> <p>5 1/2', center of excavation</p>	X		
<p>D. Did contaminated soils remain stockpiled on site after closure?</p> <p>If yes, indicate the stockpile location on the site map.</p> <p>Name of DHEC representative authorizing soil removal:</p>			X
<p>E. Was a petroleum sheen or free product detected on any excavation or boring waters?</p> <p>If yes, indicate location and thickness.</p>	X		

X. SAMPLING METHODOLOGY

Provide a detailed description of the methods used to collect and store (preserve) the samples.

After the removal of UST BLDG 54 soil and ground water samples were taken. Sampling was performed in accordance with SC DHEC R.61-92 Part 280 and SC DHEC UST Assessment Guidelines.

The samples are identified as follows:

	Detachment Charleston		General Engineering Labs
Soil Sample	UST54-1	=	SPORT -0075-1
Soil Sample	UST54-2	=	SPORT -0075-2
Ground Water Sample	UST54-3	=	SPORT -0075-3
Ground Water Sample	UST54-4	=	SPORT -0075-4

Sample jars were prepared by the testing laboratory. The grab method was utilized to fill the sample containers leaving as little head space as possible and immediately capped. Soil samples were extracted where the ends of the tanks had rested. Ground water samples were taken from the bottom center of the excavation.

The samples were marked, logged, and immediately placed in sample coolers packed with ice to maintain an approximate temperature of 4° C. Tools were thoroughly cleaned and decontaminated with organic-free soap and water after each sample.

The samples remained in the custody of SPORTENVDETCASN until they were transferred to General Engineering Laboratories for analysis as documented in the attached Chain-of-Custody Record.

SITE MAP

You must supply a scaled site map. It should include all buildings, road names, utilities, tank and pump island locations, sample locations, extent of excavation, and any other pertinent information.

Site Maps 1, 2, and 3
Photographs 1- 5

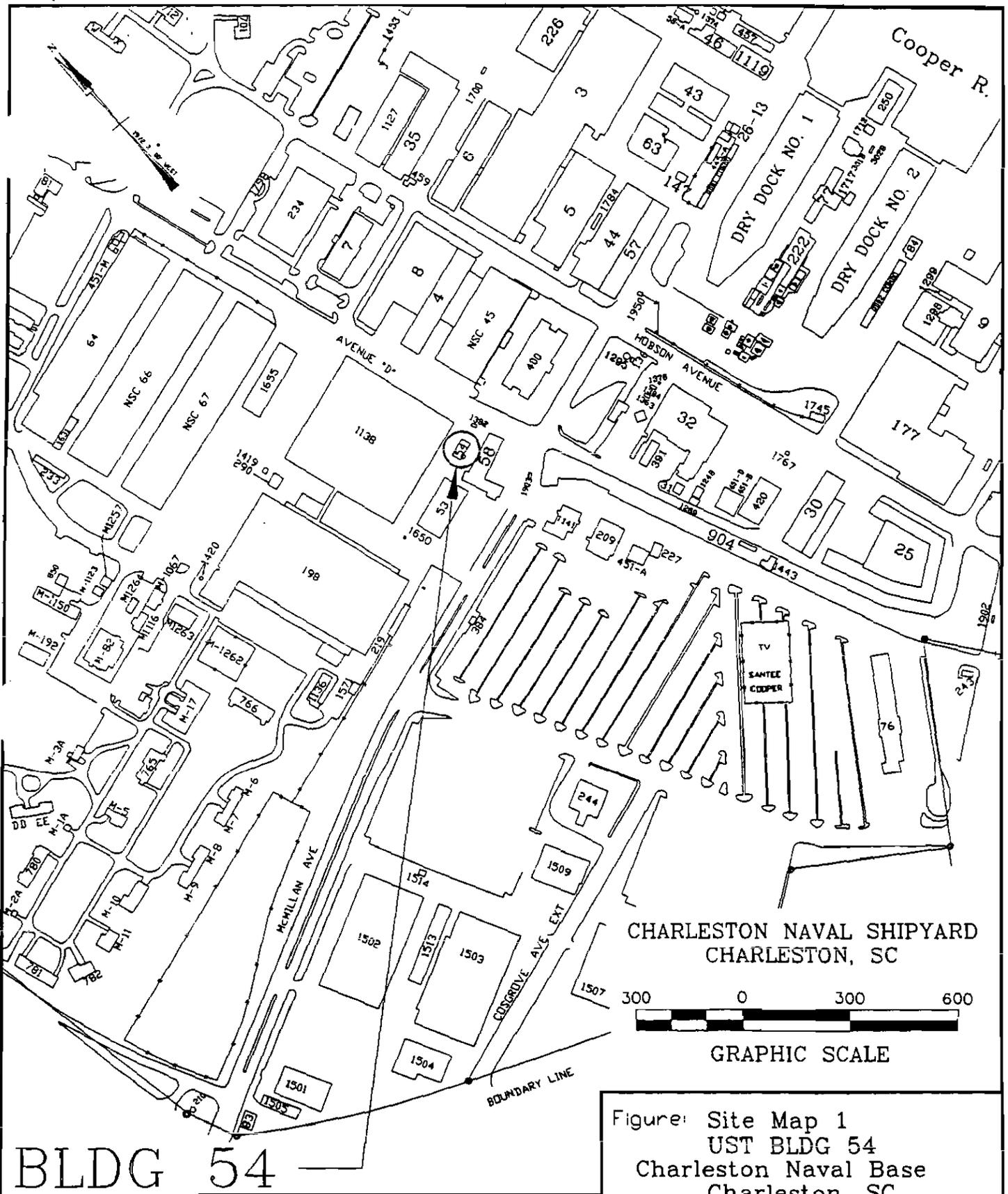


Figure: Site Map 1
UST BLDG 54
Charleston Naval Base
Charleston, SC

DWG DATE: 18 Sept 1996

DWG NAME: BLDG54_1

BLDG 54

SPORT SOIL SAMPLE 0075-1

Vent

Excavation
Heavy diesel fuel odor
noted throughout.

Former
UST BLDG 54

SPORT GROUND WATER
SAMPLES 0075-3 & 0075-4
(Naphthalene > RBSL)

Ground Water 5.5' below GSL x1' deep,
clear with sheen, no free product.
Diesel fuel odor noted.

6" Water line

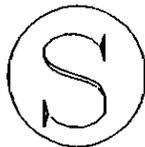
Suction

Fill

SPORT SOIL SAMPLE 0075-2
(Naphthalene > RBSL)

LEGEND

- ⓔ Electrical conduit
- Ⓢ Sewer manhole
- Ⓦ Water line access cover



GRAPHIC SCALE



SPORTENVDETHASN
1899 North Hobson Avenue
North Charleston, SC 29405-2106

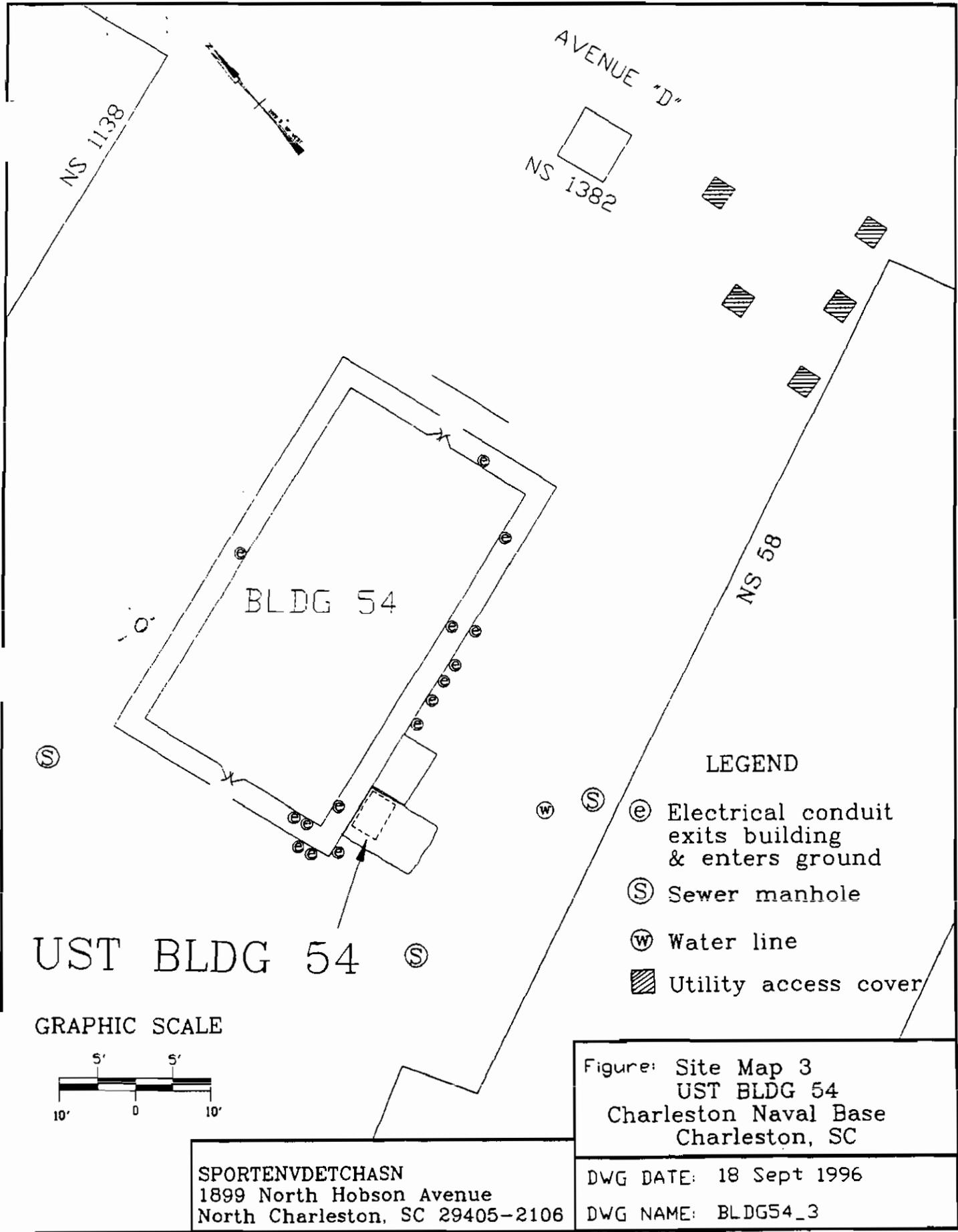
Figure: Site Map 2
UST BLDG 54
Charleston Naval Base
Charleston, SC

DWG DATE: 23 Sept 1996
DWG NAME: BLDG54_2



Ⓦ

NS 58
SN



- LEGEND
- Ⓧ Electrical conduit exits building & enters ground
 - Ⓢ Sewer manhole
 - Ⓦ Water line
 - ▨ Utility access cover

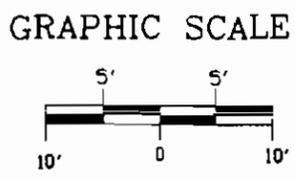


Figure: Site Map 3
 UST BLDG 54
 Charleston Naval Base
 Charleston, SC

SPORTENVDETHASN
 1899 North Hobson Avenue
 North Charleston, SC 29405-2106

DWG DATE: 18 Sept 1996
 DWG NAME: BLDG54_3

UST BLDG 54

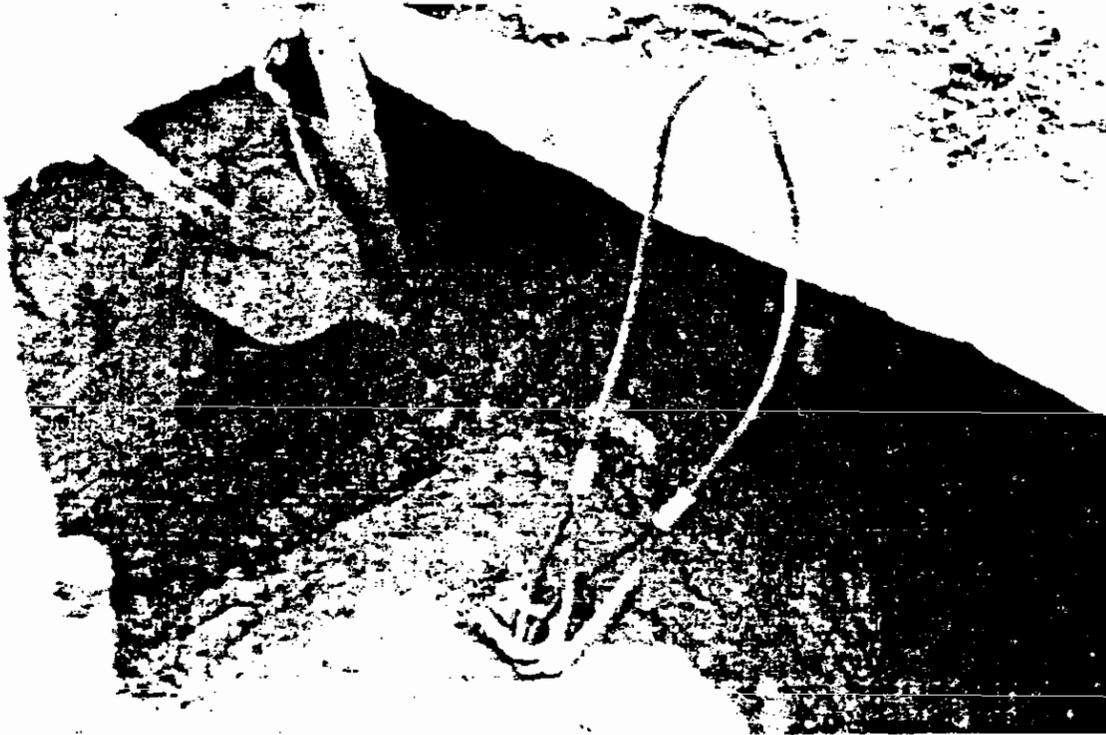


Photo 1: Prior to removal. Suction line is being indicated by shovel.



Photo 2: Removal in progress.

UST BLDG 54

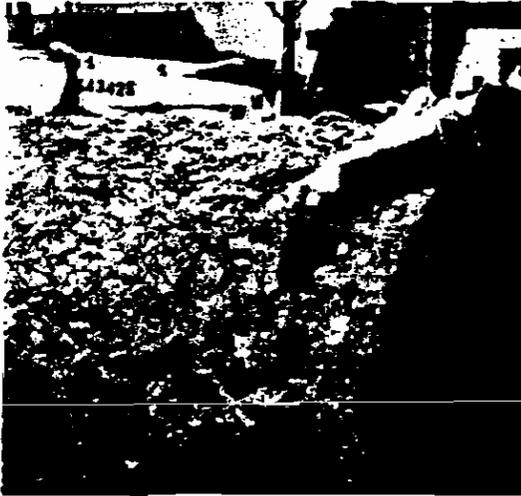


Photo 3: Quarter-inch hole is being indicated.



Photo 4: A second 1/4 inch hole is being indicated.



Photo 5: UST BLDG 54 ends cut open for steam cleaning.

ANALYTICAL RESULTS

You must submit the laboratory report and chain-of-custody form for the samples. These samples must be analyzed by a South Carolina certified laboratory.

Certified Analytical Results
Chain-of-Custody



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 21, 1996

Page 1 of 3

Sample ID : SPORT 0075-1
 Lab ID : 9606277-01
 Matrix : Soil
 Date Collected : 06/12/96
 Date Received : 06/14/96
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>X - 4 items</i>											
Benzene	U	0.00	1.00	2.00	ug/kg	1.0	THL	06/18/96	1300	86067	1
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
Naphthalene		4.12	1.00	2.00	ug/kg	1.0					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	BDG	06/18/96	1800	86033	2
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	165	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	165	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Chrysene	U	0.00	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	165	330	ug/kg	1.0					
Fluoranthene	U	0.00	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene	U	0.00	165	330	ug/kg	1.0					
Pyrene	U	0.00	165	330	ug/kg	1.0					

Following prep procedures were performed:
 GC/MS Base/Neutral Compounds

GWL 06/17/96 1700 86033 3





GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers
Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 21, 1996

Page 2 of 3

Sample ID : SPORT 0075-1

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	99.3	(30.0 - 115.)
Nitrobenzene-d5	M610	95.3	(23.0 - 120.)
p-Terphenyl-d14	M610	85.0	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	90.2	(59.7 - 159.)
Dibromofluoromethane	BTEX-8260	116.	(74.0 - 128.)
Toluene-d8	BTEX-8260	92.6	(53.4 - 163.)
Bromofluorobenzene	NAP-8260	90.2	(59.7 - 159.)
omofluoromethane	NAP-8260	116.	(74.0 - 128.)
me-d8	NAP-8260	92.6	(53.4 - 163.)

M = Method	Method-Description
M 1	EPA 8260
M 2	EPA 8270
M 3	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicate that a quality control analyte recovery is outside of specified acceptance criteria.

GEL Laboratory Certifications		EPI Laboratory Certifications	
AL - 41040	AZ - AZ0514	AL - 41050	AZ - AZ0514
CA - 2089	CT - PH-0169	CA - I-1023/2056	CT - PH-0175



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 21, 1996

Page 3 of 3

Sample ID : SPORT 0075-1

GEL Laboratory Certifications

DE - SC012
ME - SC012
NC - 233
RI - 135
TN - 02934
VA - 00151
WT - 999887790

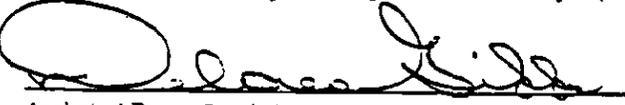
FL - E87156/87294
MS - 10120
NY - 11501
SC - 10120
UT - E-251
WA - C223

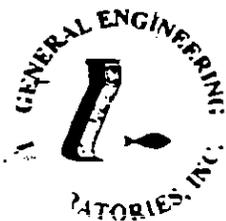
EPI Laboratory Certifications

FL - E87472/87458
NY - 11502
SC - 10582
UT - E-227
WA - C225
PA - 68-485

MS - 29417
RI - 138
TN - 02934
VA - 00111
NJ - 79002
WV - 235

Data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.


Analytical Report Specialist



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 21, 1996

Page 1 of 3

Sample ID : SPORT 0075-2
 Lab ID : 9606277-02
 Matrix : Soil
 Date Collected : 06/12/96
 Date Received : 06/14/96
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>X - 4 items</i>											
Benzene	U	0.00	10.0	20.0	ug/kg	10.	THL	06/17/96	1731	86067	1
Ethylbenzene		216	10.0	20.0	ug/kg	10.					
Toluene	U	0.00	10.0	20.0	ug/kg	10.					
Xylenes (TOTAL)		58.3	10.0	20.0	ug/kg	10.					
Naphthalene		1270	10.0	20.0	ug/kg	10.					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	BDG	06/18/96	1833	86033	2
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	165	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	165	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Chrysene	U	0.00	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	165	330	ug/kg	1.0					
Fluoranthene	U	0.00	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene		924	165	330	ug/kg	1.0					
Pyrene	U	0.00	165	330	ug/kg	1.0					

Following prep procedures were performed:
 AMS Base/Neural Compounds

GWL 06/17/96 1700 86033 3





GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 21, 1996

Page 2 of 3

Sample ID : SPORT 0075-2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
-----------	-----------	--------	----	----	-------	----	---------	------	------	-------	---

Comments:

A dilution was required for Volatiles Organics due to large amounts of hydrocarbons. As a result, the detection limits were elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
1,2,4-Trichlorobiphenyl	M610	95.3	(30.0 - 115.)
1,2,4-Trichlorobenzene-d5	M610	103.	(23.0 - 120.)
p-Terphenyl-d14	M610	69.4	(37.3 - 128.)
Bromofluorobenzene	BTEX-8260	104.	(59.7 - 159.)
Dibromofluoromethane	BTEX-8260	107.	(74.0 - 128.)
Toluene-d8	BTEX-8260	96.0	(53.4 - 163.)
Bromofluorobenzene	NAP-8260	104.	(59.7 - 159.)
Dibromofluoromethane	NAP-8260	107.	(74.0 - 128.)
Toluene-d8	NAP-8260	96.0	(53.4 - 163.)

M = Method	Method-Description
M 1	EPA 8260
M 2	EPA 8270
M 3	EPA 3550

Notes:

The qualifiers in this report are defined as follows:

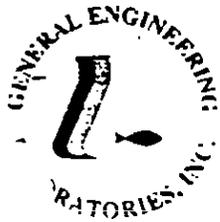
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicate that a quality control analyte recovery is outside of specified acceptance criteria.

Laboratory Certifications

EPI Laboratory Certifications



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 21, 1996

Page 3 of 3

Sample ID : SPORT 0075-2

GEL Laboratory Certifications

AL - 41040
CA - 2089
DE - SC012
ME - SC012
NC - 233
RI - 135
TN - 02934
- 00151
- 999887790

AZ - AZ0514
CT - PH-0169
FL - E87156/87294
MS - 10120
NY - 11501
SC - 10120
UT - E-251
WA - C223

EPI Laboratory Certifications

AL - 41050
CA - I-1023/2056
FL - E87472/87458
NY - 11502
SC - 10582
UT - E-227
WA - C225
PA - 68-485

AZ - AZ0514
CT - PH-0175
MS - 29417
RI - 138
TN - 02934
VA - 00111
NJ - 79002
WV - 235

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Analytical Report Specialist



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

Page 1 of 4

Sample ID : SPORT 0075-3
 Lab ID : 9606277-03
 Matrix : GroundH2O
 Date Collected : 06/12/96
 Date Received : 06/14/96
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>γ - 4 items</i>											
<i> Benzene</i>	U	0.00	1000	2000	ug/l	1000	RMB	06/17/96	1833	86063	1
Ethylbenzene	U	0.00	1000	2000	ug/l	1000					
Toluene	U	0.00	1000	2000	ug/l	1000					
Xylenes (TOTAL)	U	0.00	1000	2000	ug/l	1000					
Methyl Tert Butyl Ether	U	0.00	1000	2000	ug/l	1000					
Naphthalene		4200	1000	2000	ug/l	1000					
Extractable Organics											
<i>Polynuclear Aromatic Hydrocarbons - 16 items</i>											
Acenaphthene	U	0.00	200	400	ug/l	40.	BDG	06/18/96	1336	86043	2
Acenaphthylene	U	0.00	200	400	ug/l	40.					
Anthracene	U	0.00	200	400	ug/l	40.					
Benzo(a)anthracene	U	0.00	200	400	ug/l	40.					
Benzo(a)pyrene	U	0.00	200	400	ug/l	40.					
Benzo(b)fluoranthene	U	0.00	200	400	ug/l	40.					
Benzo(ghi)perylene	U	0.00	200	400	ug/l	40.					
Benzo(k)fluoranthene	U	0.00	200	400	ug/l	40.					
Chrysene	U	0.00	200	400	ug/l	40.					
Dibenzo(a,h)anthracene	U	0.00	200	400	ug/l	40.					
Fluoranthene	U	0.00	200	400	ug/l	40.					
Fluorene	U	0.00	200	400	ug/l	40.					
Indeno(1,2,3-c,d)pyrene	U	0.00	200	400	ug/l	40.					
Naphthalene	U	0.00	200	400	ug/l	40.					
Phenanthrene	U	0.00	200	400	ug/l	40.					
Pyrene	U	0.00	200	400	ug/l	40.					





GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

Page 2 of 4

Sample ID : SPORT 0075-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
-----------	-----------	--------	----	----	-------	----	---------	------	------	-------	---

The following prep procedures were performed:
 GC/MS Base/Neutral Compounds

TSD 06/17/96 1030 86043 3

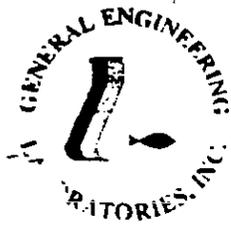
Comments:

Dilution was required for Volatiles Organics due to large amounts of hydrocarbons. As a result, the detection limits were elevated.

A dilution was also required for Extractables Organics due to matrix interference. As a result, the detection limits are elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(43.0 - 108.)
Nitrobenzene-d5	M610	0.00*	(35.0 - 111.)
p-Terphenyl-d14	M610	0.00*	(33.0 - 125.)
Bromofluorobenzene	BTEX-8260	92.0	(80.0 - 128.)
Dibromofluoromethane	BTEX-8260	106.	(67.7 - 135.)
Toluene-d8	BTEX-8260	94.0	(76.8 - 122.)
Bromofluorobenzene	MTBE-8260	92.0	(80.0 - 128.)
Dibromofluoromethane	MTBE-8260	106.	(67.7 - 135.)
Toluene-d8	MTBE-8260	94.0	(76.8 - 122.)
Bromofluorobenzene	NAP-8260	92.0	(80.0 - 128.)
Dibromofluoromethane	NAP-8260	106.	(67.7 - 135.)
Toluene-d8	NAP-8260	94.0	(76.8 - 122.)

M = Method	Method-Description
M 1	EPA 8260
M 2	EPA 8270
3	EPA 3510



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

Page 3 of 4

Sample ID : SPORT 0075-3

M = Method

Method-Description

Notes:

The qualifiers in this report are defined as follows:

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicate that a quality control analyte recovery is outside of specified acceptance criteria.

GEL Laboratory Certifications

AL - 41040
CA - 2089
DE - SC012
ME - SC012
NC - 233
RI - 135
TN - 02934
VA - 00151
WI - 999887790

AZ - AZ0514
CT - PH-0169
FL - E87156/87294
MS - 10120
NY - 11501
SC - 10120
UT - E-251
WA - C223

EPI Laboratory Certifications

AL - 41050
CA - I-1023/2056
FL - E87472/87458
NY - 11502
SC - 10582
UT - E-227
WA - C225
PA - 68-485

AZ - AZ0514
CT - PH-0175
MS - 29417
RI - 138
TN - 02934
VA - 00111
NJ - 79002
WV - 235



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

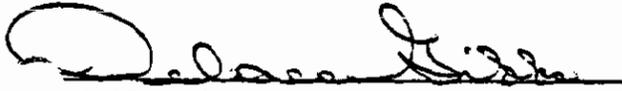
Page 4 of 4

Sample ID : SPORT 0075-3

GEL Laboratory Certifications

EPI Laboratory Certifications

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.


Specialist



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

Page 1 of 3

Sample ID : SPORT 0075-4
 Lab ID : 9606277-04
 Matrix : GroundH2O
 Date Collected : 06/12/96
 Date Received : 06/14/96
 Priority : Routine
 Collector : Client

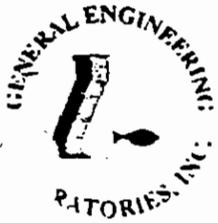
Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
<i>TEX - 4 items</i>											
Benzene	U	0.00	200	400	ug/l	200	RMB	06/18/96	1555	86063	1
Ethylbenzene	U	68.0	200	400	ug/l	200					
Toluene	U	0.00	200	400	ug/l	200					
Xylenes (TOTAL)	U	0.00	200	400	ug/l	200					
Methyl Tert Butyl Ether	U	0.00	200	400	ug/l	200					
Naphthalene		1360	200	400	ug/l	200					

Comments:

A dilution was required for this sample due to hydrocarbons.
 As a result, the detection limits is elevated.

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	BTEX-8260	92.0	(80.0 - 128.)
Dibromofluoromethane	BTEX-8260	105.	(67.7 - 135.)
Toluene-d8	BTEX-8260	95.2	(76.8 - 122.)
Bromofluorobenzene	MTBE-8260	92.0	(80.0 - 128.)
Dibromofluoromethane	MTBE-8260	105.	(67.7 - 135.)
Toluene-d8	MTBE-8260	95.2	(76.8 - 122.)
Bromofluorobenzene	NAP-8260	92.0	(80.0 - 128.)
Dibromofluoromethane	NAP-8260	105.	(67.7 - 135.)
Toluene-d8	NAP-8260	95.2	(76.8 - 122.)





GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
 SUPSHIP-Portsmouth Detachment-Env.
 1899 North Hobson Ave.
 North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

Page 2 of 3

Sample ID : SPORT 0075-4

M = Method	Method-Description
M 1	EPA 8260

Notes:

The qualifiers in this report are defined as follows:

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

K indicates that the analyte was not detected at a concentration greater than the detection limit.

L indicates that a quality control analyte recovery is outside of specified acceptance criteria.

GEL Laboratory Certifications

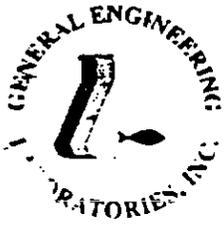
AL - 41040
 CA - 2089
 DE - SC012
 ME - SC012
 NC - 233
 RI - 135
 TN - 02934
 VA - 00151
 WI - 999887790

AZ - AZ0514
 CT - PH-0169
 FL - E87156/87294
 MS - 10120
 NY - 11501
 SC - 10120
 UT - E-251
 WA - C223

EPI Laboratory Certifications

AL - 41050
 CA - I-1023/2056
 FL - E87472/87458
 NY - 11502
 SC - 10582
 UT - E-227
 WA - C225
 PA - 68-485

AZ - AZ0514
 CT - PH-0175
 MS - 29417
 RI - 138
 TN - 02934
 VA - 00111
 NJ - 79002
 WV - 235



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CERTIFICATE OF ANALYSIS

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00196

Report Date: June 20, 1996

Page 3 of 3

Sample ID

: SPORT 0075-4

GEL Laboratory Certifications

EPI Laboratory Certifications

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

lytical Report Specialist

NI 00196

13

General Engineering Laboratories, Inc.
 2040 Savage Road
 Charleston, South Carolina 29414
 P.O. Box 30712
 Charleston, South Carolina 29417
 (803) 556-8171

CHAIN OF CUSTODY RECORD

9606277

Page 1 of 1

Client Name/Facility Name		SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods												Use F or P in the boxes to indicate whether sample was filtered and/or preserved						
SPORTENV DET CHASN		pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	BN Extractables	PCB's	Cyanide	Collform - specify type	BTEX - specify	PAH	Remarks	
Collected by/Company	RADKIALS																			WELL
SPORTENV DET CHASN		SAMPLE ID	DATE	TIME																
-01	SPORT0075-1	6/12/96	1300	X		2												X	X	UST 54-1 - SOIL
-02	SPORT0075-2	6/12/96	1500	X		2												X	X	UST 54-2 - SOIL
-03	SPORT0075-3	6/12/96	1300		X	5												1	X	UST 54-3 GW
-04	SPORT0075-4	6/12/96	1500		X	3												1	X	UST 54-4 GW
-05	SPORT0075-5	6/12/96	1300		X	3												X	X	UOA TRIP BLANK
																				1. BTEX & NAPTH FMTBE

Relinquished by: <i>Landy Adolph</i>	Date: 6/13/96	Time: 1345	Received by: <i>Shirley S. McCann</i>	Relinquished by: <i>W. S. Thiers, Jr.</i>	Date: 6/14/96	Time: 1025	Received by: <i>Michael Patrick</i>
Relinquished by: <i>Michael Patrick</i>	Date: 6/14/96	Time: 1141	Received by: <i>D. Desrenewe</i>	Date: 6/14/96	Time: 1200	Remarks:	

White = sample collector Yellow = file Pink = with report

Attachment III

Certificate of Disposal (tank)

APPENDIX B

GEOLOGIC BORING LOGS

BORING LOG

PROJECT NAME: Site 32 Bldg 54 BORING NUMBER: CNC32-B02
 PROJECT NUMBER: NO/64 Zone C DATE: 5/14/99
 DRILLING COMPANY: Tidewater GEOLOGIST: BDH
 DRILLING RIG: Geoprobe DRILLER: DD

Sample No. and Type or RQD	Depth (Fl. or Run No.)	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft. or Screened Interval)	MATERIAL DESCRIPTION			U S C S	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**
				1.1'	loose to firm	mod to very yellow	Sand, f. fine silty clay, sandy, mottled greenish gray		sl. moist	0			0
	4		4 1/4'	4.4'						0			
			5.1'	5.5'	loose to firm	tan to brown	Sand, f. fine silty clay sandy		sl. moist	0			0
	8				loose to firm	tan to brown	Sand, clayey, f. fine mottled orange yellow		sl. moist	0			0
							TD 8'						

5-1
1100

1-2
1-0
12

* When rock coring, enter rock brokenness.
 ** Include monitor reading in 6 foot intervals @ borehole Increase reading frequency if elevated response read.

Remarks: _____

Drilling Area Background (ppm):

Converted to Well: Yes No Well I.D. #: _____

BORING LOG

PROJECT NAME: Site 32 Bldg 54 BORING NUMBER: CNC 32 - B03
 PROJECT NUMBER: ND 164 Zone C DATE: 5/15/99
 DRILLING COMPANY: Tidewater GEOLOGIST: BDH
 DRILLING RIG: Geoprobe DRILLER: DD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION			U S C S	Remarks	PID/FID Reading (ppm)										
					Soil Density/Consistency or Rock Hardness	Color	Material Classification			Sample	Sampler BZ	Borehole**	Driller BZ**							
				1.0'	base med fm		sand, f. gnd, silty		sl. moist											
			4 1/4'		fin fm		clay, sandy, mottled tan, med fm, w/ rounded rock frags		sl. moist											
9-1 1142	4			4.8' / 5.2'	fin fm		clay, sandy		sl. moist											
			4 1/4'		fin fm		sand, clayey, less clayey @ base													
5-2 1147	8						all staining @ 6.5' and light fuel odor		met @ 6.2'											

When rock coring, enter rock brokenness.
 Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.
 Remarks: _____ Drilling Area Background (ppm):
 Converted to Well: Yes No Well I.D. #: _____

BORING LOG

PROJECT NAME: Site 32 Bldg 54 BORING NUMBER: CNC 32 B06
 PROJECT NUMBER: N 0164 Zone C DATE: 5/15/99
 DRILLING COMPANY: TideWater GEOLOGIST: BDH
 DRILLING RIG: Proprobe DRILLER: DD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color			Material Classification	Sample	Sampler BZ	Borehole**
5-1 @ 402	4	/	4 1/4'	1.2'	loose med brn sand, silty w/ unbrn - 2" shell frags		sl. moist	0 1/2			0	
				3.1'	firm comp brn clay, silty, mottled with brn, blk		sl. moist	0				
5-2 @ 1405	8	/	4 1/4'	6.8'	firm fm sand, clayey		sl. moist	0			0	
					thin clay interbeds		1-2" sh sl moist	0 1/3			0	
5-3 @ 1431	12	/	4 1/4'		tan sand, f. grad to gray		Wet @ 6'	0			0	
					med gray			0			0	
5-4 @ 1450	16	/	3 3/4'	15.5'	sand, finer grad, sl clayey			0			0	
					abund shell frags - w/ fine - weakly cemented			0			0	
5-5 @ 1511	20	/	4 1/4'		brn sand, fine to med, abund. shell frags / blk frags - phyllosite (loose)			?			0	
					fin to med gray			0			0	
5-6 @ 1525	24	/	4 1/4'	22'	fin to med gray		Wet	0			0	
				23'	sand, med. grad, med blk phyllosite, shell frags			0			0	
					sand, f. grad to silt w/ abund shell frags							

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

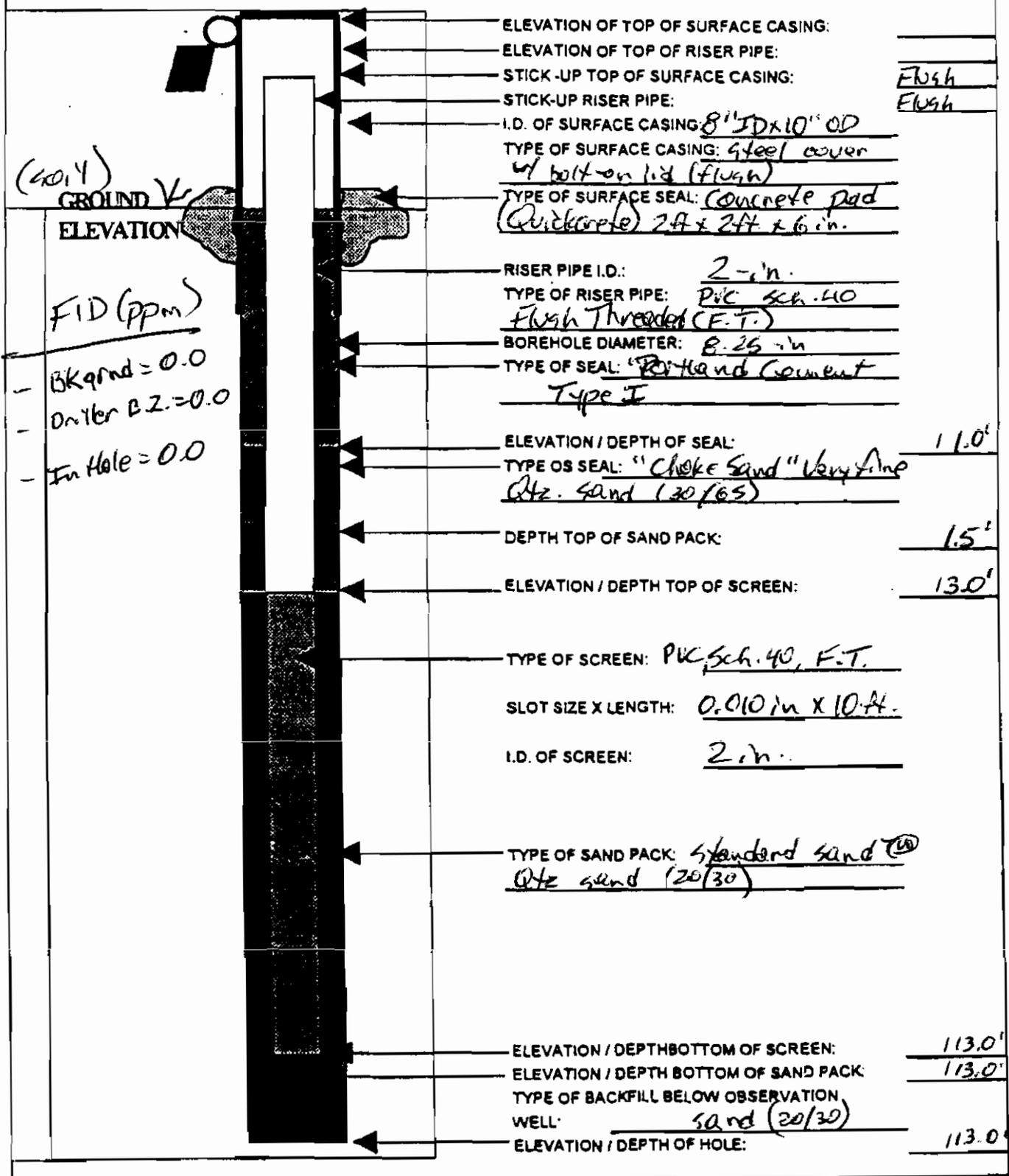
Remarks: _____

Drilling Area
Background (ppm):

Converted to Well: Yes No Well I.D. #: _____

OVERBURDEN MONITORING WELL SHEET

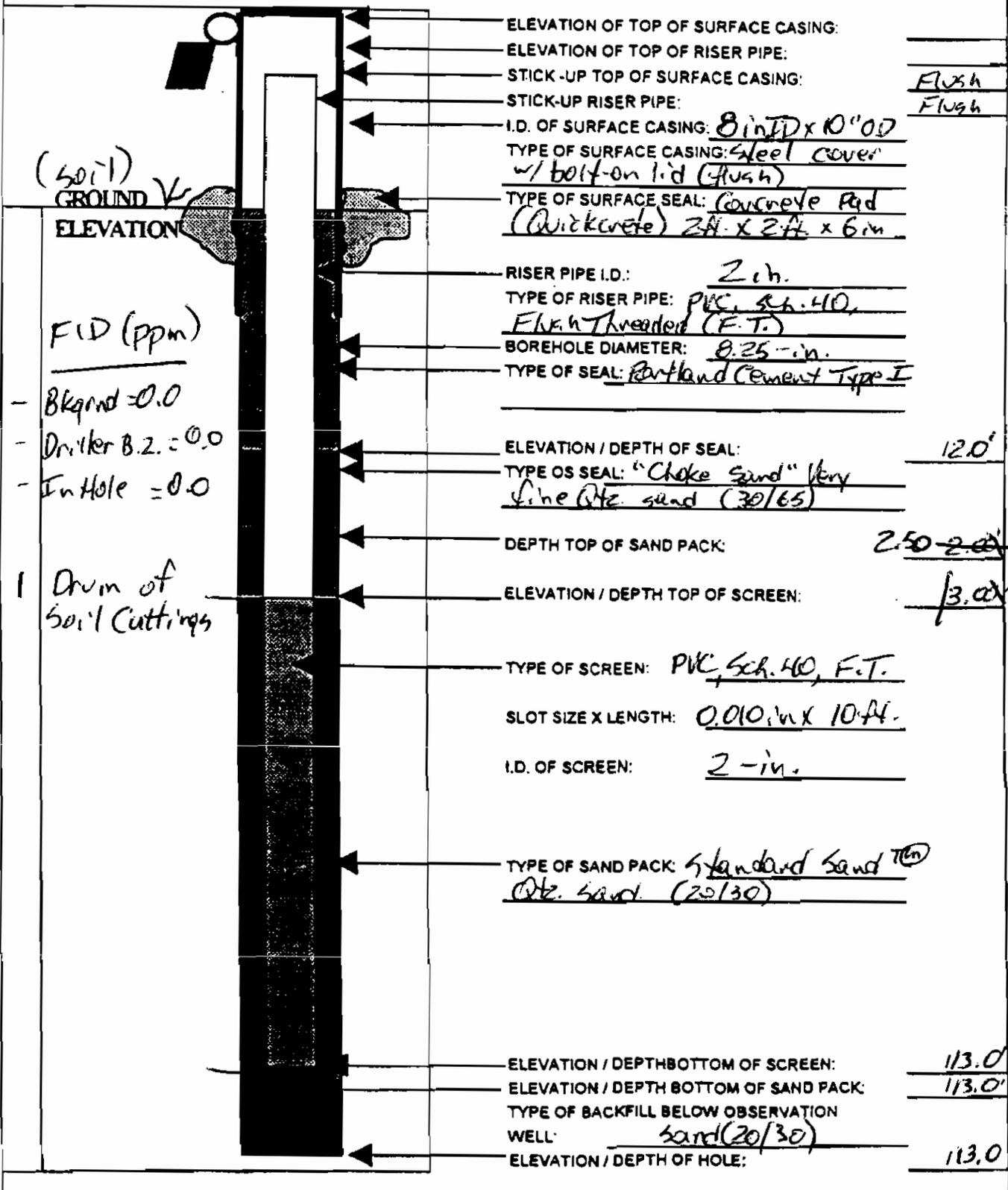
PROJECT <u>Chas. Naval Complex</u>	LOCATION <u>S. 1032/Zone C</u>	DRILLER <u>Cyber Drilling</u>
PROJECT NO. <u>NO164</u>	BORING <u>CNC32-mw01</u>	METHOD <u>DPT 4.25-in HSA</u>
ELEVATION _____	DATE <u>6/17/99</u>	DRILLING <u>Daniel Markin</u>
FIELD GEOLOGIST <u>Mark Davidson</u>		DEVELOPMENT: NA



- ELEVATION OF TOP OF SURFACE CASING: _____
- ELEVATION OF TOP OF RISER PIPE: _____
- STICK-UP TOP OF SURFACE CASING: Flush
- STICK-UP RISER PIPE: Flush
- I.D. OF SURFACE CASING: 8" ID x 10" OD
- TYPE OF SURFACE CASING: steel cover w/ bolt on lid (flush)
- TYPE OF SURFACE SEAL: Concrete pad (Quickcrete) 24" x 24" x 6 in.
- RISER PIPE I.D.: 2 in.
- TYPE OF RISER PIPE: PVC Sch. 40 Flush Threaded (F.T.)
- BOREHOLE DIAMETER: 8.25 in
- TYPE OF SEAL: Portland Cement Type I
- ELEVATION / DEPTH OF SEAL: _____ 11.0'
- TYPE OF SEAL: "Choke Sand" Very Fine Qtz. sand (20/65)
- DEPTH TOP OF SAND PACK: _____ 1.5'
- ELEVATION / DEPTH TOP OF SCREEN: _____ 13.0'
- TYPE OF SCREEN: PVC Sch. 40, F.T.
- SLOT SIZE X LENGTH: 0.010 in x 10 ft.
- I.D. OF SCREEN: 2 in.
- TYPE OF SAND PACK: Standard sand (20) Qtz sand (20/30)
- ELEVATION / DEPTH BOTTOM OF SCREEN: _____ 113.0'
- ELEVATION / DEPTH BOTTOM OF SAND PACK: _____ 113.0'
- TYPE OF BACKFILL BELOW OBSERVATION WELL: sand (20/30)
- ELEVATION / DEPTH OF HOLE: _____ 113.0'

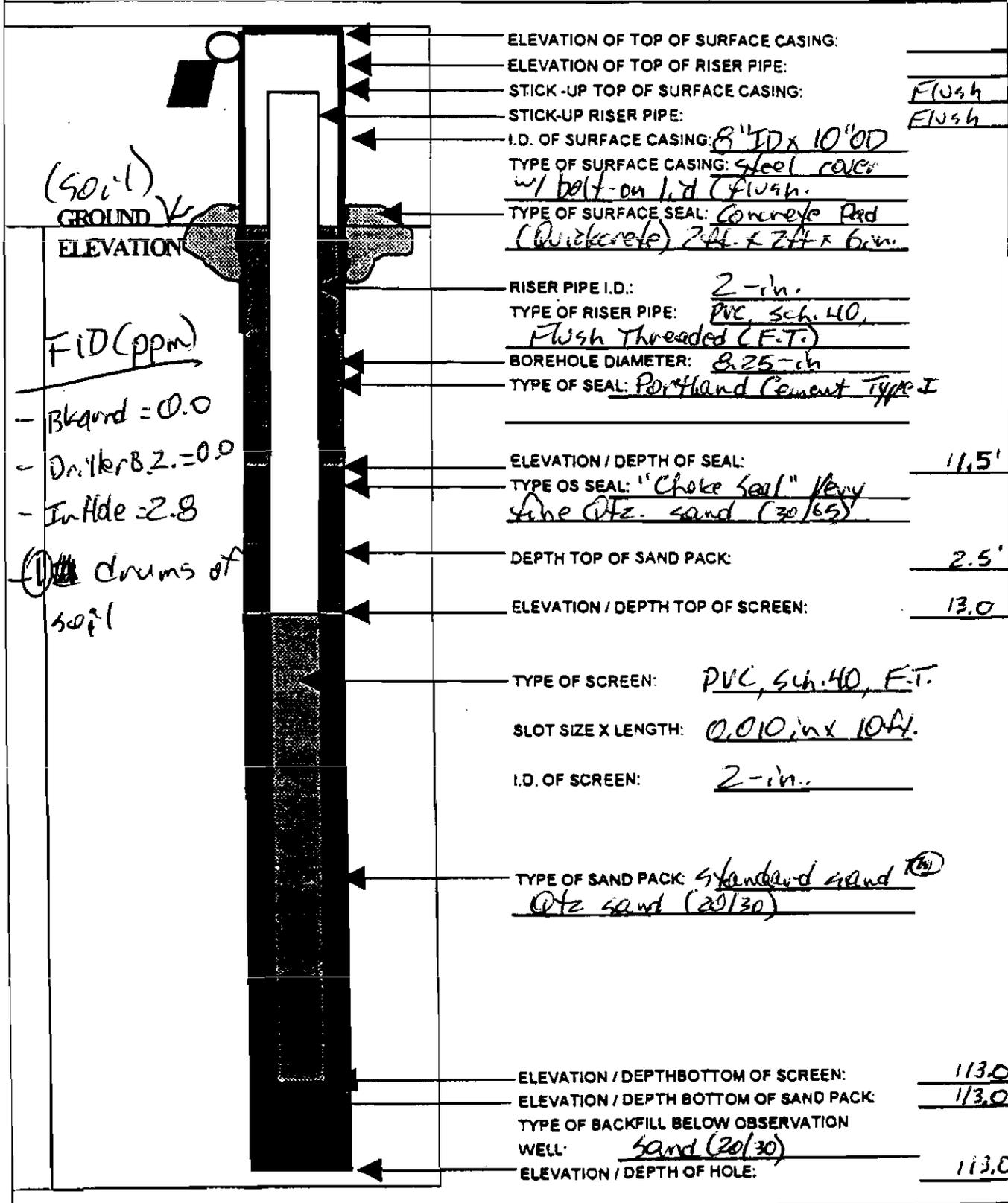
OVERBURDEN MONITORING WELL SHEET

PROJECT <u>Chas. Naval Complex</u>	LOCATION: <u>S. Ye 32/Zone C</u>	DRILLER <u>Custom Drilling</u>
PROJECT NO. <u>N0164</u>	BORING <u>CNC32-MW02</u>	METHOD: <u>DPT 4.25-in. H44</u>
ELEVATION _____	DATE <u>6/17/99</u>	DRILLING <u>Darrell Martin</u>
FIELD GEOLOGIST <u>Mark Darrington</u>		DEVELOPMENT: <u>NA</u>



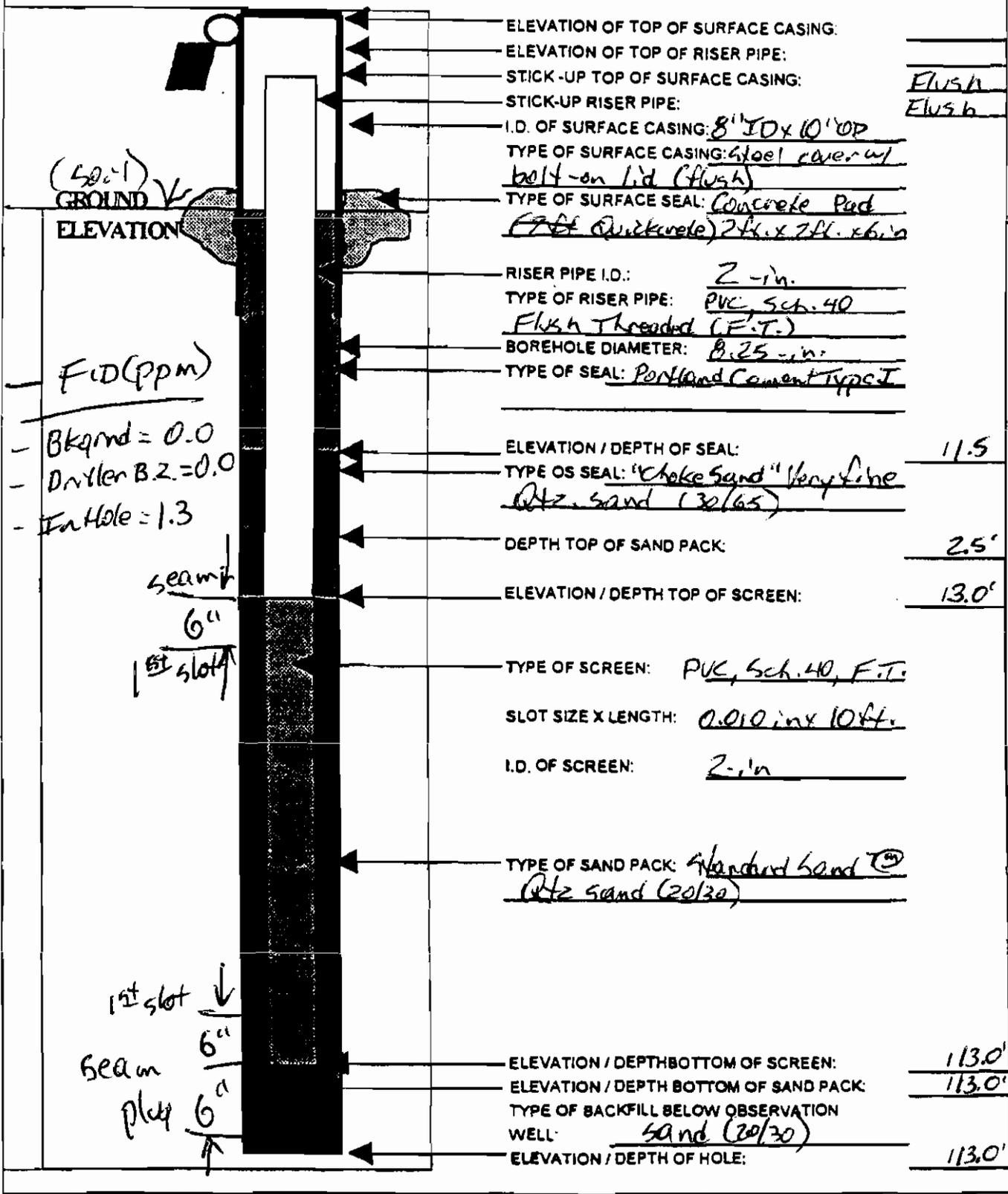
OVERBURDEN MONITORING WELL SHEET

PROJECT <u>Chas. Naval Complex</u>	LOCATION: <u>S, 1632 / Zone C</u>	DRILLER <u>Custom Drilling</u>
PROJECT NO. <u>N0164</u>	BORING <u>CNC32-MW03</u>	METHOD: <u>DPT 4.25-in. HSA</u>
ELEVATION _____	DATE <u>6/17/99</u>	DRILLING <u>Darrell March</u>
FIELD GEOLOGIST <u>Mark Darrington</u>		DEVELOPMENT: <u>NA</u>



OVERBURDEN MONITORING WELL SHEET

PROJECT <u>Chas. Naval Complex</u>	LOCATION: <u>site 32/zone C</u>	DRILLER <u>Urban Drilling</u>
PROJECT NO. <u>NO164</u>	BORING <u>CNC32-MW04</u>	METHOD: <u>DPT 4.25-in. HSA</u>
ELEVATION _____	DATE <u>6/17/99</u>	DRILLING <u>Darrell N. Gordon</u>
FIELD GEOLOGIST <u>Mark Darrington</u>		DEVELOPMENT: <u>NA</u>



(50±) GROUND ELEVATION ✓

FID (ppm)
 - Bkgnd = 0.0
 - Driller B.Z. = 0.0
 - In Hole = 1.3

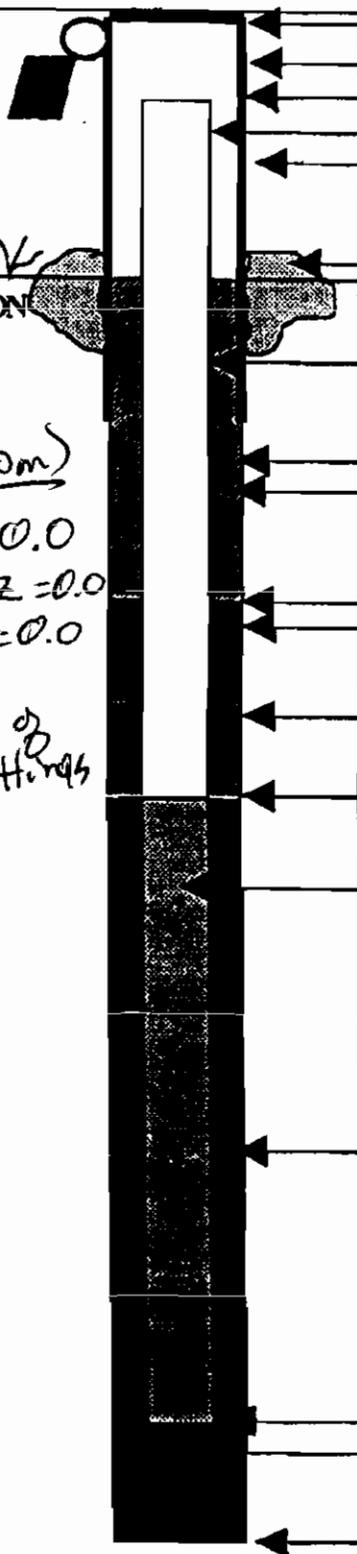
seam
 6"
 1st slot

1st slot ↓
 seam
 ply 6"
 6"

- ELEVATION OF TOP OF SURFACE CASING: _____
- ELEVATION OF TOP OF RISER PIPE: _____
- STICK-UP TOP OF SURFACE CASING: Flush
- STICK-UP RISER PIPE: Flush
- I.D. OF SURFACE CASING: 8" ID x 10' OP
- TYPE OF SURFACE CASING: 6-lb gal cover w/ bolt-on lid (flush)
- TYPE OF SURFACE SEAL: Concrete Pad (70# Quikcrete) 24" x 24" x 6"
- RISER PIPE I.D.: 2-in.
- TYPE OF RISER PIPE: PVC, Sch. 40
- Flush Threaded (F.T.)
- BOREHOLE DIAMETER: 8.25-in.
- TYPE OF SEAL: Portland Cement Type I
- ELEVATION / DEPTH OF SEAL: 11.5
- TYPE OF SEAL: "Choke Sand" Very fine Qtz. sand (30/65)
- DEPTH TOP OF SAND PACK: 2.5'
- ELEVATION / DEPTH TOP OF SCREEN: 13.0'
- TYPE OF SCREEN: PVC, Sch. 40, F.T.
- SLOT SIZE X LENGTH: 0.010 in x 10 ft.
- I.D. OF SCREEN: 2-in.
- TYPE OF SAND PACK: Standard Sand (20/30) Qtz sand (20/30)
- ELEVATION / DEPTH BOTTOM OF SCREEN: 113.0'
- ELEVATION / DEPTH BOTTOM OF SAND PACK: 113.0'
- TYPE OF BACKFILL BELOW OBSERVATION WELL: sand (20/30)
- ELEVATION / DEPTH OF HOLE: 113.0'

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>Chas. Naval Complex</u>	LOCATION: <u>Site 32/Zone C</u>	DRILLER <u>Custom Drilling</u>
PROJECT NO. <u>N0164</u>	BORING <u>CNC32-MW05</u>	METHOD: <u>DPT 4.25-in. A5A</u>
ELEVATION _____	DATE <u>6/17/99</u>	DRILLING <u>Darrell Martin</u>
FIELD GEOLOGIST <u>Mark Derrington</u>		DEVELOPMENT: <u>NA</u>

<p>(50%) GROUND ELEVATION</p> <p>FID (ppm)</p> <p>- Bkgrnd = 0.0</p> <p>- Driller B.Z. = 0.0</p> <p>- In Hole = 0.0</p> <p>① 1 Drum of Soil Cuttings</p>		ELEVATION OF TOP OF SURFACE CASING: _____
	ELEVATION OF TOP OF RISER PIPE: _____	
	STICK-UP TOP OF SURFACE CASING: <u>Flush</u>	
	STICK-UP RISER PIPE: <u>Flush</u>	
	I.D. OF SURFACE CASING: <u>8" ID x 10" OD</u>	
	TYPE OF SURFACE CASING: <u>Steel Caser w/ bolt-on I.D. (A5A)</u>	
	TYPE OF SURFACE SEAL: <u>Concrete Pad (Quickrete) 24" x 24" x 6" in</u>	
	RISER PIPE I.D.: <u>2-in.</u>	
	TYPE OF RISER PIPE: <u>PVC, Sch. 40, Flush Threaded (F.T.)</u>	
	BOREHOLE DIAMETER: <u>8.25 in.</u>	
	TYPE OF SEAL: <u>Portland Cement Type 1</u>	
	ELEVATION / DEPTH OF SEAL: <u>11.5'</u>	
	TYPE OF SEAL: <u>"Choke Sand" Very Fine Qtz sand (30/65)</u>	
	DEPTH TOP OF SAND PACK: <u>2.5'</u>	
	ELEVATION / DEPTH TOP OF SCREEN: <u>13.0'</u>	
TYPE OF SCREEN: <u>PVC, Sch. 40, F.T.</u>		
SLOT SIZE X LENGTH: <u>0.010 in x 10 ft</u>		
I.D. OF SCREEN: <u>2-in.</u>		
TYPE OF SAND PACK: <u>Standard sand (M) Qtz. sand (20/30)</u>		
ELEVATION / DEPTH BOTTOM OF SCREEN: <u>113.0'</u>		
ELEVATION / DEPTH BOTTOM OF SAND PACK: <u>113.0'</u>		
TYPE OF BACKFILL BELOW OBSERVATION WELL: <u>Sand (20/30)</u>		
ELEVATION / DEPTH OF HOLE: <u>113.0</u>		

BORING LOG

PROJECT NAME: CNC site 32 BORING NUMBER: CNC32-MW06D
 PROJECT NUMBER: ND164 Bldg 54 DATE: 6/22/99
 DRILLING COMPANY: Custom Drilling GEOLOGIST: Marty Rul
 DRILLING RIG: _____ DRILLER: Custom Drilling (Rod)

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION		U S C S *	Remarks	PID/FID Reading (ppm)			
					Soil Density/Consistency or Rock Hardness	Color			Material Classification	Sample	Sampler BZ	Borehole
#1	24'	6 6"			Firm			well sorted				
	↓	4 6"	2 1/2'					Some shell hash				
	↓	8 6"						Pale olive green				
	26'	10 6"						No odor				
								well sorted				
								damp				
#2	26'	4 6"			Firm			Sandy silt to silt				
	↓	4 6"						v.f. grain, some shell hash				
	↓	8 6"			Firm			Pale olive green, well sorted	0.0 PPM			
	28'	7 6"						silt, some shell hash				
								Pale olive green				
								No odor				
								damp				
#3	28'	9 6"			Firm			Silt w/trace very fine sand				
	↓	10 6"						some shell hash				
	↓	14 6"						Pale olive green (very wet 8")				
	30'	19 6"						well sorted				
								No odor				
								damp to wet				
					Firm			slightly silty clay				
								Pale olive green, No odor				
								Some shell hash.				
#4	30'	4			Firm	olive		very tight clay				
	↓	8						olive color				
	32'	12						trace shell hash				
								cohesive				
								(Plastic)				

black specs observed throughout (phosphate?)

* When rock coring, enter rock brokenness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Remarks: _____ Drilling Area Background (ppm):

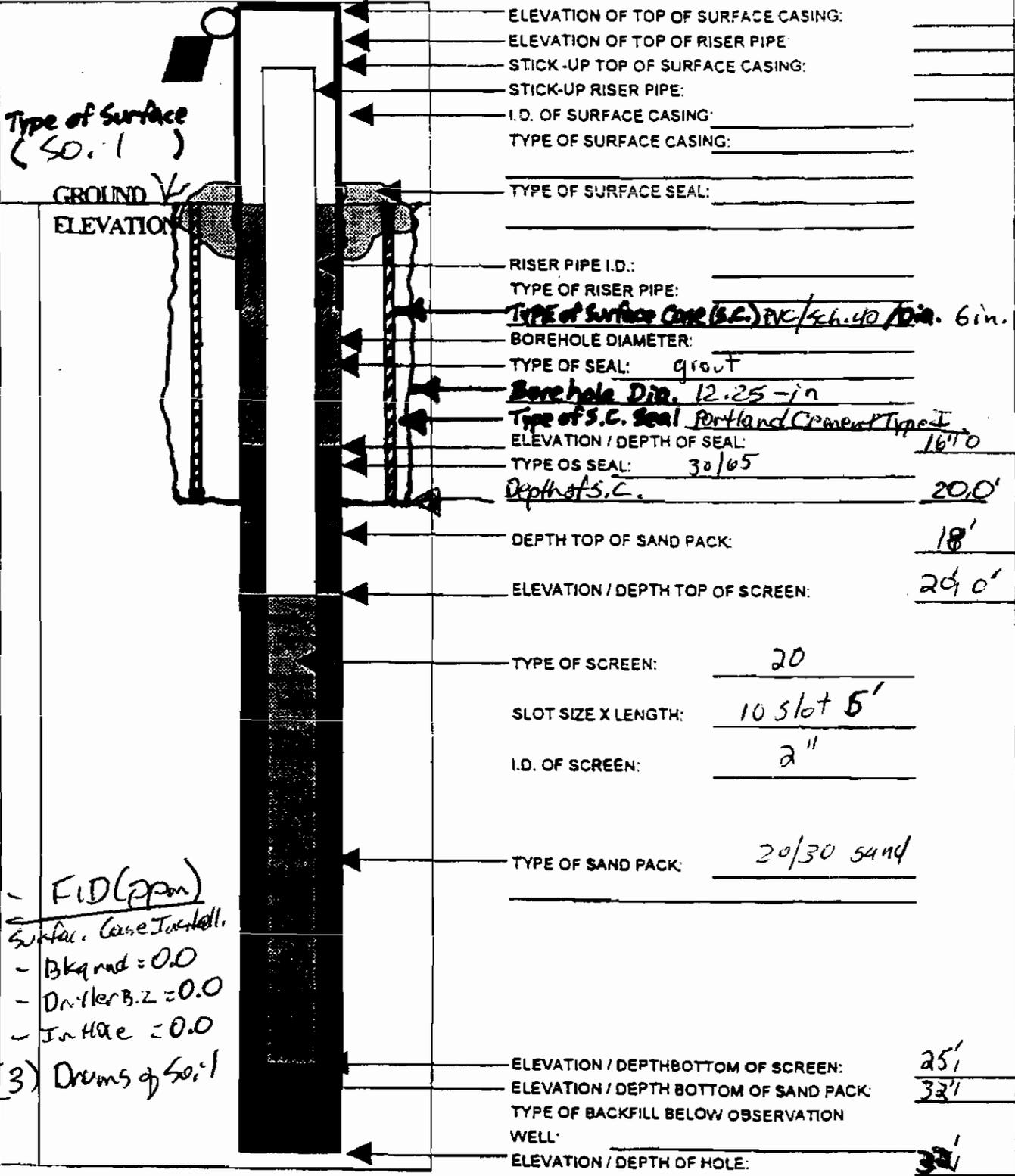
Converted to Well: Yes No Well I.D. #: _____

BORING NO. CNC 32 MW06D

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>Chas. Naval Complex</u>	LOCATION: <u>Site 32 / B. 501</u>	DRILLER <u>Cogdon Drilling</u>
PROJECT NO. <u>N0164</u>	BORING <u>CNC 32 - MW06D</u>	METHOD: <u>8.25 HSA</u>
ELEVATION _____	DATE <u>6/29/99</u>	DRILLING <u>Darrell Martin</u>
FIELD GEOLOGIST <u>Mark Darnington</u>	DEVELOPMENT: _____	

Logging Methods: Surface Casing: 8.25 HSA (Inner Casing)



Type of Surface (S.C.)

GROUND ELEVATION

- FID (ppm)
- Surface Case: Tacbell
- Bkgnd = 0.0
- Driller B.Z. = 0.0
- In Hole = 0.0

5C. (3) Drums of Soil
6/29/99

APPENDIX C

FIELD SAMPLING DATA SHEETS

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: <u>Zone C Site 32</u>	Sample ID No.: <u>32GLM0101</u>
Project No.: <u>ND164 Bldg 54</u>	Sample Location: <u>CNC32.mw1</u>
<input type="checkbox"/> Domestic Well Data <input type="checkbox"/> Monitoring Well Data <input type="checkbox"/> Other Well Type: <input type="checkbox"/> QA Sample Type:	Sampled By: <u>JA/OA</u>
	C.O.C. No.:
	Type of Sample:
	<input type="checkbox"/> Low Concentration <input type="checkbox"/> High Concentration

SAMPLING DATA:									
Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other	
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA	
<u>8 5 99</u>									
Time: <u>0930</u>									
Method: <u>Low Flow</u>									

PURGE DATA:									
Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other	
	Initial								
<u>8 5 99</u>									
Method: <u>~</u>									
Monitor Reading (ppm):	1	<u>5.87</u>	<u>.255</u>	<u>24.3</u>	<u>φ</u>	<u>.75</u>			
Well Casing Diameter & Material	2	<u>5.89</u>	<u>.261</u>	<u>24.3</u>	<u>φ</u>	<u>.66</u>			
Type: <u>2"</u>	3	<u>5.84</u>	<u>.260</u>	<u>24.1</u>	<u>φ</u>	<u>.77</u>			
Total Well Depth (TD): <u>13.28</u>									
Static Water Level (WL): <u>6.46</u>									
One Casing Volume(gal/L): <u>1.09</u>									
Start Purge (hrs): <u>0836</u>									
End Purge (hrs): <u>0930</u>									
Total Purge Time (min):									
Total Vol. Purged (gal/L):									

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
<u>BTEX/EDB</u>	<u>HCl</u>	<u>3 x 40ml</u>	
<u>PAH</u>	<u>—</u>	<u>2 x 1 ltr.</u>	
<u>Anions</u>	<u>—</u>	<u>1 plastic</u>	

OBSERVATIONS / NOTES:

13.28
6.46
6.82 x .16 = 1.09

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

GROUNDWATER SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: <u>Zone C Site 32</u> Project No.: <u>N0164</u> <u>Bldg. 54</u> <input type="checkbox"/> Domestic Well Data <input type="checkbox"/> Monitoring Well Data <input type="checkbox"/> Other Well Type: _____ <input type="checkbox"/> QA Sample Type: _____	Sample ID No.: <u>32GLMΦ2Φ1</u> Sample Location: <u>CNC 32 MW 1</u> Sampled By: <u>JA/RA</u> C.O.C. No.: _____ Type of Sample: <input type="checkbox"/> Low Concentration <input type="checkbox"/> High Concentration
--	---

SAMPLING DATA:									
Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other	
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA	
<u>8 5 99</u>									
Time: <u>8:30 09:35</u>									
Method: <u>Low Flow</u>									

PURGE DATA:									
Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other	
	Initial								
<u>8 5 99</u>									
Method:									
Monitor Reading (ppm):	1	<u>5.86</u>	<u>.314</u>	<u>25.5</u>	<u>Φ</u>	<u>1.02</u>	<u>—</u>		
Well Casing Diameter & Material	2	<u>5.82</u>	<u>.309</u>	<u>25.6</u>	<u>Φ</u>	<u>1.18</u>	<u>—</u>		
Type: <u>2"</u>	3	<u>5.82</u>	<u>.310</u>	<u>25.6</u>	<u>Φ</u>	<u>0.95</u>	<u>—</u>		
Total Well Depth (TD): <u>13.10</u>									
Static Water Level (WL): <u>6.44</u>									
One Casing Volume(gal/L): <u>1.07</u>									
Start Purge (hrs): <u>0840</u>									
End Purge (hrs): <u>0935</u>									
Total Purge Time (min):									
Total Vol. Purged (gal/L):									

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
<u>STEX/EDR</u>	<u>Hel</u>	<u>3 x 40 ml</u>	
<u>PAH</u>	<u>—</u>	<u>2 x 1ltr.</u>	
<u>Anions</u>	<u>—</u>	<u>1 x 1 plastic</u>	

OBSERVATIONS / NOTES:

$$\begin{array}{r} 13.10 \\ - 6.44 \\ \hline 6.66 = 1.06 \end{array}$$

Circle if Applicable:	Signature(s):
MS/MSD Duplicate ID No.:	_____

GROUNDWATER SAMPLE LOG SHEET

Page of

Project Site Name: <u>Zone C Site 32</u> Project No.: <u>NO164 Bldg 54</u> <input type="checkbox"/> Domestic Well Data <input type="checkbox"/> Monitoring Well Data <input type="checkbox"/> Other Well Type: _____ <input type="checkbox"/> QA Sample Type: _____	Sample ID No.: <u>329LM0301</u> Sample Location: <u>CPC 32 MW3</u> Sampled By: _____ C.O.C. No.: _____ Type of Sample: <input type="checkbox"/> Low Concentration <input type="checkbox"/> High Concentration
--	---

SAMPLING DATA:									
Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other	
Time:	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA	
<u>8 4 98</u>									
<u>1635</u>									
Method:									

PURGE DATA:								
Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method:	Initial	<u>5.86</u>	<u>.817</u>	<u>26.6</u>	<u>0</u>	<u>1.0</u>		
Monitor Reading (ppm):	1	<u>5.84</u>	<u>.752</u>	<u>26.0</u>	<u>0</u>	<u>1.0</u>		
Well Casing Diameter & Material	2	<u>5.82</u>	<u>.714</u>	<u>25.7</u>	<u>0</u>	<u>0.6</u>		
Type:	3	<u>5.84</u>	<u>.691</u>	<u>25.4</u>	<u>0</u>	<u>1.75</u>		
Total Well Depth (TD):	<u>13.04</u>							
Static Water Level (WL):	<u>6.82</u>							
One Casing Volume(gal/L):								
Start Purge (hrs):	<u>1455</u>							
End Purge (hrs):	<u>1642</u>							
Total Purge Time (min):	<u>107</u>							
Total Vol. Purged (gal/L):	<u>-3 gal</u>							

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
<u>BTEX/EPB</u>		<u>3 x 40ml</u>	
<u>PAH</u>		<u>2 1ltr.</u>	

OBSERVATIONS / NOTES:

13.04
6.82

6.22

Circle if Applicable:		Signature(s):
<input type="checkbox"/> MS/MSD	Duplicate ID No.:	

GROUNDWATER SAMPLE LOG SHEET

Page of

Project Site Name: <u>Zone C Site 32</u>	Sample ID No.: <u>329LM0301</u>
Project No.: <u>ND164 Bldg 54</u>	Sample Location: <u>32MW4</u>
<input type="checkbox"/> Domestic Well Data	Sampled By: _____
<input type="checkbox"/> Monitoring Well Data	C.O.C. No.: _____
<input type="checkbox"/> Other Well Type: _____	Type of Sample:
<input type="checkbox"/> QA Sample Type: _____	<input type="checkbox"/> Low Concentration
	<input type="checkbox"/> High Concentration

SAMPLING DATA:

Date: <u>8/4/98</u>	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: <u>1630</u>	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method:								

PURGE DATA:

Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method:	Initial	<u>5.99</u>	<u>187</u>	<u>26.2</u>	<u>0</u>	<u>0.61</u>		
Monitor Reading (ppm):	1	<u>6.39</u>	<u>.188</u>	<u>25.3</u>	<u>0</u>	<u>1.15</u>		
Well Casing Diameter & Material	2	<u>6.06</u>	<u>.192</u>	<u>25.2</u>	<u>0</u>	<u>1.06</u>		
Type:	3	<u>5.99</u>	<u>.186</u>	<u>25.6</u>	<u>0</u>	<u>1.09</u>		
Total Well Depth (TD): <u>13.25</u>								
Static Water Level (WL): <u>5.98</u>								
One Casing Volume(gal/L):								
Start Purge (hrs): <u>1457</u>								
End Purge (hrs): <u>1627</u>								
Total Purge Time (min): <u>90</u>								
Total Vol. Purged (gal/L): <u>~3.5</u>								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
<u>BTEX/EDB</u>	<u>HCl</u>	<u>3 x 40ml</u>	
<u>PAH</u>	<u>-</u>	<u>2 x 1ltr.</u>	

OBSERVATIONS / NOTES:

13.04 13.25
6.82 5.98
6.22 7.27

Circle if Applicable:	Signature(s):
<input type="checkbox"/> MS/MSD Duplicate ID No.: _____	

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: <u>Zone C Site 32</u> Project No.: <u>ND164 Bldg 54</u> <input type="checkbox"/> Domestic Well Data <input type="checkbox"/> Monitoring Well Data <input type="checkbox"/> Other Well Type: <input type="checkbox"/> QA Sample Type:	Sample ID No.: <u>32GLM0501</u> Sample Location: <u>CNC 32 mws</u> Sampled By: <u>JA/DA</u> C.O.C. No.: Type of Sample: <input type="checkbox"/> Low Concentration <input type="checkbox"/> High Concentration
--	--

SAMPLING DATA:								
Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Date: <u>8 5 99</u>								
Time: <u>09:20</u>								
Method: <u>Low Flow</u>								

PURGE DATA:								
Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
	Initial							
Date: <u>8 5 99</u>								
Method:	Initial	<u>5.74</u>	<u>.150</u>	<u>24.4</u>	<u>0</u>	<u>6.78</u>		
Monitor Reading (ppm):	1	<u>5.92</u>	<u>.152</u>	<u>24.5</u>	<u>0</u>	<u>1.15</u>		
Well Casing Diameter & Material	2	<u>5.80</u>	<u>.154</u>	<u>24.6</u>	<u>0</u>	<u>1.08</u>		
Type: <u>2"</u>	3	<u>5.89</u>	<u>.155</u>	<u>24.6</u>	<u>0</u>	<u>4.92</u>		
Total Well Depth (TD): <u>13.40</u>								
Static Water Level (WL): <u>6.82</u>								
One Casing Volume(gal/L): <u>1.05</u>								
Start Purge (hrs): <u>08 38</u>								
End Purge (hrs): <u>09 20</u>								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
<u>BTEX/EDB</u>	<u>HCl</u>	<u>3 x 40ml</u>	
<u>PAH</u>	<u>—</u>	<u>2 x 1 Ltr.</u>	
<u>Anions</u>	<u>—</u>	<u>1 x plastic</u>	

OBSERVATIONS / NOTES:

$$\begin{array}{r} 2.131 \\ 18.40 \\ \hline 6.82 \\ 6.58 \times .16 = 1.05 \end{array}$$

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

GROUNDWATER SAMPLE LOG SHEET

Page of

Project Site Name:	<u>Zone C Site 32</u>	Sample ID No.:	<u>32GLM0601</u>
Project No.:	<u>ND164 Bldg 54</u>	Sample Location:	<u>(NC32mw01)</u>
<input type="checkbox"/> Domestic Well Data		Sampled By:	<u>JA</u>
<input type="checkbox"/> Monitoring Well Data		C.O.C. No.:	_____
<input type="checkbox"/> Other Well Type:	_____	Type of Sample:	<input type="checkbox"/> Low Concentration
<input type="checkbox"/> QA Sample Type:	_____		<input type="checkbox"/> High Concentration

SAMPLING DATA:									
Date:	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other	
Time:	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA	
<u>8 21 99</u>									
<u>1557</u>									
Method:									

PURGE DATA:									
Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other	
<u>8 21 99</u>	Initial	<u>7.35</u>	<u>1.21</u>	<u>23.3</u>	<u>999</u>	<u>0.77</u>			
Method:	1	<u>7.24</u>	<u>1.27</u>	<u>23.3</u>	<u>703</u>	<u>1.43</u>			
Monitor Reading (ppm):	2	<u>7.20</u>	<u>1.25</u>	<u>23.3</u>	<u>95</u>	<u>2.65</u>			
Well Casing Diameter & Material									
Type:	<u>2.25</u>	<u>7.13</u>	<u>1.31</u>	<u>24.7</u>	<u>65</u>	<u>1.99</u>			
Total Well Depth (TD): 27.0	<u>24.96</u>	<u>7.16</u>	<u>1.53</u>	<u>24.3</u>	<u>10</u>	<u>0.98</u>			
Static Water Level (WL): 13.7	<u>10.92</u>								
One Casing Volume(gal/L):	<u>3.744</u>								
Start Purge (hrs):	<u>1412</u>								
End Purge (hrs):	<u>1557</u>								
Total Purge Time (min):									
Total Vol. Purged (gal/L):	<u>~12</u>								

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
<u>BTEX/EDB</u>	<u>HCl</u>	<u>3 x 40ml</u>	
<u>PAH</u>	<u>-</u>	<u>2 x 1Lr.</u>	

OBSERVATIONS / NOTES:

<u>24.96</u>	<u>252</u>	<u>17.84</u>
<u>10.12</u>	<u>14.84</u>	<u>+.6</u>
<u>4</u>	<u>.16</u>	
	<u>18904</u>	
	<u>14840</u>	
	<u>3.744</u>	

Circle if Applicable:	Signature(s):				
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">MS/MSD</td> <td style="width: 50%;">Duplicate ID No.:</td> </tr> <tr> <td></td> <td style="text-align: center;"><u>3.744</u></td> </tr> </table>	MS/MSD	Duplicate ID No.:		<u>3.744</u>	
MS/MSD	Duplicate ID No.:				
	<u>3.744</u>				



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

A

Tetra Tech NUS, Inc.

Page 1 of 1

Project Site Name: <u>Zone C Site 32</u>	Sample ID No.: <u>32GLM0201</u>
Project No.: <u>ND164 Bldg 54</u>	Sample Location: <u>CNC32M02</u>
Sampled By: <u>DRA/SA</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>DRA/SA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): 	

SAMPLING DATA:

Date:	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 1-10 mg/L) Analysis Time: 1045

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	1-5 mg/L	200 ml	0.200 N	0.01		x 0.01	= mg/L
<input type="checkbox"/>	2-10 mg/L	100 ml	0.200 N	0.02		x 0.02	= mg/L

CHEMetrics: 3 mg/L

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1053

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	10-40 mg/L	100 ml	0.1600 N	0.1	&	x 0.1	= mg/L
<input checked="" type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	& <u>200</u>	x 0.4	= <u>80</u> mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	&	x 1.0	= mg/L
<input type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	&	x 2.0	= mg/L
<input type="checkbox"/>	500-2000 mg/L	20 ml	1.600 N	5.0	&	x 5.0	= mg/L
<input type="checkbox"/>	1000-4000 mg/L	10 ml	1.600 N	10.0	&	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:			

CHEMetrics: _____ mg/L

Notes:

Standard Additions: Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1101

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input checked="" type="checkbox"/>	10-50 mg/L	200 ml	0.3636 N	0.1	30	x 0.1	= mg/L
<input checked="" type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2	<u>361</u>	x 0.2	= <u>72.2</u> mg/L
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0		x 1.0	= mg/L
<input type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0		x 2.0	= mg/L

CHEMetrics: _____ mg/L

Notes:

Standard Additions: Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

(A)

Tetra Tech NUS, Inc.

Page 1 of 2

Project Site Name: <u>Zone C Site 32</u>	Sample ID No.: <u>32GLM241</u>
Project No.: <u>NO164 Bldg 54</u>	Sample Location: <u>CNC32M2</u>
Sampled By: <u>DRA/JA</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>DRA/JA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <input type="checkbox"/>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn²⁺):

Equipment: DR-700	DR-8 __	HACH MN-5	Other: _____	Analysis Time: <u>1126</u>
Program/Module: 525nm	41			
Concentration: <u>0.4</u> mg/L				Filtered: <input type="checkbox"/>
				Digestion: <input type="checkbox"/>
Standard Solution: <input type="checkbox"/>	Results: _____			Reagent Blank Correction: <input type="checkbox"/>
Standard Additions: <input type="checkbox"/>	Digits Required: 0.1ml: _____	0.2ml: _____	0.3ml: _____	

Notes: _____

Ferrous Iron (Fe²⁺):

Equipment: DR-700	DR-8 __	IR-18C Color Wheel	Other: _____	Analysis Time: <u>1202</u>
Program/Module: 500nm	33			
Concentration: <u>0.23</u> mg/L				Filtered: <input type="checkbox"/>

Notes: _____

Hydrogen Sulfide (H₂S):

Equipment: HS-C	Other: _____	Analysis Time: _____
Concentration: _____ mg/L	Exceeded 5.0 mg/L range on color chart: <input type="checkbox"/>	

Notes: _____

QA/QC Checklist:

All data fields have been completed as necessary:

Correct measurement units are cited in the SAMPLING DATA block:

Multiplication is correct for each *Multiplier* table:

Final calculated concentration is within the appropriate *Range Used* block:

Alkalinity *Relationship* is determined appropriately as per manufacturer instructions:

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents:

Nitrite Interference treatment used for Nitrate test if Nitrite was detected:

Title block is initialized by person who performed the QA/QC Checklist:



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

A

Tetra Tech NUS, Inc.

Page 2 of 2

Project Site Name: <u>Zone C Site 32</u>	Sample ID No.: <u>32GLM 6201</u>
Project No.: <u>NO164 Bldg 54</u>	Sample Location: <u>CNC 32 MW2</u>
Sampled By: <u>DRA/TA</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>DRA/TA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <input type="checkbox"/>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S²⁻):

Equipment: DR-700	DR-8 __	HS-C Color Chart	HS-WR Color Wheel	Analysis Time: <u>1150</u>
Program/Module: 610nm	93		Other: _____	

Concentration: 0.01 mg/L Filtered:

Notes: _____

Sulfate (SO₄²⁻):

Equipment: DR-700	DR-8 __	Other: _____	Analysis Time: _____
Program/Module: _____	91		

Concentration: _____ mg/L Filtered:

Standard Solution: Results: _____

Standard Additions: Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____

Notes: _____

Nitrite (NO₂⁻-N):

Equipment: DR-700	DR-8 __	Other: _____	Analysis Time: <u>1223</u>
Program/Module: _____	60		Filtered: <input type="checkbox"/>

Concentration: 0.130 mg/L Reagent Blank Correction:

Standard Solution: Results:

Notes: _____

Nitrate (NO₃⁻-N):

Equipment: DR-700	DR-8 __	Other: _____	Analysis Time: _____
Program/Module: _____	55		Filtered: <input type="checkbox"/>

Concentration: _____ mg/L Nitrite Interference Treatment:

Standard Solution: Results: _____ Reagent Blank Correction:

Standard Additions: Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____

Notes: _____



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS



Tetra Tech NUS, Inc.

Page of

Project Site Name: <u>Zoo C Site 32</u>	Sample ID No.: <u>32GLM0101</u>
Project No.: <u>N0164</u> Bldg <u>54</u>	Sample Location: <u>CNE 32MW1</u>
Sampled By: <u>DLA/JA</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>" "</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): 	

SAMPLING DATA:								
Date:	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 1-10 mg/L) Analysis Time: 1046

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	1-5 mg/L	200 ml	0.200 N	0.01		x 0.01	= mg/L
<input type="checkbox"/>	2-10 mg/L	100 ml	0.200 N	0.02		x 0.02	= mg/L

CHEMetrics: 2 mg/L

Notes:

Alkalinity:

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: mg/L) Analysis Time: 1054

Filtered:

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	= mg/L
<input checked="" type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & <u>190</u>	x 0.4	= <u>76</u> mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	_____ & _____	x 1.0	= mg/L
<input type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	= mg/L
<input type="checkbox"/>	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	= mg/L
<input type="checkbox"/>	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:			

CHEMetrics: mg/L

Notes:

Standard Additions: Titrant Molarity: Digits Required: 1st.: 2nd.: 3rd.:

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: mg/L) Analysis Time: 1102

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	10-50 mg/L	200 ml	0.3636 N	0.1		x 0.1	= mg/L
<input checked="" type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2	<u>340</u>	x 0.2	= <u>68</u> mg/L
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0		x 1.0	= mg/L
<input type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0		x 2.0	= mg/L

CHEMetrics: mg/L

Notes:

Standard Additions: Titrant Molarity: Digits Required: 1st.: 2nd.: 3rd.:



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

B

Tetra Tech NUS, Inc.

Page of

Project Site Name: <u>Zone C Site 32</u>	Sample ID No.: <u>32GLM0101</u>
Project No.: <u>NO164 Bldg 54</u>	Sample Location: <u>CALC 32 m w/</u>
Sampled By: <u>DRA/TA</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u> </u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): 	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S²⁻):

Equipment: DR-700	DR-8 <u> </u>	HS-C Color Chart	HS-WR Color Wheel	Analysis Time: <u>1157</u>
Program/Module: 610nm	93	Other: <u> </u>		

Concentration: 0.02 mg/L Filtered:

Notes:

Sulfate (SO₄²⁻):

Equipment: DR-700	DR-8 <u> </u>	Other: <u> </u>	Analysis Time: <u> </u>
Program/Module: <u> </u>	91	Other: <u> </u>	

Concentration: mg/L Filtered:

Standard Solution: Results:

Standard Additions: Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes:

Nitrite (NO₂⁻-N):

Equipment: DR-700	DR-8 <u> </u>	Other: <u> </u>	Analysis Time: <u>1156 1223</u>
Program/Module: <u> </u>	60	Other: <u> </u>	

Concentration: 0.100 mg/L Filtered: DRA

Reagent Blank Correction:

Standard Solution: Results:

Notes:

Nitrate (NO₃⁻-N):

Equipment: DR-700	DR-8 <u> </u>	Other: <u> </u>	Analysis Time: <u> </u>
Program/Module: <u> </u>	55	Other: <u> </u>	

Concentration: mg/L Filtered:

Nitrite interference Treatment:

Reagent Blank Correction:

Standard Solution: Results:

Standard Additions: Digits Required: 0.1ml: 0.2ml: 0.3ml:

Notes:



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page of



Project Site Name: DRA Zone C Sample ID No.: 32GLM0501
 Project No.: NO164 Bldg 54 Sample Location: ~~S233~~ CNC32MWS
 Sampled By: DRA JA Duplicate: DRA
 Field Analyst: DRA JA Blank:
 Field Form Checked as per QA/QC Checklist (initials):

SAMPLING DATA:

Date:	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:
 Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 1-10 mg/L) Analysis Time: 1047

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	1-5 mg/L	200 ml	0.200 N	0.01		x 0.01	= mg/L
<input type="checkbox"/>	2-10 mg/L	100 ml	0.200 N	0.02		x 0.02	= mg/L

CHEMetrics: 2 mg/L

Notes: _____

Alkalinity:
 Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1055
 Filtered:

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	= mg/L
<input checked="" type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & <u>100</u>	x 0.4	= <u>40</u> mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	_____ & _____	x 1.0	= mg/L
<input type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	= mg/L
<input type="checkbox"/>	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	= mg/L
<input type="checkbox"/>	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:			

CHEMetrics: _____ mg/L

Notes: _____

Standard Additions: Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____

Carbon Dioxide:
 Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1103

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input type="checkbox"/>	10-50 mg/L	200 ml	0.3636 N	0.1		x 0.1	= mg/L
<input checked="" type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2	<u>2.5</u>	x 0.2	= <u>43</u> mg/L
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0		x 1.0	= mg/L
<input type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0		x 2.0	= mg/L

CHEMetrics: _____ mg/L

Notes: _____

Standard Additions: Titrant Molarity: _____ Digits Required: 1st.: _____ 2nd.: _____ 3rd.: _____



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

(C)

Tetra Tech NUS, Inc.

Page of

Project Site Name: <u>Zoo C Site 32</u>	Sample ID No.: <u>32 GLM0501</u>
Project No.: <u>ND164 Bldg 54</u>	Sample Location: <u>CNC 32 MWS</u>
Sampled By: <u>DRA (JA)</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u> " "</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <input type="checkbox"/>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn²⁺):

Equipment: DR-700 DR-8 __ HACH MN-5 Other: _____ Analysis Time: 11 28

Program/Module: 525nm 41

Concentration: 0.0 mg/L Filtered:

Standard Solution: Results: _____ Digestion:

Standard Additions: Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____ Reagent Blank Correction:

Notes: _____

Ferrous Iron (Fe²⁺):

Equipment: DR-700 DR-8 __ IR-18C Color Wheel Other: _____ Analysis Time: 12 44

Program/Module: 500nm 33

Concentration: 0.66 mg/L Filtered:

Notes: _____

Hydrogen Sulfide (H₂S):

Equipment: HS-C Other: _____ Analysis Time: _____

Concentration: _____ mg/L Exceeded 5.0 mg/L range on color chart:

Notes: _____

QA/QC Checklist:

All data fields have been completed as necessary:

Correct measurement units are cited in the SAMPLING DATA block:

Multiplication is correct for each *Multiplier* table:

Final calculated concentration is within the appropriate *Range Used* block:

Alkalinity *Relationship* is determined appropriately as per manufacturer instructions:

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents:

Nitrite Interference treatment used for Nitrate test if Nitrite was detected:

Title block is initialized by person who performed the QA/QC Checklist:

APPENDIX D

SOIL AND GROUNDWATER LABORATORY ANALYTICAL DATA



September 14, 1999

Mr. Paul Calligan

Tetra Tech Nus

1401 Oven Park Dr., Suite 102

Tallahassee, FL 32308

RE: Katahdin Lab Number: WP3543
Project ID: CNC Charleston
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date(s): 8/6/99

Dear Mr. Calligan:

Please find enclosed the following information:

- * Report of Analysis
- * Quality Control Data Summary
- * Chain of Custody
- * Confirmation

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. This cover letter is an integral part of the ROA.

We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Sincerely,

KATAHDIN ANALYTICAL SERVICES

Mary S. Manell
Authorized Signature

9.14.99
Date



**SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECHNUS
CASE CNC CHARLESTON**

Sample Receipt

The following samples were received on August 6, 1999 and were logged in under Katahdin Analytical Services work order number WP3543 for a hardcopy due date of September 5, 1999.

<u>Sample No.</u>	<u>Sample Identification</u>
KATAHDIN WP3543-1	TTNUS 32GLM0101
WP3543-2	32GLM0101D
WP3543-3	32GLM0201
WP3543-4	32GLM0501
WP3543-5	32TL00201

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

Five aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on August 6, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this workorder were performed on the 5970-Q instrument. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ppb.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. No matrix spike/matrix spike duplicate was performed on any sample in this workorder.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.



Semivolatile Organics Analysis

Four aqueous samples were received by Katahdin Analytical Services laboratory on August 6, 1999 for analysis in accordance with 8270C for a client specified PAH list of analytes.

Extraction of the samples occurred following USEPA method 3510 on August 11, 1999. A laboratory control spike, consisting of all PAH analytes spiked into organic free water, was extracted in the batch, along with a matrix spike/matrix spike duplicate pair on sample WP3543-2.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

For work order WP3543 analyses for Nitrate (E300) and Sulfate (E300) were performed according to the U.S. EPA "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA 600/R-93/100, August 1993. All samples were run within laboratory hold time.

The wet chemistry staff noted no protocol deviations.

0000003

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
 Tel. (207) 874-2400
 Fax (207) 775-4029

LAB (WORK ORDER) # WP 3543

PAGE: 1 OF 1

COOLER: 1 OF 1

COC# _____

SDG# _____

DATE / TIME RECEIVED: 8-6-99 0915

DELIVERED BY: FedEx

RECEIVED BY: SA

LIMS ENTRY BY: SA

LIMS REVIEW BY / PM: MS

CLIENT: TetraTech

PROJECT: _____

mm

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>0.6</u>	<u>called client on 8/6/99</u>
6. SAMPLES RECEIVED AT 4°C +/- .27 ICE / ICE PACKS PRESENT (Y or N)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		

13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP NEESC ACOE AFCEE OTHER (STATE OF ORIGIN): SC

LOG-IN NOTES⁽¹⁾: 1 of 2 PAH bottles for sample 326LM0501 arrived broken - called client on 8/6/99
we should have sufficient volume. KAP 8/6/99

⁽¹⁾ Use this report and additional sheets if necessary) to document samples that are received broken, compromised, C-O-C discrepancies, radiation checks, residual chlorine check, residual pH check if rec... If samples required pH adjustment, record volume and type of preservative added.



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-3543-1
Report Date: 09/14/99
PO No. : N7912-P99264
Project : CIO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 1 of 4

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY			SAMPLED DATE RECEIVED		
32GLM0101	Aqueous	J. ALEXANDER			08/05/99	08/06/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Nitrogen, Nitrate (as N)	0.36	mg/L	1.0	0.050	E300	08/06/99 CF	
Sulfate (as SO4)	32.	mg/L	2.0	1.0	E300	08/24/99 CF	

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

09/14/99

LJO/baekp(dw)/msm
PH06N3W1

0000004

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

ORDER NO WP-3543

Project Manager: Andrea J. Colby

RT TO: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 08/06/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 05 SEP

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 FOSTER PLAZA 7, 661 ANDERSEN DR.
 PITTSBURGH, PA 15220

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: J. ALEXANDER

DELIVERED BY: FEDEX

DISPOSE: AFTER 05 SEP

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3543-1	32GLM0101	05 AUG 0930	06 AUG	AQ
	WP3543-2	32GLM0101D	05 AUG		
	WP3543-3	32GLM0201	05 AUG 0935		
	WP3543-4	32GLM0501	05 AUG 0920		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	4	75.00	300.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	4	125.00	500.00
Nitrogen, Nitrate (as N)	E300	4	30.00	120.00
Sulfate (as SO4)	E300	4	0.00	0.00
GC Subcontract		4	95.00	380.00

TOTALS		4	325.00	1300.00
--------	--	---	--------	---------

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2 WP3543-5	32TL00201	05 AUG 1730	06 AUG	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	75.00	75.00

ORDER NOTE: QC-IV NFESC
 DD(KAS007QC-DB3)
 CNC CHARLESTON

FINAL PAGE

KAP 8/6/99

COPIES: With Report

TOTAL ORDER AMOUNT \$1,375.00

This is NOT an Invoice

BKR/KP/WEST.KP(dw)

08-06 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

0000038



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3543-1
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0101	AQ	8/5/99	8/6/99	8/11/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	53	%	1.0		
2-FLUOROBIPHENYL	52	%	1.0		
TERPHENYL-D14	78	%	1.0		

Report Notes:

0000005



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Owen Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3543-1
 SDG: WP3543
 Report Date: 9/13/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: SW8260
 Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0101	AQ	8/5/99	8/6/99	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	85	%	1.0		
2-DICHLOROETHANE-D4	76	%	1.0		
TOLUENE-D8	96	%	1.0		
P-BROMOFLUOROBENZENE	91	%	1.0		

Report Notes:

000006



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-3543-2
Report Date: 09/14/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 2 of 4

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY			SAMPLED DATE RECEIVED			
32GLM0101D	Aqueous	J. ALEXANDER			08/05/99	08/06/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Nitrogen, Nitrate (as N)	<0.050	mg/L	1.0	0.050	E300	08/06/99	CF	
Sulfate (as SO4)	29.	mg/L	2.0	1.0	E300	08/14/99	CF	

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

09/14/99

LJO/baebae/msm
PH06N3W1

0000007



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3543-2
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0101D	AQ	8/5/99	8/6/99	8/11/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PERYLENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	56	%	1.0		
2-FLUOROBIPHENYL	57	%	1.0		
TERPHENYL-D14	74	%	1.0		

Report Notes:

0000008



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3543-2
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0101D	AQ	8/5/99	8/6/99	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	87	%	1.0		
1,2-DICHLOROETHANE-D4	79	%	1.0		
TOLUENE-D8	97	%	1.0		
P-BROMOFLUOROBENZENE	90	%	1.0		

Report Notes:

000009



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-3543-3
Report Date: 09/14/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 3 of 4

SAMPLE DESCRIPTION	MATRIX		SAMPLED BY			SAMPLED DATE RECEIVED		
32GLM0201	Aqueous		J. ALEXANDER			08/05/99	08/06/99	
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Nitrogen, Nitrate (as N)	0.65	mg/L	1.0	0.050	E300	08/06/99	CF	
Sulfate (as SO4)	34.	mg/L	4.0	1.0	E300	08/14/99	CF	

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

09/14/99

LJO/baebae/msm
PH06N3W1

00000010



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
 Proj. ID: CNC CHARLESTON

Lab Number: WP3543-3
 SDG: WP3543
 Report Date: 9/13/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0201	AQ	8/5/99	8/6/99	8/11/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	57	%	1.0		
2-FLUOROBIPHENYL	59	%	1.0		
TERPHENYL-D14	64	%	1.0		

Report Notes:

0000011



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3543-3
SDG: WP3543
Report Date: 9/13/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0201	AQ	8/5/99	8/6/99	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	83	%	1.0		
M-1,2-DICHLOROETHANE-D4	80	%	1.0		
M-TOLUENE-D8	96	%	1.0		
P-BROMOFLUOROBENZENE	93	%	1.0		

Report Notes:

0000012

CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-3543-4
Report Date: 09/14/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 4 of 4

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED	
32GLM0501	Aqueous	J. ALEXANDER	08/05/99	08/06/99

PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Nitrogen, Nitrate (as N)	<0.050	mg/L	1.0	0.050	E300	08/06/99	CF	
Sulfate (as SO4)	20.	mg/L	2.0	1.0	E300	08/14/99	CF	

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.

09/14/99

LJO/baebae/msm
PH06N3W1

0000013



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3543-4
 SDG: WP3543
 Report Date: 9/13/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 8/16/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0501	AQ	8/5/99	8/6/99	8/11/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
YRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	49	%	1.0		
2-FLUOROBIPHENYL	53	%	1.0		
TERPHENYL-D14	60	%	1.0		

Report Notes:

0000014



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3543-4
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0501	AQ	8/5/99	8/6/99	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	84	%	1.0		
1,2-DICHLOROETHANE-D4	76	%	1.0		
TOLUENE-D8	98	%	1.0		
P-BROMOFLUOROBENZENE	94	%	1.0		

Report Notes:

0000015



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

nt: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP3543-5
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32TL00201	AQ	8/5/99	8/6/99	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	88	%	1.0		
DICHLOROETHANE-D4	80	%	1.0		
LUENE-D8	95	%	1.0		
P-BROMOFLUOROBENZENE	90	%	1.0		

Report Notes:

0000016

Karadhin Analytical Services, Inc.
Quality Control Report

Method Blank and Laboratory Control Sample Results

Client: Tetra Tech NUS

Work Order: WP3543

METHOD BLANK RESULTS

LABORATORY CONTROL SAMPLE RESULTS

Parameter	Date of Prep	Date of Analysis	Concentration			Practical Quantitation Level**	LABORATORY CONTROL SAMPLE RESULTS					
			Units	Measured in Blank	Acceptance Range		Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)
Nitrate-Nitrogen	06-Aug-99	06-Aug-99	mg/L	< 0.050	< 0.050	0.050	mg/L	2.5	2.36	94.4	80-120	
Sulfate	14-Aug-99	14-Aug-99	mg/L	< 1.0	< 1.0	1.0	mg/L	10	10.2	102.0	80-120	
	24-Aug-99	24-Aug-99	mg/L	< 1.0	< 1.0	1.0	mg/L	10	11.7	117.0	80-120	

** Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.

0000017

Katahdin Analytical Services, Inc.
Quality Control Report

Duplicate and Matrix Spike/Matrix Spike Duplicate Results

Client: Tetra Tech NUS
Work Order: WP3543

DUPLICATE RESULTS

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Parameter	Katahdin Sample No	<i>DUPLICATE RESULTS</i>					<i>MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS</i>										
		Units	Sample Measurements Rep 1	Sample Measurements Rep 2	Mean Conc	Acceptance Range for RPD	Concentration or Quantity Units	Sample Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Sample +Spike Dup 1	Sample +Spike Dup 2	Matrix Spike Recovery (%) Acceptance Range	RPD (%)	Acceptance Range (%)	
Nitrate - N	WP3543-4	mg/L	<0.050	<0.050	<0.050	0.0	0-20	mg/L	<0.050	2.0	1.75		87.5		75-125		0-20

RPD = Relative percent difference, which is the absolute value of the difference between two replicate results divided by the mean concentration then multiplied by 100%.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted. The laboratory does not use the sample duplicate and matrix spike acceptance ranges as acceptance criteria for a specific analysis. Sample duplicate and matrix spike data are used to evaluate method performance in the environmental sample matrix only. Please refer to LCS data for assessment of quality control for each parameter.

8100000

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;081199

Lab Name: Katahdin Analytical Services

SDG No.: WP3543

Lab File ID: Z1730

Lab Sample ID: SBLK;081199

Instrument ID: 5972-Z

Date Extracted: 8/11/99

GC Column: RTX-624 ID: 0.18 (mm)

Date Analyzed: 08/13/99

Matrix: (soil/water) WATER

Time Analyzed: 15:46

Level: (low/med) LOW

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCS;081199	LCS;081199	Z1731	8/13/99	4:32:00 PM
32GLM0101	WP3543-1	Z1732	8/13/99	5:20:00 PM
32GLM0101D	WP3543-2	Z1733	8/13/99	6:06:00 PM
32GLM0201	WP3543-3	Z1734	8/13/99	6:52:00 PM
32GLM0501	WP3543-4	Z1737	8/16/99	10:43:00 AM
32GLM0101DMS	WP3543-2MS	Z1738	8/16/99	11:30:00 AM
32GLM0101DMSD	WP3543-2MSD	Z1739	8/16/99	12:16:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

ent: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: SBLK;081199
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;081199	AQ	-	-	8/11/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
RENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	62	%	1.0		
2-FLUOROBIPHENYL	60	%	1.0		
TERPHENYL-D14	79	%	1.0		

Report Notes:

00000000

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: Z1731

Sample ID: LCS;081199

Date Run: 8/13/99

Analyst: KRT

Time Injected 4:32:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	30.9	*62	70-130
ACENAPHTHENE	50	32.9	*66	70-130
ACENAPHTHYLENE	50	33.7	*67	70-130
ANTHRACENE	50	38.6	77	70-130
BENZO[A]ANTHRACENE	50	36.2	72	70-130
BENZO[A]PYRENE	50	30.2	*60	70-130
BENZO[B]FLUORANTHENE	50	27.4	*55	70-130
BENZO[G,H,I]PERYLENE	50	29.7	*59	70-130
BENZO[K]FLUORANTHENE	50	34.7	*69	70-130
CHRYSENE	50	37.9	76	70-130
DIBENZ[A,H]ANTHRACENE	50	31.1	*62	70-130
FLUORANTHENE	50	36.6	73	70-130
FLUORENE	50	33.5	*67	70-130
INDENO[1,2,3-CD]PYRENE	50	36.0	72	70-130
NAPHTHALENE	50	31.0	*62	70-130
PHENANTHRENE	50	33.4	*67	70-130
PYRENE	50	35.9	72	70-130

* Out of Limits

1

0000021

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3543-2	Z1733	8/13/99	6:06:00 PM	KRT	AQ	8270_99
WP3543-2MS	Z1738	8/16/99	11:30:00 AM	KRT	AQ	8270_99
WP3543-2MSD	Z1739	8/16/99	12:16:00 PM	KRT	AQ	8270_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
CHRYSENE	0	50	50	34.3	32.6	68	65	60-140	5.1	30
ACENAPHTHENE	0	50	50	30.6	27.1	61	*54	60-140	12	30
ACENAPHTHYLENE	0	50	50	30.8	27.2	62	*54	60-140	12	30
ANTHRACENE	0	50	50	34.7	32.8	69	66	60-140	5.6	30
BENZO[A]ANTHRACENE	0	50	50	32.9	31.4	66	63	60-140	4.7	30
BENZO[A]PYRENE	0	50	50	27.7	26.3	*55	*52	60-140	5.2	30
BENZO[B]FLUORANTHENE	0	50	50	26.6	24.7	*53	*49	60-140	7.4	30
2-METHYLNAPHTHALENE	0	50	50	28.4	23.8	*57	*48	60-140	18	30
BENZO[K]FLUORANTHENE	0	50	50	30.6	29.4	61	*59	60-140	4.0	30
PYRENE	0	50	50	33.5	31.0	67	62	60-140	7.8	30
DIBENZ[A,H]ANTHRACENE	0	50	50	28.4	27.0	*57	*54	60-140	5.0	30
FLUORANTHENE	0	50	50	33.7	32.7	67	65	60-140	3.0	30
FLUORENE	0	50	50	30.4	28.0	61	*56	60-140	8.2	30
INDENO[1,2,3-CD]PYRENE	0	50	50	31.5	30.3	63	60	60-140	3.9	30
1-METHYLNAPHTHALENE	0	50	50	29.2	24.2	*58	*48	60-140	19	30
PERYLENE	0	50	50	30.3	29.3	60	*58	60-140	3.4	30
BENZO[G,H,I]PERYLENE	0	50	50	28.0	26.1	*56	*52	60-140	7.0	30

RPD = [(ms res - msd res) / (ms res + msd res) / 2] * 100

* Out of Limits

0000022
1

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBKQ13A

Lab Name: Katahdin Analytical Services

SDG No.: WP3543

Lab File ID: Q6291

Lab Sample ID: VBKQ13A

Date Analyzed: 08/13/99

Time Analyzed: 11:30

GC Column: RTX-502 ID: 0.53 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5970-Q

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSQ13A	LCSQ13A	Q6290	8/13/99	10:40:00 AM
32GLM0101	WP3543-1	Q6292	8/13/99	12:25:00 PM
32GLM0101D	WP3543-2	Q6293	8/13/99	1:03:00 PM
32GLM0201	WP3543-3	Q6294	8/13/99	1:42:00 PM
32GLM0501	WP3543-4	Q6295	8/13/99	2:21:00 PM
32TL00201	WP3543-5	Q6296	8/13/99	3:00:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKQ13A
SDG: WP3543
Report Date: 9/13/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/13/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKQ13A	AQ	-	-	8/13/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	89	%	1.0		
1,1-DICHLOROETHANE-D4	81	%	1.0		
1,1-DICHLOROETHANE-D8	94	%	1.0		
P-BROMOFLUOROBENZENE	93	%	1.0		

Report Notes:

0000024

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Q6290

Sample ID: LCSQ13A

Date Run: 8/13/99

Analyst: KMC

Time Injected 10:40:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	57.0	114	60-140
BENZENE	50	57.4	115	60-140
ETHYLBENZENE	50	57.3	115	60-140
MTBE	50	51.8	104	60-140
NAPHTHALENE	50	53.7	107	60-140
TOLUENE	50	57.0	114	60-140
TOTAL XYLENES	150	160	107	60-140

* Out of Limits

1

0000025



ENSR
Air Toxics Specialty Laboratory
42 Nagog Park
Acton, MA 01720

DATE: August 31, 1999

TO: Andrea Colby
Katahdin Analytical
340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098

Re: Organic Analyses of Aqueous Samples by Gas Chromatography Flame
Ionization Detection (GC/FID)

PROJECT #: **8601-008-200**

LAB ID #: **990139**

ANALYTICAL PROCEDURE:

Four (4) aqueous samples were analyzed under the guidelines of EPA SW846 Method 3810.

A Hewlett Packard 5890 series II gas chromatograph (GC) equipped with a Hewlett Packard flame ionization detector (FID) was used for the analysis. A 1.0 mL headspace aliquot of each sample was injected into the column for analysis. The operating conditions of the GC/FID are listed in Table 1. A five point calibration was performed for the target analyte (methane).

No problems occurred during sample receipt or log-in.

A laboratory blank was analyzed daily in the same manner as the samples. Target compounds were not present in the laboratory blank.

MS/MSD was performed on sample WP3492-5(08) / WP3492-5(05)

Date Samples Received by the Laboratory: 08/10/99

Date Analysis Started: 08/13/99

A:\990131\katrpt3.doc



TABLE 1
GC/FID OPERATING CONDITIONS

Instrument	Hewlett Packard 5890 Series II GC
Injector Temperature	195°C
Column	80/100 Carboxen 1004
Parameters	1/16" OD; stainless steel
Carrier Gas	UHP Helium
Flow Rate	16 ml/min
Detector	Flame Ionization Detector
Temperature	210°C
Temperature Program	Initial Temp: 135°C
	Hold: 0.0 min
	Ramping Rate: 20°C/min
	Final Temperature: 150°C
	Final Hold: 6.25 min
Data System	Turbochrom 4.1 software



340 County Road No. 5
 P.O. Box 720
 Westbrook, ME 04098
 Tel: (207) 874-2400
 Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page of

Client <i>Katahdin Analytical Services</i>	Contact <i>Andrew Collins</i>	Phone # () ()	Fax # () ()
---	----------------------------------	--------------------------	------------------------

City <i>above</i>	State	Zip Code
----------------------	-------	----------

Purchase Order #	Proj. Name / No.	Katahdin Quote #
------------------	------------------	------------------

Bill (if different than above)	Address
--------------------------------	---------

Sampler (Print / Sign)	Copies To:
------------------------	------------

LAB USE ONLY WORK ORDER #: <u> </u> KATAHDIN PROJECT MANAGER <u> </u> REMARKS: <u>Out to Field</u> SHIPPING INFO: <input checked="" type="checkbox"/> FED EX <input type="checkbox"/> UPS <input type="checkbox"/> CLIENT AIRBILL NO: <u> </u> TEMP°C <u> </u> <input type="checkbox"/> TEMP BLANK <input type="checkbox"/> INTACT <input type="checkbox"/> NOT INTACT	ANALYSIS AND CONTAINER TYPE PRESERVATIVES <table border="1" style="width:100%"> <tr> <th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th><th>Filt.</th> </tr> <tr> <td>YO</td><td>NO</td><td>YO</td><td>NO</td><td>YO</td><td>NO</td><td>YO</td><td>NO</td><td>YO</td><td>NO</td><td>YO</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>	Filt.	YO	NO	YO																													
Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.																								
YO	NO	YO	NO	YO	NO	YO	NO	YO	NO	YO																								

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.
	<i>W-1040-1</i>	<i>10/19/09</i>	<i>AG</i>	<i>1</i>	<i>X</i>								
	<i>W-1040-2</i>	<i>10/19/</i>	<i>↓</i>	<i>1</i>	<i>X</i>								
	<i>W-1040-3</i>	<i>10/19/09</i>	<i>↓</i>	<i>1</i>	<i>X</i>								
	<i>W-1040-4</i>	<i>10/19/09</i>	<i>↓</i>	<i>1</i>	<i>X</i>								
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											
	/	/											

COMMENTS: *QC-II / PECO W-1040-1-4 (B&C) Results Due: 10/19*

Relinquished By: (Signature) <i>[Signature]</i>	Date / Time <i>8/1/09 11:30</i>	Received By: (Signature) <i>[Signature]</i>	Relinquished By: (Signature)	Date / Time <i>8/1/09 10:10</i>	Received By: (Signature)
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)

SAMPLE LOG-IN & RECEIPT CHECKLIST

Client/Proj #: KATAHDIN WP 3543

Proj Mgr: M. Hoyt

Lab Pool #: 990159

Inspected & Logged in by: A. Reez

Date Time: 8/10/99 1040

Sample Matrix	Number of Samples	Analysis Requested	Analyze by (date)	Storage Location
<u>HQUEVJS 40-L Vials</u>	<u>3</u>	<u>Me</u>	<u>8/19/99</u>	<u>R1</u>
			<u>RESULTS 4/4</u>	

Circle the appropriate response:

- 1) Shipped / Hand delivered
- 2) COC present / not present on receipt
- 3) COC Tape present / not present on shipping container
- 4) Samples broken / Intact on receipt
- 5) Samples ambient / chilled on receipt CCC
- 6) Samples preserved correctly / incorrectly / none recommended
- 7) Received within / outside holding time
- 8) COC tapes present / not present on samples
- 9) Discrepancies / NO discrepancies noted between COCs and samples

Additional Comments: _____

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3543-1 (A)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: _____ 990139-1 _____

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ MEE_023 _____

Level: (low/med) _____ low _____

Date Received: _____ 08/10/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 08/13/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) _____ µg/L _____

Q

74-82-8

Methane

120

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3543-2 (D)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: _____ 990139-2 _____

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ MEE_024 _____

Level: (low/med) _____ low _____

Date Received: _____ 08/10/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 08/13/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) _____ µg/L _____

Q

74-82-8

Methane

130

ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: ENSR Contract:

WP3543-3 (B)

Lab Code: Case No.: SAS NO.: SDG NO.:

Matrix: (soil/water) water Lab Sample ID: 990139-3

Sample wt / vol: 32.5 ml (g/ml) Lab File ID: MEE_025

Level: (low/med) low Date Received: 08/10/99

% Moisture: NA Date Analyzed: 08/13/99

GC Column: Carboxen 1004 OD: 1/16" Dilution Factor: 1

Soil Extract Volume: NA (µl) Soil Aliquot Volume: NA (µl)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (µg/L or PPMv) µg/L	Q
74-82-8	Methane	90	

ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3543-4 (A)

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: _____ 990139-4 _____

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ MEE_026 _____

Level: (low/med) _____ low _____

Date Received: _____ 08/10/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 08/13/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:

(µg/L or PPMv) _____ µg/L _____

Q

74-82-8

Methane

540

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

VBLK01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____

Lab Sample ID: _____ Method Blank _____

Sample wt / vol: _____ 32.5 ml _____ (g/ml)

Lab File ID: _____ MEE_013 _____

Level: (low/med) _____ low _____

Date Received: _____ NA _____

% Moisture: _____ NA _____

Date Analyzed: _____ 08/13/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl)

Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (µg/L or PPMv) _____ µg/L _____	Q
74-82-8	Methane	5.2	U

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: ENSR Contract:

LCS01

Lab Code: Case No.: SAS NO.: SDG NO.:

Matrix: (soil/water) water

Lab Sample ID: LCS

Sample wt / vol: 32.5 ml (g/ml)

Lab File ID: MEE_014

Level: (low/med) low

Date Received: NA

% Moisture: NA

Date Analyzed: 08/13/99

GC Column: Carboxen 1004 OD: 1/16"

Dilution Factor: 1

Soil Extract Volume: NA (µl)

Soil Aliquot Volume: NA (µl)

CAS NO.

COMPOUND

CONCENTRATION UNITS:
(µg/L or PPMv) µg/L

Q

74-82-8

Methane

170

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____ WP3492-5(08)MS

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____ Lab Sample ID: _____ 990131-1 MS _____

Sample wt / vol: _____ 32.5 ml _____ (g/ml) Lab File ID: _____ MEE_016 _____

Level: (low/med) _____ low _____ Date Received: _____ 08/05/99 _____

% Moisture: _____ NA _____ Date Analyzed: _____ 08/13/99 _____

GC Column: _____ Carboxen 1004 _____ OD: _____ 1/16" _____ Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (µl) Soil Aliquot Volume: _____ NA _____ (µl)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (µg/L or PPMv) _____ µg/L _____	Q
74-82-8	Methane	180	

ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: ENSR Contract: WP3492-5(05)MSD

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Matrix: (soil/water) _____ water _____ Lab Sample ID: 990131-1 MSDSample wt / vol: 32.5 ml (g/ml) Lab File ID: MEE_017Level: (low/med) _____ low _____ Date Received: 08/05/99% Moisture: NA Date Analyzed: 08/13/99GC Column: Carboxen 1004 OD: 1/16" Dilution Factor: 1Soil Extract Volume: NA (μ l) Soil Aliquot Volume: NA (μ l)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (μ g/L or PPMv) <u>μg/L</u>	Q
74-82-8	Methane	200	

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ENSR Contract: _____

Lab Code: _____ Case NO.: _____ SAS NO.: _____ SDG NO.: _____

Matrix Spike - EPA Sample NO.: WP3492-5

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC	#	QC LIMITS REC.
Methane	205.0	22	178.9	76%		50-150

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC	% RPD #	RPD	QC LIMITS REC.
Methane	205.0	196.5	85%	12%	50	50-150

Spike recovery: 0 out of 2 outside limits.RPD: 0 out of 1 outside limits.

Comments:

4
METHOD BLANK SUMMARY

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

VBLK01

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Lab File ID: ___ MEE_013 _____ Lab Sample ID: ___ Method blank _____

Instrument ID: _____ HPGC#3 _____ Date Analyzed: ___ 08/13/99 _____

Matrix: (soil/water) _____ water _____ Level: (low/med) _____ low _____

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES; MS AND MSD

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	LCS01	LCS	MEE_014	08/13/99
02	WP3492-5 (08)MS	990131-1 MS	MEE_016	08/13/99
03	WP3492-5 (05)MSD	990131-1 MSD	MEE_017	08/13/99
04	WP3543-1 (A)	990139-1	MEE_023	08/13/99
05	WP3543-2 (D)	990139-2	MEE_024	08/13/99
06	WP3543-3 (B)	990139-3	MEE_025	08/13/99
07	WP3543-4 (A)	990139-4	MEE_026	08/13/99
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

COMMENTS:

INITIAL CALIBRATION SUMMARY

Lab Name: _____ ENSR _____

Contract: _____

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Instrument ID: _____ HPGC#3 _____

Init. Calib. Date: _____ 08/13/99 _____

METHANE

Amt. (NG/L)	RUN #	RT (MIN)	RF	
5.124	MEE_006	0.85	3027	
20.5	MEE_007	0.86	2509	
102.48	MEE_008	0.86	2387	
409.93	MEE_009	0.85	2311	
1025	MEE_010	0.85	2188	
			MEAN	%RSD
			2485	13.08%

ETHENE

Amt. (NG/L)	RUN #	RT (MIN)	RF	
9.06	MEE_006	3.76	2005	
36.24	MEE_007	3.77	2100	
181.19	MEE_008	3.76	1988	
724.76	MEE_009	3.75	2013	
1812	MEE_010	3.74	1935	
			MEAN	%RSD
			2008	2.98%

ETHANE

Amt. (NG/L)	RUN #	RT (MIN)	RF	
9.712	MEE_006	5.44	2236	
38.85	MEE_007	5.46	2350	
194.2	MEE_008	5.45	2253	
776.9	MEE_009	5.43	2290	
1942	MEE_010	5.40	2195	
			MEAN	%RSD
			2265	2.58%

Comments:

CALIBRATION VERIFICATION SUMMARY

Lab Name: _____ ENSR _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS NO.: _____ SDG NO.: _____

Instrument ID: _____ HPGC#3 _____ Init. Calib. Date: ___08/13/99___

Lab File ID: _MEE_021_____ Date Analyzed: __08/13/99_____

COMPOUND	RT	CALC AMOUNT (µg/L)	NOM AMOUNT (µg/L)	RPD
Methane	0.85	102.5	95.5	7.1%
Ethene	3.75	181.2	176.0	2.9%
Ethane	5.44	194.2	185.8	4.4%

Lab File ID: _MEE_033_____

Date Analyzed: __08/13/99_____

COMPOUND	RT	CALC AMOUNT (µg/L)	NOM AMOUNT (µg/L)	RPD
Methane	0.86	102.5	96.1	6.4%
Ethene	3.75	181.2	189.6	4.5%
Ethane	5.43	194.2	203.1	4.5%



October 1, 1999

Mr. Paul Calligan

Tetra Tech Nus

1401 Oven Park Dr., Suite 102

Tallahassee, FL 32308

RE: Katahdin Lab Number: WP3703
Project ID: CNC Charleston
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date(s): 8/24/99

Dear Mr. Calligan:

Please find enclosed the following information:

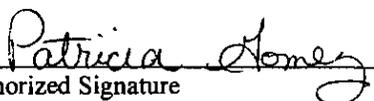
- * Report of Analysis
- * Quality Control Data Summary
- * Chain of Custody
- * Confirmation

Should you have any questions or comments concerning this Report of Analysis, please do not hesitate to contact the project manager listed above. This cover letter is an integral part of the ROA.

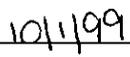
We appreciate your continued use of our laboratory and look forward to working with you in the future. The following signature indicates technical review and acceptance of the data.

Sincerely,

KATAHDIN ANALYTICAL SERVICES



Authorized Signature



Date

**SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON**

Sample Receipt

The following samples were received on August 24, 1999 and were logged in under Katahdin Analytical Services work order number WP3703 for a hardcopy due date of September 23, 1999.

<u>KATAHDIN</u>	<u>TTNUS</u>	<u>GEL</u>
<u>Sample No.</u>	<u>Sample Identification</u>	<u>Sample Identification</u>
WP3703-1	26GLM0801	
WP3703-2	26GLM10D01	
WP3703-3	26GLM0401	
WP3703-4	26GLM0601	
WP3703-5	26GLM0501	
WP3703-6	26GLM0701	
WP3703-7	26GLM0701D	
WP3703-8	13GLM0601	
WP3703-9	32GLM0601	
WP3703-10	21GLM0301	
WP3703-11	21GLM0201	
WP3703-12	21GLM0201D	
WP3703-13	21GLM07D01	
WP3703-14	21GLM0801	
WP3703-15	26GLM09D01	
WP3703-16	26GLM0301	
WP3703-17	26GLM0201	
WP3703-18	30GLM0301	
WP3703-19	30GLM0701	
WP3703-20	30GLM0101	
WP3703-21	30GLM0501	
WP3703-22	26TL00101	
WP3703-23	24SLB070405	
WP3703-24	24SLB040304	9908879-01
WP3703-25	24SLB020203	
WP3703-26	24SLB040304D	9908879-05
WP3703-27	42SLP200304	
WP3703-28	42SLP210304	

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.

Volatile Organic Analysis

Six soil/sediment and twenty-two aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on August 24, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this workorder were performed on the 5970-Q (aqueous), 5972-F (aqueous), 5973-U (low level soil), and 5972-M (low level soil) instruments. A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ppb.

Batch QC (VBLK, and LCS) was performed in each twelve-hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. Matrix spike/matrix spike duplicate pairs were performed on samples WP3703-2 (aqueous) and WP3703-28 (soil).

Initial analysis of sample WP3703-20 yielded a concentration of naphthalene over the upper limit of the calibration curve. Reanalysis occurred at a 1:2 dilution successfully. Both sets of data are included in this data package.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

Semivolatile Organic Analysis

Six soil/sediment and twenty-one aqueous samples were received by Katahdin Analytical Services laboratory on August 24, 1999 for analysis in accordance with 8270C for a client specified PAH list of analytes.

Extraction of the soil samples occurred following USEPA method 3550 on August 24 and 25, 1999. A laboratory control spike was extracted in each batch, along with a matrix spike/matrix spike duplicate pair on sample WP3703-26 in the 08/25/99 extraction batch.

Extraction of aqueous samples WP3703 1-13, 15, 16, 18-21 were extracted following USEPA method 3510 on August 25, 1999. A laboratory control spike was extracted in the batch, along with a matrix spike/matrix spike duplicate pair on sample WP3703-2. Sample WP3703-17 was

extracted on August 26, 1999, following USEPA method 3510. A laboratory control spike was extracted in the batch.

The original extract for sample WP3703-14 was lost during the concentration process. This sample was reextracted on September 8, 1999, outside of extraction holding times. A laboratory control spike was extracted in this batch.

Analysis of sample WP3703-3 yielded a low recovery of the surrogate nitrobenzene-d5. No reextraction was performed due to the obvious matrix/chromatographic interferences.

Initial analysis of sample WP3703-13 yielded a low surrogate recovery. Reanalysis yielded a similar result. The sample was reextracted on September 10, 1999, outside of extraction holding times, following USEPA method 3510. Surrogate recoveries for this reextracted sample met QC windows. All three sets of data for this sample are included in this data package.

Initial analysis of sample WP3703-16 yielded low surrogate recoveries. The sample was reextracted on September 10, 1999, outside of extraction holding times, following USEPA method 3510. Surrogate recoveries for this reextracted sample met QC windows. Both sets of data for this sample are included in this data package.

Initial analysis of sample WP3703-20 yielded concentrations of naphthalene and 2-methylnaphthalene over the upper limit of the calibration curve. Reanalysis occurred at a 1:2 dilution successfully. Both sets of data are included in this data package.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

Alternate method for analysis of nitrate was approved by Kelly Johnson-Carper due to holding time constraints upon sample arrival. All analyses were performed within hold time. No protocol deviations were noted by the Wet Chemistry staff.

Metals Analysis

The samples of Katahdin Work Order WP3703 were prepared and analyzed for metals in accordance with the "Test Methods for Evaluating Solid Waste", SW-846, November 1986, Third Edition.

Inductively-Coupled Plasma (ICP) Atomic Emission Spectroscopic Analysis

Soil-matrix Katahdin Sample Nos. WP3703-(24, 25, 26) were originally digested for ICP analysis on 08/26/99 (QC Batch PH261CS0) in accordance with USEPA Method 3050B. The measured zinc concentration (0.16 mg/L) of the preparation blank that is associated with QC Batch PH261CS0 exceeds the laboratory's acceptance limits, and therefore redigestion of Katahdin Sample Nos. WP3703-(24, 25, 26) for zinc was required. In addition, the digestate of Katahdin Sample No. WP3703-25 was spilled (and lost) before ICP analyses of antimony, arsenic, iron, lead, selenium, and thallium were completed, so redigestion of this sample was necessary to provide additional digestate volume for analysis. For these reasons, Katahdin Sample Nos. WP3703-(24, 25, 26) were redigested for ICP analysis on 09/02/99 (QC Batch PI02ICS0, containing Katahdin Sample No. WP3703-25) and 09/13/99 (QC Batch PI13ICS1, containing Katahdin Sample Nos. WP3703-24 and WP3703-26). These redigestates are identified throughout the raw data by the suffix "R" appended to the Katahdin sample number, e.g. "WP3703-025R".

The measured recovery (161.9%) for the laboratory control sample that is associated with QC Batch PI02ICS0 exceeds the laboratory's acceptance limits, and Katahdin Sample No. WP3703-25 therefore required redigestion for iron analysis. Katahdin Sample No. WP3703-25 was redigested a second time for ICP analysis on 09/14/99 (QC Batch PI14ICS0). This redigestate is identified throughout the raw data by the suffix "X" appended to the Katahdin sample number, e.g. "WP3703-025X".

ICP analyses of Katahdin Work Order WP3703 sample digestates were performed in accordance with USEPA Method 6010B, using a Thermo Jarrell Ash (TJA) Trace ICP spectrometer and a TJA 61 ICP spectrometer. All samples were analyzed within holding times and all QC criteria were met with the following comments or exceptions:

Some of the results for run QC samples (ICV, ICB, CCV, CCB, ICSA, and ICSAB) included in the accompanying data package may have exceeded acceptance limits for some elements. Please note that all client samples and batch QC samples associated with out-of-control results for run QC samples were subsequently reanalyzed for the analytes in question.

Analysis of Mercury by Cold Vapor Atomic Absorption (CVAA) Spectrophotometry

Soil-matrix Katahdin Sample Nos. WP3703-(24, 25, 26) were digested for mercury analysis on 09/03/99 (QC Batch PI03HGS0) in accordance with USEPA Method 7470A. Katahdin Sample No. WP3703-24 was prepared with duplicate matrix-spiked aliquots.

Mercury analyses of Katahdin Work Order WP3703 sample digestates were performed using a Leeman Labs PS200 automated mercury analyzer. All samples were analyzed within holding times and all run QC criteria were met.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400
 Fax (207) 775-4029

LAB (WORK ORDER) # WP 3703

PAGE: 1 OF 5

COOLER: 1 OF 5

COC# -

SDG# -

DATE / TIME RECEIVED: 8-24-99 0850

DELIVERED BY: FedEx

RECEIVED BY: SA

LIMS ENTRY BY: BEK

LIMS REVIEW BY / PM: ADL

CLIENT: Tetra Tech

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C)= <u>3.1</u>	
6. SAMPLES RECEIVED AT 4°C +/- 2? (ICE) ICE PACKS PRESENT (Y or N)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C)= <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

0000139

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
 Tel. (207) 874-2400
 Fax (207) 775-4029

LAB (WORK ORDER) # WP 3703
 PAGE: 2 OF 5
 COOLER: 2 OF 5
 COC# —
 SDG# —
 DATE / TIME RECEIVED: 8-24-99 0850
 DELIVERED BY: FedEx
 RECEIVED BY: Sam
 LIMS ENTRY BY: BEW
 LIMS REVIEW BY / PM: ADC

CLIENT: Tetra Tech

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>0.6</u>	<u>ADC notified and done callign by fax 8/24/99</u>
6. SAMPLES RECEIVED AT 4°C +/- 2°? (ICE) / ICE PACKS PRESENT (Y) or N?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u> (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use 1 check (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH required. If samples required pH adjustment, record volume and type of preservative used.

0000140

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
 Tel. (207) 874-2400
 Fax (207) 775-4029

LAB (WORK ORDER) # WP 3703

PAGE: 3 OF 5

COOLER: 3 OF 5

CLIENT: Tetra Tech

COC# -

SDG# -

DATE / TIME RECEIVED: 8-24-99 0850

DELIVERED BY: FedEx

RECEIVED BY: SP

LIMS ENTRY BY: BKJ

LIMS REVIEW BY / PM: AC

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C)= _____	
6. SAMPLES RECEIVED AT 4°C +/- 2° (ICE / ICE PACKS PRESENT (Y) or N)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>3.1</u> NA (RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN): _____					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

0000141

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
 Tel. (207) 874-2400
 Fax (207) 775-4029

LAB (WORK ORDER) # WP 3703

PAGE: 4 OF 5

COOLER: 4 OF 5

CLIENT: Tetra-Tech

COC# -

SDG# -

DATE / TIME RECEIVED: 8-24-99 0850

DELIVERED BY: FedEx

RECEIVED BY: Sam

LIMS ENTRY BY: BFR

LIMS REVIEW BY / PM: ACL

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>1.0</u>	<u>AK notified about calligan by fax 8/24/99</u>
6. SAMPLES RECEIVED AT 4°C +/- 2°?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	
<u>(ICE)</u> ICE PACKS PRESENT <u>(Y)</u> or N?				(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
7. VOLATILES FREE OF HEADSPACE?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check required. If samples required pH adjustment, record volume and type of preservative used.

KATAHDIN ANALYTICAL SERVICES, INC.
SAMPLE RECEIPT CONDITION REPORT
 Tel. (207) 874-2400
 Fax (207) 775-4029

LAB (WORK ORDER) # WP3703

PAGE: 5 OF 5

COOLER: 5 OF 5

CLIENT: Tetra Tech

COC# =

SDG# =

DATE / TIME RECEIVED: 8-24-99 0850

DELIVERED BY: FedEx

RECEIVED BY: sc

LIMS ENTRY BY: BEA

LIMS REVIEW BY / PM: ALC

PROJECT: CNC

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>1.8</u>	<u>ALC notified David Calligan by fax 8/24/99.</u>
6. SAMPLES RECEIVED AT 4°C +/- 2? (ICE) ICE PACKS PRESENT (Y or N)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)
7. VOLATILES FREE OF HEADSPACE?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
8. TRIP BLANK PRESENT IN THIS COOLER	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	N/A		

13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP NFESC ACOE AFCEE OTHER (STATE OF ORIGIN):

LOG - IN NOTES⁽¹⁾: * 1 of 2 PAH bottles for sample 266LM09D01 is labeled 266LM0901 (date/time matches)

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative added.

0000143



340 County Road No. 5
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Client <u>Efra Tech NUS</u>	Contact <u>Bryan Honze</u>	Phone # <u>(603) 554-4925</u>	Fax # <u>()</u>
Address <u>NH-21 Ave. H</u>	City <u>N. Charleston</u>	State <u>SC</u>	Zip Code <u></u>

Purchase Order # _____ Proj. Name / No. _____ Katahdin Quote # _____

Bill (if different than above) _____ Address _____

Sampler (Print / Sign) _____ Copies To: _____

LAB USE ONLY

WORK ORDER #: WP3703

KATAHDIN PROJECT MANAGER _____

REMARKS: _____

SHIPPING INFO: FED EX UPS CLIENT

AIRBILL NO: _____

TEMP °C _____ TEMP BLANK INTACT NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.
					OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON
					<i>PES, HTO, FED, Neph</i>	<i>PAH</i>	<i>TAL Metals</i>	<i>Grain Size</i>	<i>Dissolved Methane</i>	<i>Anions</i>				<i>FID Rds</i>
*	<u>24SLB020203</u>	<u>8/23/99/1045</u>	<u>soil</u>	<u>5</u>	<u>4</u>	<u>1</u>	<u>1</u>							<u>60ppm</u>
*	<u>24SLB040304</u>	<u>8/23/99/0950</u>	<u>soil</u>	<u>6</u>	<u>4</u>	<u>1</u>	<u>1</u>							<u>+ Run Fac from PAH jar 50pp</u>
*	<u>24SLB040304D</u>	<u>8/23/99</u>	<u>soil</u>	<u>5</u>	<u>4</u>	<u>1</u>	<u>1</u>							<u>X Run Fac from PAH jar 50pp</u>
	<u>GLM09001</u>	<u>8/23/99/1045</u>	<u>aq</u>	<u>5</u>	<u>3</u>	<u>2</u>								
	<u>26GLM0301</u>	<u>8/23/99/1515</u>	<u>aq</u>	<u>5</u>	<u>3</u>	<u>2</u>								
	<u>26GLM0201</u>	<u>8/23/99/1530</u>	<u>aq</u>	<u>5</u>	<u>3</u>	<u>2</u>								
	<u>30GLM0101</u>	<u>8/22/99/1010</u>	<u>aq</u>	<u>9</u>	<u>3</u>	<u>2</u>			<u>3</u>	<u>1</u>				
	<u>30GLM0301</u>	<u>8/22/99/1610</u>	<u>aq</u>	<u>5</u>	<u>3</u>	<u>2</u>								
	<u>30GLM0501</u>	<u>8/22/99/1225</u>	<u>aq</u>	<u>9</u>	<u>3</u>	<u>2</u>			<u>3</u>	<u>1</u>				
	<u>30GLM0701</u>	<u>8/22/99/1515</u>	<u>aq</u>	<u>5</u>	<u>3</u>	<u>2</u>								
	<u>42SLP200304</u>	<u>8/23/99/1400</u>	<u>soil</u>	<u>5</u>	<u>4</u>	<u>1</u>								<u>← 48 hour turn around 3.2pp</u>
	<u>42SLP210304</u>	<u>8/23/99/1415</u>	<u>soil</u>	<u>5</u>	<u>4</u>	<u>1</u>								<u>← 48 hour turn around 2.6pp</u>
	<u>26TLO0101</u>	<u>8/23/99</u>	<u>aq</u>	<u>2</u>	<u>2</u>									
	<u>/</u>	<u>/</u>												
	<u>/</u>	<u>/</u>												
	<u>/</u>	<u>/</u>												

COMMENTS
* Do TAL metals analysis from PAH jar.

Relinquished By: (Signature) _____	Date / Time <u>8-24-99 0850</u>	Received By: (Signature) <u>[Signature]</u>	Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____
Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____	Relinquished By: (Signature) _____	Date / Time _____	Received By: (Signature) _____

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
 New England-ME Laboratory (207) 874-2400
 CONFIRMATION

ORDER NO WP-3703

Project Manager: Andrea J. Colby

REPORT TO: PAUL CALLIGAN
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 08/24/99
 PHONE: 850/385-985
 FAX: 850/385-9860
 DUE: 23 SEP
 FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 FOSTER PLAZA 7, 661 ANDERSEN DR.
 PITTSBURGH, PA 15220

PHONE: 412/921-7090
 PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 23 OCT

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3703-1	26GLM0801	21 AUG 1513	24 AUG	AQ
	WP3703-2	26GLM10D01	21 AUG 1240		
	WP3703-3	26GLM0401	21 AUG 0945		
	WP3703-4	26GLM0601	21 AUG 1005		
	WP3703-5	26GLM0501	21 AUG 0945		
	WP3703-6	26GLM0701	21 AUG 1155		
	WP3703-7	26GLM0701D	21 AUG		
	WP3703-8	13GLM0601	21 AUG 1140		
	WP3703-9	32GLM0601	21 AUG 1557		
	WP3703-10	21GLM0301	22 AUG 1152		
	WP3703-11	21GLM0201	22 AUG 0955		
	WP3703-12	21GLM0201D	22 AUG		
	WP3703-13	21GLM07D01	22 AUG 1430		
	WP3703-14	21GLM0801	22 AUG 1500		
	WP3703-15	26GLM09D01	23 AUG 1645		
	WP3703-16	26GLM0301	23 AUG 1515		
	WP3703-17	26GLM0201	23 AUG 1520		
	WP3703-18	30GLM0301	22 AUG 1610		
	WP3703-19	30GLM0701	22 AUG 1515		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	19	75.00	1425.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	19	125.00	2375.00
TOTALS		19	200.00	3800.00

0000146
 M. Attilaa

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

ORDER NO WP-3703

Project Manager: Andrea J. Colby

REF TO: PAUL CALLIGAN
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 08/24/99
 PHONE: 850/385-9899
 FAX: 850/385-9860
 DUE: 23 SEP
 FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 FOSTER PLAZA 7, 661 ANDERSEN DR.
 PITTSBURGH, PA 15220

PHONE: 412/921-7090
 PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 23 OCT

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2 WP3703-20	30GLM0101	22 AUG 1210	24 AUG	AQ
WP3703-21	30GLM0501	22 AUG 1225		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	75.00	150.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	125.00	250.00
Nitrate as N	353.2	2	30.00	60.00
Sulfate (as SO4)	E300	2	0.00	0.00
Methane Subcontract		2	95.00	190.00
TOTALS		2	325.00	650.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3 WP3703-22	26TL00101	23 AUG	24 AUG	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	75.00	75.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4 WP3703-23	24SLB070405	23 AUG 0915	24 AUG	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Volatile Organics by 8260B	SW8260	1	85.00	85.00
TOTALS		1	220.00	220.00

0000147 mg
 10/1/99
 -0000147
 AT 8/23/99

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

ORDER NO WP-3703

Project Manager: Andrea J. Colby

REPORT TO: PAUL CALLIGAN
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 08/24/99
 PHONE: 850/385-9865
 FAX: 850/385-9865
 DUE: 23 SEP
 FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 FOSTER PLAZA 7, 661 ANDERSEN DR.
 PITTSBURGH, PA 15220

PHONE: 412/921-7090
 PO: N7912-P99264
 PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 23 OCT

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
5 WP3703-24	24SLB040304	23 AUG 0950	24 AUG	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Target Analyte List Metals, Total		1	100.00	100.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Grain Size Subcontract		1	110.00	110.00
Total Combustible Organics	ASTM D2974	1	30.00	30.00
TOC Subcontract		1	60.00	60.00
TPH Subcontract		1	75.00	75.00
TOTALS		1	595.00	595.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
6 WP3703-25	24SLB020203	23 AUG 1045	24 AUG	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Target Analyte List Metals, Total		1	100.00	100.00
TOTALS		1	320.00	320.00

msc
 10/1/99 0000148
 21, 9/21/20 0000150

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

ORDER NO WP-3703

Project Manager: Andrea J. Colby

REPORT TO: PAUL CALLIGAN
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 08/24/99
 PHONE: 850/385-9899
 FAX: 850/385-9860
 DUE: 23 SEP
 FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 FOSTER PLAZA 7, 661 ANDERSEN DR.
 PITTSBURGH, PA 15220

PHONE: 412/921-7090
 PO: N7912-P99264
 PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 23 OCT

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
7	WP3703-27	42SLP200304	23 AUG 1400	24 AUG	SL
	WP3703-28	42SLP210304	23 AUG 1415		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	2	85.00	170.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	135.00	270.00
Solids-Total Residue (TS)	CLP/CIP SO	2	0.00	0.00
TOTALS		2	220.00	440.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
	WP3703-26	24SLB040304D	23 AUG	24 AUG	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Total Combustible Organics	ASTM D2974	1	30.00	30.00
TOC Subcontract		1	60.00	60.00
Target Analyte List Metals, Total		1	100.00	100.00
TPH Subcontract		1	75.00	75.00
TOTALS		1	485.00	485.00

0000149
 h. alv. l. g.

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 5

ORDER NO WP-3703

Project Manager: Andrea J. Colby

REPORT TO: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 08/24/99
PHONE: 850/385-989
FAX: 850/385-9860
DUE: 23 SEP
FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
FOSTER PLAZA 7, 661 ANDERSEN DR.
PITTSBURGH, PA 15220

PHONE: 412/921-7090
PO: N7912-P99264
PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 23 OCT

ORDER NOTE: QC-II+ W/NARRATIVE
DD(KAS007QC-DB3)
CNC CHARLESTON
NFESC

REPORT COPY: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT AND DISK

INVOICE: With Report

TOTAL ORDER AMOUNT \$6,585.00

This is NOT an Invoice

AJC/BKR/WEST.AJC(dw)

09-21Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

0000150
n.alsilga



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	'#' flag denotes surrogate compound recovery is out of criteria.
E	'E' flag indicates an estimated value. The analyte was detected in the sample at a concentration greater than the standard calibration range.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.
O-2	Sample dilution required for quantitation of one or more target analytes; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3703-9
SDG: WP3703
Report Date: 9/24/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 9/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0601	AQ	8/21/99	8/24/99	8/25/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZO[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	78	%	1.0		
2-FLUOROBIPHENYL	78	%	1.0		
TERPHENYL-D14	104	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP3703-9
SDG: WP3703
Report Date: 9/24/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 8/25/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32GLM0601	AQ	8/21/99	8/24/99	8/25/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	104	%	1.0		
1,2-DICHLOROETHANE-D4	102	%	1.0		
TOLUENE-D8	92	%	1.0		
P-BROMOFLUOROBENZENE	91	%	1.0		

Report Notes:

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK1;082599

Lab Name: Katahdin Analytical Services

SDG No.: WP3703

Lab File ID: Z1964

Lab Sample ID: SBLK1;082599

Instrument ID: 5972-Z

Date Extracted: 8/25/99

GC Column: RTX-5 ID: 0.25 (mm)

Date Analyzed: 09/07/99

Matrix: (soil/water) WATER

Time Analyzed: 14:09

Level: (low/med) LOW

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCS;082599	LCS;082599	Z1965	9/7/99	2:58:00 PM
26GLM0801	WP3703-1	Z1966	9/7/99	3:47:00 PM
26GLM10D01	WP3703-2	Z1967	9/7/99	4:36:00 PM
26GLM10D01MS	WP3703-2MS	Z1968	9/7/99	5:24:00 PM
26GLM10D01MSD	WP3703-2MSD	Z1969	9/7/99	6:12:00 PM
26GLM0401	WP3703-3	Z1970	9/7/99	7:00:00 PM
26GLM0601	WP3703-4	Z1971	9/7/99	7:51:00 PM
26GLM0501	WP3703-5	Z1972	9/7/99	8:39:00 PM
26GLM0701	WP3703-6	Z1973	9/7/99	9:29:00 PM
26GLM0701D	WP3703-7	Z1974	9/7/99	10:17:00 PM
13GLM0601	WP3703-8	Z1975	9/7/99	11:05:00 PM
32GLM0601	WP3703-9	Z1976	9/7/99	11:55:00 PM
21GLM0301	WP3703-10	Z1977	9/8/99	12:43:00 AM
21GLM0201D	WP3703-12	Z1990	9/8/99	9:34:00 AM
21GLM07D01	WP3703-13	Z1991	9/8/99	10:21:00 AM
26GLM09D01	WP3703-15	Z1992	9/8/99	11:10:00 AM
26GLM0301	WP3703-16	Z1993	9/8/99	11:59:00 AM
30GLM0301	WP3703-18	Z2010	9/9/99	2:01:00 PM
21GLM07D01	WP3703-13RA	Z2011	9/9/99	2:48:00 PM
30GLM0701	WP3703-19	Z2015	9/9/99	5:59:00 PM
30GLM0101	WP3703-20	Z2016	9/9/99	6:48:00 PM
30GLM0501	WP3703-21	Z2017	9/9/99	7:35:00 PM
21GLM0201	WP3703-11	Z2030	9/10/99	2:03:00 PM
30GLM0101	WP3703-20DL	Z2040	9/13/99	10:29:00 AM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: SBLK1;082599
 SDG: WP3703
 Report Date: 9/24/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 9/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK1;082599	AQ	-	-	8/25/99	DS	EPA 3510	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<10	ug/L	1.0	10	10
2-METHYLNAPHTHALENE	<10	ug/L	1.0	10	10
ACENAPHTHYLENE	<10	ug/L	1.0	10	10
ACENAPHTHENE	<10	ug/L	1.0	10	10
FLUORENE	<10	ug/L	1.0	10	10
PHENANTHRENE	<10	ug/L	1.0	10	10
ANTHRACENE	<10	ug/L	1.0	10	10
FLUORANTHENE	<10	ug/L	1.0	10	10
PYRENE	<10	ug/L	1.0	10	10
BENZO[A]ANTHRACENE	<10	ug/L	1.0	10	10
CHRYSENE	<10	ug/L	1.0	10	10
BENZO[B]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[K]FLUORANTHENE	<10	ug/L	1.0	10	10
BENZO[A]PYRENE	<10	ug/L	1.0	10	10
INDENO[1,2,3-CD]PYRENE	<10	ug/L	1.0	10	10
DIBENZ[A,H]ANTHRACENE	<10	ug/L	1.0	10	10
BENZO[G,H,I]PERYLENE	<10	ug/L	1.0	10	10
NITROBENZENE-D5	68	%	1.0		
2-FLUOROBIPHENYL	69	%	1.0		
TERPHENYL-D14	86	%	1.0		

Report Notes:

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: Z1909

Sample ID: LCS1;082599

Date Run: 8/31/99

Analyst: KRT

Time Injected 5:19:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	1667	1530	92	60-140
ACENAPHTHENE	1667	1630	98	60-140
ACENAPHTHYLENE	1667	1600	96	60-140
ANTHRACENE	1667	1710	102	60-140
BENZO[A]ANTHRACENE	1667	1780	107	60-140
BENZO[A]PYRENE	1667	1750	105	60-140
BENZO[B]FLUORANTHENE	1667	1700	102	60-140
BENZO[G,H,I]PERYLENE	1667	1660	100	60-140
BENZO[K]FLUORANTHENE	1667	1930	116	60-140
CHRYSENE	1667	1930	116	60-140
DIBENZ[A,H]ANTHRACENE	1667	1800	108	60-140
FLUORANTHENE	1667	1790	107	60-140
FLUORENE	1667	1700	102	60-140
INDENO[1,2,3-CD]PYRENE	1667	1820	109	60-140
NAPHTHALENE	1667	1560	94	60-140
PHENANTHRENE	1667	1800	108	60-140
PYRENE	1667	1770	106	60-140

* Out of Limits

1

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3703-2	Z1967	9/7/99	4:36:00 PM	KRT	AQ	8270_99
WP3703-2MS	Z1968	9/7/99	5:24:00 PM	KRT	AQ	8270_99
WP3703-2MSD	Z1969	9/7/99	6:12:00 PM	KRT	AQ	8270_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
BENZO[G,H,I]PERYLENE	0	49	49	56.6	56.0	115	114	60-140	1.1	30
2-METHYLNAPHTHALENE	0	49	49	42.9	42.2	87	86	60-140	1.6	30
NAPHTHALENE	0	49	49	40.3	41.4	82	84	60-140	2.7	30
INDENO[1,2,3-CD]PYRENE	0	49	49	59.8	59.1	122	120	60-140	1.2	30
FLUORENE	0	49	49	47.2	43.1	96	88	60-140	9.1	30
FLUORANTHENE	0	49	49	46.7	43.3	95	88	60-140	7.6	30
DIBENZ[A,H]ANTHRACENE	0	49	49	52.8	52.3	108	107	60-140	0.95	30
PHENANTHRENE	0	49	49	47.8	46.9	97	96	60-140	1.9	30
BENZO[K]FLUORANTHENE	0	49	49	52.8	51.8	108	106	60-140	1.9	30
PYRENE	0	49	49	53.8	54.8	110	112	60-140	1.8	30
BENZO[B]FLUORANTHENE	0	49	49	40.7	40.0	83	82	60-140	1.7	30
BENZO[A]PYRENE	0	49	49	46.5	45.8	95	93	60-140	1.5	30
BENZO[A]ANTHRACENE	0	49	49	47.0	46.6	96	95	60-140	0.85	30
ANTHRACENE	0	49	49	46.6	45.1	95	92	60-140	3.3	30
ACENAPHTHYLENE	0	49	49	45.9	42.2	94	86	60-140	8.4	30
APHTHENE	0	49	49	45.8	42.3	94	86	60-140	7.9	30
CHRYSENE	0	49	49	53.2	52.6	108	107	60-140	1.1	30

RPD = [(ms res - msd res) / (ms res + msd res)/2] * 100

* Out of Limits

1

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBLKF25A

Lab Name: Katahdin Analytical Services

SDG No.: WP3703

Lab File ID: F1601

Lab Sample ID: VBLKF25A

Date Analyzed: 08/25/99

Time Analyzed: 9:28

GC Column: RTX-624 ID: 0.18 (mm)

Heated Purge: (Y/N) N

Instrument ID: 5972-F

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, LCS'S, MS AND MSD'S

Client Sample ID	Lab Sample ID	Lab Data File	Date Injected	Time Injected
LCSF25A	LCSF25A	F1600	8/25/99	8:35:00 AM
26GLM10D01MS	WP3703-2MS	F1605	8/25/99	12:11:00 PM
26GLM10D01MSD	WP3703-2MSD	F1606	8/25/99	12:47:00 PM
26GLM0801	WP3703-1	F1608	8/25/99	2:00:00 PM
26GLM10D01	WP3703-2	F1609	8/25/99	2:36:00 PM
26GLM0401	WP3703-3	F1610	8/25/99	3:13:00 PM
26GLM0601	WP3703-4	F1611	8/25/99	3:49:00 PM
26GLM0501	WP3703-5	F1612	8/25/99	4:26:00 PM
26GLM0701	WP3703-6	F1613	8/25/99	5:02:00 PM
26GLM0701D	WP3703-7	F1614	8/25/99	5:38:00 PM
13GLM0601	WP3703-8	F1615	8/25/99	6:15:00 PM
32GLM0601	WP3703-9	F1616	8/25/99	6:51:00 PM



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: PAUL CALLIGAN
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
 Proj. ID: CNC CHARLESTON

Lab Number: VBLKF25A
 SDG: WP3703
 Report Date: 9/24/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: SW8260
 Date Analyzed: 8/25/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF25A	AQ	-	-	8/25/99	KMC	5030	KMC

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	104	%	1.0		
1,2-DICHLOROETHANE-D4	100	%	1.0		
TOLUENE-D8	91	%	1.0		
P-BROMOFLUOROBENZENE	91	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F1600

Sample ID: LCSF25A

Date Run: 8/25/99

Analyst: KMC

Time Injected 8:35:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	54.0	108	60-140
BENZENE	50	48.0	96	60-140
ETHYLBENZENE	50	49.7	99	60-140
MTBE	50	51.9	104	60-140
NAPHTHALENE	50	50.4	101	60-140
TOLUENE	50	48.3	96	60-140
TOTAL XYLENES	150	144	96	60-140

* Out of Limits

1

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3703-2	F1609	8/25/99	2:36:00 PM	KMC	AQ	8260_99
WP3703-2MS	F1605	8/25/99	12:11:00 PM	KMC	AQ	8260_99
WP3703-2MSD	F1606	8/25/99	12:47:00 PM	KMC	AQ	8260_99

Compound Name	Native (ug/L)	MS Spk Amount (ug/L)	MSD Spk Amount (ug/L)	MS Result (ug/L)	MSD Result (ug/L)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
TOTAL XYLENES	0	150	150	122	118	81	79	60-140	3.3	20
TOLUENE	0	50	50	41.8	39.5	84	79	60-140	5.6	20
NAPHTHALENE	0	50	50	47.4	45.2	95	90	60-140	4.8	20
MTBE	0	50	50	49.8	47.1	100	94	60-140	5.6	20
ETHYLBENZENE	0	50	50	42.0	41.0	84	82	60-140	2.4	20
BENZENE	0	50	50	42.5	39.9	85	80	60-140	6.3	20
1,2-DIBROMOETHANE	0	50	50	50.4	47.6	101	95	60-140	5.7	20

RPD = [(ms res - msd res) / (ms res + msd res)/2] * 100

* Out of Limits

**SDG NARRATIVE
KATAHDIN ANALYTICAL SERVICES
TETRA TECH NUS
CASE CNC CHARLESTON**

Sample Receipt

The following samples were received on May 19, 1999 and were logged in under Katahdin Analytical Services work order number WP2502 for a hardcopy due date of June 18, 1999.

<u>KATAHDIN</u> <u>Sample No.</u>	<u>TTNUS</u> <u>Sample Identification</u>	<u>GEL</u> <u>Sample No.</u>
WP2502-1	34SLB01-0203	
WP2502-2	32SLB02-0506	
WP2502-3	32SLB04-0506	
WP2502-4	32SLB01-0506	
WP2502-5	32SLB03-0506D	
WP2502-6	34SLB03-0304	9905606-05
WP2502-7	34SLB02-0304D	
WP2502-8	32SLB03-0506	9905606-04
WP2502-9	34SLB02-0304	
WP2502-10	34SLB04-0304	
WP2502-11	33SLB05-0304	9905606-06
WP2502-12	33SLB04-0304D	
WP2502-13	33SLB04-0304	
WP2502-14	33SLB06-0405	
WP2502-15	33SLB01-0304	
WP2502-16	32SLB09-0506	
WP2502-17	34SLB05-0203	
WP2502-18	33SLB08-0405	
WP2502-19	04TL00104	
WP2502-20	01E00101	
WP2502-21	01F00101	

The samples were logged in for the analyses specified on the chain of custody form. All problems encountered and resolved during sample receipt have been documented on the applicable chain of custody forms.

Sample analyses have been performed by the methods as noted herein.



Volatile Organic Analysis

Three aqueous (trip blank) and eighteen soil/sediment samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on May 19, 1999 and were specified to be analyzed by USEPA method 8260B for the analytes benzene, toluene, ethylbenzene, xylenes, MTBE, naphthalene, and EDB.

Analyses for this SDG were performed on instruments 5970-Q (medium level soil), 5972-Z (low level soil), 5972-M (low level soil), and 5972-F (medium level soil and aqueous). A VSTD050 (50 ppb standard) was used for the continuing calibration standard. Internal standard and surrogate compounds were also spiked at 50 ug/l.

Batch QC (VBLK, and LCS) was performed in each twelve hour window. Results are included in this data package. The LCS QC samples were spiked with the entire list of compounds quantitated for at 50 ppb. No matrix spike/matrix spike duplicate pair was analyzed on any of the samples in this workorder.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Method 8260B narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, several analytes had %RSD values exceeding the allowed 15%. Since the average %RSD for all analytes was 8.3%, 8.4%, 13.4%, 13.4%, and 14.1%, the curves were acceptable.

Analysis of sample WP2502-1 was performed using the methanol extract due to high target analyte concentrations, resulting in elevated reporting limits.

Initial analysis of sample WP2502-2 yielded target analyte concentrations over the upper limit of the calibration curve and a high recovery of the surrogate BFB. Reanalysis occurred with the methanol extract successfully. Both sets of data for this sample are included in the data package.

Initial analyses of samples WP2502-4, -8, -10, -11, -12, -13, -14, -15, and -18 yielded internal standard area recovery and/or surrogate recovery deviations. Reanalysis of each yielded similar results, confirming matrix interference. For each sample, both sets of data are included in this data package.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" (software-generated) on the pertinent quantitation reports. All "M" flags have been dated and initialed by the analyst performing the integration. In addition, all "M" flags have been reviewed and approved by the GC/MS supervisor. Copies of each manual integration are included in the pertinent quantitation reports.

No other protocol deviations were noted by the volatile organics staff.

000003

Semivolatile Organic Analysis

Eighteen soil/sediment samples were received by the Katahdin GC/MS laboratory on May 19, 1999 for analysis in accordance with 8270C for the PAH list of analytes.

Extraction of all of the soil samples occurred following USEPA method 3550 on May 29, 1999. A laboratory control spike, consisting of all TCL analytes spiked into organic free sand, was extracted in the batch along with a site specific MS/MSD pair on sample WP2502-1.

Samples WP2502-2, -15, and -17 were analyzed at dilutions due to the matrix (1:100, 1:5, and 1:25, respectively), resulting in elevated reporting limits.

Initial analyses of samples WP2502-11-14 and 18 yielded internal standard area recovery deviations. Reanalyses yielded similar results, confirming matrix interference in each sample. Reanalysis of sample WP2502-18 (WP2502-18RA) occurred nineteen minutes outside of the twelve hour DFTPP tuning window. Both sets of data for each sample are included in the data package.

Method 8000B, section 7.5.1.2.1 (Revision 2, 12/96) states, "in those instances where the RSD for one or more analytes exceeds 20%, the initial calibration curve may still be acceptable if the mean of the RSD values for all analytes in the calibration is less than or equal to 20%." Section 7.3.7.1 of method 8270C (revision 3, 12/96) narrows this 20% maximum to 15%.

In the calibration curves analyzed in this SDG, several analytes had %RSD values exceeding the allowed 15%. Since the average %RSD for all analytes was 8.5% and 8.5%, respectively, the curves were acceptable.

Several manual integrations were performed due to split peaks; all have been flagged with a "M" by the data system. All manual integrations have been dated and initialed by the responsible analyst. Copies of each manual integration are included in the data package. All manual integrations have been reviewed and approved by the GC/MS supervisor.

No other protocol deviations were noted by the semivolatiles organics staff.

Wet Chemistry Analysis

For work order WP2502 the analyses for Total Combustible Organics (TCO) have been performed in accordance with the "Annual Book of ASTM Standards", 1987. Analyses for Solids-Total Residue (TS) for work order WP2502 samples have been performed in accordance with "Contract Laboratory Program Statement of Work for Inorganic Analysis".

All analyses were performed within analytical hold time. No protocol deviations were noted by the Wet Chemistry laboratory staff.

0000004

Subcontracted Analysis

Analyses for Total Organic Carbon and Total Petroleum Hydrocarbon were subcontracted to outside laboratories. Both sets of data are included as separate sections to the data package.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager and/or his designee, as verified by the following signature.

Dorothy J. Nadeau
Authorized Signature
7.19.99

0000005

KATAHDIN ANALYTICAL SERVICES, INC.

SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400

Fax (207) 775-4029

LAB (WORK ORDER) # WP 2502

PAGE: 1 OF 2

COOLER: 1 OF 2

COC# —

SDG# —

DATE / TIME RECEIVED: 5-19-99 0945

DELIVERED BY: FedEx

RECEIVED BY: Jan

LIMS ENTRY BY: AJC

LIMS REVIEW BY / PM: AX

CLIENT: Tetra Tech - SE

PROJECT: CNC Charleston

	YES	NO	EXCEPTIONS	COMMENTS	RESOLUTION
1. CUSTODY SEALS PRESENT / INTACT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
2. CHAIN OF CUSTODY PRESENT IN THIS COOLER?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
3. CHAIN OF CUSTODY SIGNED BY CLIENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
4. CHAIN OF CUSTODY MATCHES SAMPLES?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>only received UOA for AQ</u>	<u>AJC notified B and Callege. and was told to proceed w/ UOA</u>
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>2.5</u>	
6. SAMPLES RECEIVED AT 4°C ± 2° (ICE) ICE PACKS PRESENT (Y or N)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C) = <u>NA</u>	
7. VOLATILES FREE OF HEADSPACE?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(RECORD COOLER TEMP ONLY IF TEMP BLANK IS NOT PRESENT)	
8. TRIP BLANK PRESENT IN THIS COOLER	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
9. PROPER SAMPLE CONTAINERS AND VOLUME?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
10. SAMPLES WITHIN HOLD TIME UPON RECEIPT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
11. SAMPLES PROPERLY PRESERVED ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12. CORRECTIVE ACTION REPORT FILED?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>N/A</u>		
13. ANALYTICAL PROGRAMS (CIRCLE ONE) COMMERCIAL CLP HAZWRAP <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken or compromised, C-O-C discrepancies, radiation checks, residual chlorine check, results of pH check if required. If samples required pH adjustment, record volume and type of preservative.



3467 County Road No. 3
P.O. Box 720
Westbrook, ME 04098
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Page 1 of 2

Client: **Tetra Tech NUS** Contact: **Bryan Howze** Phone #: **(423) 483-9900** Fax #: **()**

Address: **NH-21 Ave H** City: **North Charleston** State: **SC** Zip Code: **29405**

Purchase Order #: _____ Proj. Name / No.: _____ Katahdin Quote #: _____

Bill (if different than above) Address: _____

Sampler (Print / Sign) _____ Copies To: _____

LAB USE ONLY WORK ORDER #: **WP2502**
KATAHDIN PROJECT MANAGER _____

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

REMARKS: _____

SHIPPING INFO: FED EX UPS CLIENT

AIRBILL NO: _____

TEMP °C TEMP BLANK INTACT NOT INTACT

Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON	OYON
PAHs + Napth										FFB Headspace (100ml)
807DC										
TAL metals										
6010B										
BTEX, ESB										
8071A										
Grain Size										
Hydrometer										

* Sample Description	Date / Time col'd.	Matrix	No. of Cntrs.	PAHs + Napth	TAL metals	BTEX, ESB	Grain Size	Hydrometer	FFB Headspace (100ml)
34SLB01-0203	5/18/0935	S	5	X		X			21
32SLB02-0506	5/18/0820	S	5	X		X			25
32SLB04-0506	5/18/0830	S	5	X		X			0
32SLB01-0506	5/18/0810	S	5	X		X			2
32SLB03-0506D	5/18/0850	S	5	X		X			1
34SLB03-0304	5/18/1025	S	5	X		X			0
34SLB02-0304D	5/18/1010	S	5	X		X			100
32SLB03-0506	5/18/0850	S	5	X		X			10
32SLB09-0506	5/18/0840	S	6	X		X	X		4
34SLB02-0304	5/18/1010	S	5	X		X			100
34SLB05-0203	5/18/0958	S	6	X		X	X		3
34SLB04-0304	5/18/0950	S	5	X		X			0
33SLB05-0304	5/18/1235	S	5	X		X			1
33SLB04-0304D	5/18/1220	S	5	X		X			2
33SLB04-0304	5/18/1220	S	5	X		X			2
33SLB08-0405	5/18/1205	S	6	X		X	X		1

COMMENTS: _____

Relinquished By: (Signature)	Date / Time: 5/18/09 1430	Received By: (Signature) Fed Ex	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Relinquished By: (Signature)	Date / Time	Received By: (Signature) 809609650276	Relinquished By: (Signature)	Date / Time	Received By: (Signature) 0092008



570 County Road No. 2
 P.O. Box 720
 Westbrook, ME 04098
 Tel: (207) 874-2400
 Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE PRINT IN PEN

Client: Tetra Tech NUS Contact: Bryn Hawze Phone #: (423) 483-9900 Fax #: ()
 Ac: NH-21 Ave H City: North Charleston State: SC Zip Code: 29405
 Purchase Order #: _____ Proj. Name / No.: _____ Katahdin Quote #: _____

Bill (if different than above): _____ Address: _____
 Sampler (Print / Sign): _____ Copies To: _____

LAB USE ONLY WORK ORDER #: WP2502*
 KATAHDIN PROJECT MANAGER: _____

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

REMARKS: _____
 SHIPPING INFO: FED EX UPS CLIENT
 AIRBILL NO: _____
 TEMP°C: _____ TEMP BLANK INTACT NOT INTACT

Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.	Filt.
PAts + Naphth 8070C TAL metals 6010B BTEX, EDB 8060B 9071A Grain Size Hydrometer FID Headspace (ppm)													
X		X											0
X		X											0
		X											
X	X	X											
X	X	X											
/	/	/	/	/	/	/	/	/	/	/	/	/	/

COMMENTS

Relinquished By: (Signature) <u>[Signature]</u>	Date / Time <u>5/18/99 1430</u>	Received By: (Signature) <u>Fed Ex</u> <u>809609650716</u>	Relinquished By: (Signature)	Date / Time	Received By: (Signature) <u>[Signature]</u> <u>5-19-99</u> <u>0745</u>
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature) <u>[Signature]</u>

ORIGINAL

KATAADIN ANALYTICAL SERVICES, INCORPORATED
 New England-ME Laboratory (207) 874-2400
 CONFIRMATION

ORDER NO WP-2502

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 05/19/99

PHONE: 850/385-989

FAX: 850/385-986

DUE: 18 JUN

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 661 ANDERSEN DRIVE, FOSTER PLAZA VII
 PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 18 JUL

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP2502-1	34SLB01-0203	18 MAY 0935	19 MAY	SL
	WP2502-2	32SLB02-0506	18 MAY 0820		
	WP2502-3	32SLB04-0506	18 MAY 0830		
	WP2502-4	32SLB01-0506	18 MAY 0810		
	WP2502-5	32SLB03-0506D	18 MAY 0850		
	WP2502-7	34SLB02-0304D	18 MAY 1010		
	WP2502-9	34SLB02-0304	18 MAY 1010		
	WP2502-10	34SLB04-0304	18 MAY 0950		
	WP2502-12	33SLB04-0304D	18 MAY 1220		
	WP2502-13	33SLB04-0304	18 MAY 1220		
	WP2502-14	33SLB06-0405	18 MAY 1155		
	WP2502-15	33SLB01-0304	18 MAY 1145		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Solids-Total Residue (TS)	CLP/CIP SO	12	0.00	0.00
Volatile Organics by 8260B	SW8260	12	85.00	1020.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	12	135.00	1620.00
TOTALS		12	220.00	2640.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
2	WP2502-16	32SLB09-0506	18 MAY 0840	19 MAY SL
	WP2502-17	34SLB05-0203	18 MAY 0958	
	WP2502-18	33SLB08-0405	18 MAY 1205	

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Solids-Total Residue (TS)	CLP/CIP SO	3	0.00	0.00
Volatile Organics by 8260B	SW8260	3	85.00	255.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	3	135.00	405.00
Wet Lab Subcontract		3	110.00	330.00
TOTALS		3	330.00	990.00

000000

AC6/1499

~~NEW ENGLAND METEOROLOGICAL SERVICES, INCORPORATED~~
New England-ME Laboratory (207) 874-2400
CONFIRMATION

ORDER NO WP-2502

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

ORDER DATE: 05/19/99
 PHONE: 850/385-9899
 FAX: 850/385-9860
 DUE: 18 JUN
 FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
 TETRA TECH NUS, INC.
 661 ANDERSEN DRIVE, FOSTER PLAZA VII
 PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090
 PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 18 JUL

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3	WP2502-19	04TL00104	03 MAY 1515	19 MAY	SL

	DETERMINATION	METHOD	QTY	PRICE	AMOUNT
	Volatile Organics by 8260B	SW8260	1	85.00	85.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4	WP2502-20	01E00101	18 MAY 1405	19 MAY	AQ
	WP2502-21	01F00101	18 MAY 1400		

	DETERMINATION	METHOD	QTY	PRICE	AMOUNT
	Volatile Organics by 8260B	SW8260	2	75.00	150.00

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
5	WP2502-6	34SLB03-0304	18 MAY 1025	19 MAY	SL
	WP2502-8	32SLB03-0506	18 MAY 0850		
	WP2502-11	33SLB05-0304	18 MAY 1235		

	DETERMINATION	METHOD	QTY	PRICE	AMOUNT
	Solids-Total Residue (TS)	CLP/CIP SO	3	0.00	0.00
	Volatile Organics by 8260B	SW8260	3	85.00	255.00
	Polynuclear Aromatic Hydrocarbons	EPA 8270	3	135.00	405.00
	Wet Lab Subcontract		3	135.00	405.00
	Total Combustible Organics	ASTM D2974	3	30.00	90.00

TOTALS			3	385.00	1155.00
--------	--	--	---	--------	---------

000001

M. J. Colby

KATAHDIN ANALYTICAL SERVICES, INCORPORATED
New England-ME Laboratory (207) 874-2400
CONFIRMATION

Page 3

ORDER NO WP-2502

Project Manager: Andrea J. Colby

REPORT TO: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

ORDER DATE: 05/19/99

PHONE: 850/385-98

FAX: 850/385-98

DUE: 18 JUN

FAC.ID: CNC CHARLESTON

INVOICE: ACCOUNTS PAYABLE
TETRA TECH NUS, INC.
661 ANDERSEN DRIVE, FOSTER PLAZA VII
PITTSBURGH, PA 15220-2745

PHONE: 412/921-7090

PO: N7912-P99264

PROJECT: CTO #68

SAMPLED BY: CLIENT

DELIVERED BY: FEDEX

DISPOSE: AFTER 18 JUL

ORDER NOTE: QC-IV NFESC-D
DD(KAS007QC-DB3)
CNC CHARLESTON

REPORT COPY: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.
PITTSBURGH, PA 15220
REPORT & DISK

INVOICE: With Report

TOTAL ORDER AMOUNT \$5,020.00

This is NOT an Invoi

AJC/BKR/WEST.AJC(dw)

06-14Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

0000012

Mr Colby



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	# flag denotes surrogate compound recovery is out of criteria.
\$	\$ flag denotes surrogate compound recovery is out of criteria. Re-extraction or re-analysis confirmed matrix interference.
E	'E' flag indicates an estimated value. The analyte was detected in the sample at a concentration greater than the standard calibration range.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.
O-1	Sample dilution required due to matrix interference, sample viscosity or other matrix-related problem; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.
O-13	Internal standard area(s) are out of criteria. Reanalysis confirmed matrix interference.
O-2	Sample dilution required for quantitation of one or more target analytes; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	'#' flag denotes surrogate compound recovery is out of criteria.
DL	'DL' flag denotes inability to calculate surrogate recovery due to sample dilution.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.
O-1	Sample dilution required due to matrix interference, sample viscosity or other matrix-related problem; therefore, standard laboratory Practical Quantitation Level (PQL) could not be achieved.
O-13	Internal standard area(s) are out of criteria. Reanalysis confirmed matrix interference.



CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2502-2
Report Date: 07/19/99
PO No. : N7912-P99264
Project : CIO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 2 of 18

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED			
32SLB02-0506	Solid	CLIENT		05/18/99	05/19/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	88.	wt %	1.0	0.10	CLP/CIP SOW	05/20/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 05/19/99 by JF

07/19/99

LJO/baeajc(dw)/msm
PE19TSS0
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-2
 SDG: WP2502
 Report Date: 7/19/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 88
 Method: EPA 8270
 Date Analyzed: 7/8/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB02-0506	SL	5/18/99	5/19/99	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<36000	ug/Kg	110	36000	330
2-METHYLNAPHTHALENE	J29000	ug/Kg	110	36000	330
ACENAPHTHYLENE	<36000	ug/Kg	110	36000	330
ACENAPHTHENE	<36000	ug/Kg	110	36000	330
FLUORENE	<36000	ug/Kg	110	36000	330
PHENANTHRENE	<36000	ug/Kg	110	36000	330
ANTHRACENE	<36000	ug/Kg	110	36000	330
FLUORANTHENE	<36000	ug/Kg	110	36000	330
PYRENE	<36000	ug/Kg	110	36000	330
BENZO[A]ANTHRACENE	<36000	ug/Kg	110	36000	330
CHRYSENE	<36000	ug/Kg	110	36000	330
BENZO[B]FLUORANTHENE	<36000	ug/Kg	110	36000	330
BENZO[K]FLUORANTHENE	<36000	ug/Kg	110	36000	330
BENZO[A]PYRENE	<36000	ug/Kg	110	36000	330
INDENO[1,2,3-CD]PYRENE	<36000	ug/Kg	110	36000	330
DIBENZ[A,H]ANTHRACENE	<36000	ug/Kg	110	36000	330
BENZO[G,H,I]PERYLENE	<36000	ug/Kg	110	36000	330
NITROBENZENE-D5	DL	%	110		
2-FLUOROBIPHENYL	DL	%	110		
TERPHENYL-D14	DL	%	110		

Report Notes: J, DL, O-1



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-2
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 88
Method: SW8260
Date Analyzed: 6/1/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB02-0506	SL	5/18/99	5/19/99	6/1/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	120	ug/Kg	1.0	5	5
NAPHTHALENE	E880	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	J4	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	105	%	1.0		
1,2-DICHLOROETHANE-D4	103	%	1.0		
TOLUENE-D8	109	%	1.0		
p-BROMOFLUOROBENZENE	#198	%	1.0		

Report Notes: J, E, #



KATAHDIN ANALYTICAL SERVICES
REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-2DL
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 88
Method: SW8260
Date Analyzed: 6/1/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB02-0506	SL	5/18/99	5/19/99	6/1/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<750	ug/Kgdrywt	150	750	5
TOLUENE	<750	ug/Kgdrywt	150	750	5
1,2-DIBROMOETHANE	<750	ug/Kgdrywt	150	750	5
ETHYLBENZENE	1800	ug/Kgdrywt	150	750	5
NAPHTHALENE	13000	ug/Kgdrywt	150	750	5
MTBE	<750	ug/Kgdrywt	150	750	5
TOTAL XYLENES	<750	ug/Kgdrywt	150	750	5
DIBROMOFLUOROMETHANE	88	%	150		
1,2-DICHLOROETHANE-D4	89	%	150		
TOLUENE-D8	87	%	150		
P-BROMOFLUOROBENZENE	130	%	150		

Report Notes: O-2, O-1



CLIENT: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

Lab Number : WP-2502-3
 Report Date: 07/19/99
 PO No. : N7912-P99264
 Project : CTO #68

WICH#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 3 of 18

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED			
32SLB04-0506	Solid	CLIENT		05/18/99	05/19/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	88.	wt %	1.0	0.10	CLP/CIP SOW	05/20/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
 (1) Sample Preparation on 05/19/99 by JF

07/19/99

LJO/baeajc(dw)/msm
 PE19TSS0
 CC: MS. LEE LECK
 TETRA TECH NUS
 FOSTER PLAZA 7
 661 ANDERSEN DR.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-3
 SDG: WP2502
 Report Date: 7/19/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 88
 Method: EPA 8270
 Date Analyzed: 7/3/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB04-0506	SL	5/18/99	5/19/99	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<360	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	<360	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	<360	ug/Kg	1.1	360	330
FLUORENE	<360	ug/Kg	1.1	360	330
PHENANTHRENE	<360	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	<360	ug/Kg	1.1	360	330
BENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	59	%	1.1		
2-FLUOROBIPHENYL	62	%	1.1		
TERPHENYL-D14	64	%	1.1		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-3
 SDG: WP2502
 Report Date: 6/25/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 88
 Method: SW8260
 Date Analyzed: 5/27/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB04-0506	SL	5/18/99	5/19/99	5/27/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<7	ug/Kg	1.5	7	5
TOLUENE	<7	ug/Kg	1.5	7	5
1,2-DIBROMOETHANE	<7	ug/Kg	1.5	7	5
ETHYLBENZENE	<7	ug/Kg	1.5	7	5
NAPHTHALENE	J4	ug/Kg	1.5	7	5
MTBE	<7	ug/Kg	1.5	7	5
TOTAL XYLENES	<7	ug/Kg	1.5	7	5
DIBROMOFLUOROMETHANE	88	%	1.5		
1,2-DICHLOROETHANE-D4	86	%	1.5		
1,2-DICHLOROETHANE-D8	92	%	1.5		
1,4-DIBROMOFLUOROBENZENE	88	%	1.5		

Report Notes: J

CLIENT: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr., Suite 102
Tallahassee, FL 32308

Lab Number : WP-2502-4
Report Date: 07/19/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 4 of 18

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED				
32SLB01-0506	Solid	CLIENT	05/18/99	05/19/99			
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	86.	wt %	1.0	0.10	CLP/CIP SOW	05/20/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
(1) Sample Preparation on 05/19/99 by JF

07/19/99

LJO/baeajc(dw)/msm
PE19TSS0
CC: MS. LEE LECK
TETRA TECH NUS
FOSTER PLAZA 7
661 ANDERSEN DR.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-4
SDG: WP2502
Report Date: 7/19/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 86
Method: EPA 8270
Date Analyzed: 7/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB01-0506	SL	5/18/99	5/19/99	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<400	ug/Kg	1.2	400	330
2-METHYLNAPHTHALENE	<400	ug/Kg	1.2	400	330
ACENAPHTHYLENE	<400	ug/Kg	1.2	400	330
ACENAPHTHENE	<400	ug/Kg	1.2	400	330
FLUORENE	<400	ug/Kg	1.2	400	330
PHENANTHRENE	<400	ug/Kg	1.2	400	330
ANTHRACENE	<400	ug/Kg	1.2	400	330
FLUORANTHENE	<400	ug/Kg	1.2	400	330
PYRENE	<400	ug/Kg	1.2	400	330
ENZO[A]ANTHRACENE	<400	ug/Kg	1.2	400	330
CHRYSENE	<400	ug/Kg	1.2	400	330
BENZO[B]FLUORANTHENE	<400	ug/Kg	1.2	400	330
BENZO[K]FLUORANTHENE	<400	ug/Kg	1.2	400	330
BENZO[A]PYRENE	<400	ug/Kg	1.2	400	330
INDENO[1,2,3-CD]PYRENE	<400	ug/Kg	1.2	400	330
DIBENZ[A,H]ANTHRACENE	<400	ug/Kg	1.2	400	330
BENZO[G,H,I]PERYLENE	<400	ug/Kg	1.2	400	330
NITROBENZENE-D5	76	%	1.2		
2-FLUOROBIPHENYL	78	%	1.2		
TERPHENYL-D14	86	%	1.2		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-4
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 86
Method: SW8260
Date Analyzed: 5/27/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB01-0506	SL	5/18/99	5/19/99	5/27/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.2	6	5
TOLUENE	<6	ug/Kg	1.2	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.2	6	5
ETHYLBENZENE	<6	ug/Kg	1.2	6	5
NAPHTHALENE	<6	ug/Kg	1.2	6	5
MTBE	<6	ug/Kg	1.2	6	5
TOTAL XYLENES	<6	ug/Kg	1.2	6	5
DIBROMOFLUOROMETHANE	90	%	1.2		
1,2-DICHLOROETHANE-D4	87	%	1.2		
TOLUENE-D8	78	%	1.2		
P-BROMOFLUOROBENZENE	67	%	1.2		

Report Notes:



KATAHDIN ANALYTICAL SERVICES
REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-4RE
SDG: WP2502
Report Date: 6/26/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: 86
Method: SW8260
Date Analyzed: 5/29/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB01-0506	SL	5/18/99	5/19/99	5/29/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.1	6	5
TOLUENE	<6	ug/Kg	1.1	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.1	6	5
ETHYLBENZENE	<6	ug/Kg	1.1	6	5
NAPHTHALENE	<6	ug/Kg	1.1	6	5
MTBE	<6	ug/Kg	1.1	6	5
TOTAL XYLENES	<6	ug/Kg	1.1	6	5
DIBROMOFLUOROMETHANE	74	%	1.1		
1,2-DICHLOROETHANE-D4	73	%	1.1		
TOLUENE-D8	\$60	%	1.1		
P-BROMOFLUOROBENZENE	\$44	%	1.1		

Report Notes: \$



CLIENT: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

Lab Number : WP-2502-5
 Report Date: 07/19/99
 PO No. : N7912-P99264
 Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 5 of 18

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED			
32SLB03-0506D	Solid	CLIENT		05/18/99	05/19/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	87.	wt %	1.0	0.10	CLP/CIP SOW	05/20/99 JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
 (1) Sample Preparation on 05/19/99 by JF

07/19/99

LJO/baeajc(dw)/msm
 PE19TSS0
 CC: MS. LEE LECK
 TETRA TECH NUS
 FOSTER PLAZA 7
 661 ANDERSEN DR.



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-5
SDG: WP2502
Report Date: 7/19/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 87

Method: EPA 8270
Date Analyzed: 7/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB03-0508D	SL	5/18/99	5/19/99	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample	Method
				PQL	PQL
NAPHTHALENE	<360	ug/Kg	1.1	360	330
2-METHYLNAPHTHALENE	<360	ug/Kg	1.1	360	330
ACENAPHTHYLENE	<360	ug/Kg	1.1	360	330
ACENAPHTHENE	<360	ug/Kg	1.1	360	330
FLUORENE	<360	ug/Kg	1.1	360	330
PHENANTHRENE	<360	ug/Kg	1.1	360	330
ANTHRACENE	<360	ug/Kg	1.1	360	330
FLUORANTHENE	<360	ug/Kg	1.1	360	330
PYRENE	<360	ug/Kg	1.1	360	330
BENZO[A]ANTHRACENE	<360	ug/Kg	1.1	360	330
CHRYSENE	<360	ug/Kg	1.1	360	330
BENZO[B]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[K]FLUORANTHENE	<360	ug/Kg	1.1	360	330
BENZO[A]PYRENE	<360	ug/Kg	1.1	360	330
INDENO[1,2,3-CD]PYRENE	<360	ug/Kg	1.1	360	330
DIBENZ[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	64	%	1.1		
2-FLUOROBIPHENYL	58	%	1.1		
TERPHENYL-D14	70	%	1.1		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-5
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 87
Method: SW8260
Date Analyzed: 5/27/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB03-0506D	SL	5/18/99	5/19/99	5/27/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.3	6	5
TOLUENE	<6	ug/Kg	1.3	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.3	6	5
ETHYLBENZENE	<6	ug/Kg	1.3	6	5
NAPHTHALENE	J6	ug/Kg	1.3	6	5
MTBE	<6	ug/Kg	1.3	6	5
TOTAL XYLENES	<6	ug/Kg	1.3	6	5
DIBROMOFLUOROMETHANE	95	%	1.3		
1,2-DICHLOROETHANE-D4	88	%	1.3		
TOLUENE-D8	94	%	1.3		
P-BROMOFLUOROBENZENE	83	%	1.3		

Report Notes: J



CLIENT: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

Lab Number : WP-2502-8
 Report Date: 07/19/99
 PO No. : N7912-P99264
 Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 17 of 18

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED				
32SLB03-0506	Solid	CLIENT		05/18/99	05/19/99			
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	84.	wt %	1.0	0.10	CLP/CIP SOW	05/20/99	JF	1
Total Combustible Organics	2.6	wt %	1.0	0.1	ASTM D2974-8	06/07/99	JF	2

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
 (1) Sample Preparation on 05/19/99 by JF
 (2) Sample Preparation on 06/04/99 by JF

07/19/99

LJO/baeajc(dw)/msm
 PE19TSS0
 CC: MS. LEE LECK
 TETRA TECH NUS
 FOSTER PLAZA 7

661 ANDERSEN DR.

340 County Road No. 5
 P.O. Box 720, Westbrook, ME 04098
 Tel: (207) 874-2400 Fax: (207) 775-4029

<http://katabdinlab.com>

210 West Road No. 5, Portsmouth, NH 03801
 Tel: (603) 431-5777 Fax: (603) 436-3356

0000063



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-8
 SDG: WP2502
 Report Date: 7/19/99
 PO No.: N7912-P99264
 Project: CTO #68
 % Solids: 84
 Method: EPA 8270
 Date Analyzed: 7/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB03-0506	SL	5/18/99	5/19/99	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<400	ug/Kg	1.2	400	330
2-METHYLNAPHTHALENE	<400	ug/Kg	1.2	400	330
ACENAPHTHYLENE	<400	ug/Kg	1.2	400	330
ACENAPHTHENE	<400	ug/Kg	1.2	400	330
FLUORENE	<400	ug/Kg	1.2	400	330
PHENANTHRENE	<400	ug/Kg	1.2	400	330
ANTHRACENE	<400	ug/Kg	1.2	400	330
FLUORANTHENE	<400	ug/Kg	1.2	400	330
PYRENE	<400	ug/Kg	1.2	400	330
BENZO[A]ANTHRACENE	<400	ug/Kg	1.2	400	330
CHRYSENE	<400	ug/Kg	1.2	400	330
BENZO[B]FLUORANTHENE	<400	ug/Kg	1.2	400	330
BENZO[K]FLUORANTHENE	<400	ug/Kg	1.2	400	330
BENZO[A]PYRENE	<400	ug/Kg	1.2	400	330
INDENO[1,2,3-CD]PYRENE	<400	ug/Kg	1.2	400	330
DIBENZ[A,H]ANTHRACENE	<400	ug/Kg	1.2	400	330
BENZO[G,H,I]PERYLENE	<400	ug/Kg	1.2	400	330
NITROBENZENE-D5	59	%	1.2		
2-FLUOROBIPHENYL	63	%	1.2		
TERPHENYL-D14	74	%	1.2		

Report Notes:



**KATAHDIN ANALYTICAL SERVICES
REPORT OF ANALYTICAL RESULTS**

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-8RE
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 84
Method: SW8260
Date Analyzed: 5/28/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB03-0506	SL	5/18/99	5/19/99	5/28/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample	Method
				PQL	PQL
BENZENE	<6	ug/Kg	1.3	6	5
TOLUENE	<6	ug/Kg	1.3	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.3	6	5
ETHYLBENZENE	<6	ug/Kg	1.3	6	5
NAPHTHALENE	<6	ug/Kg	1.3	6	5
MTBE	<6	ug/Kg	1.3	6	5
TOTAL XYLENES	<6	ug/Kg	1.3	6	5
DIBROMOFLUOROMETHANE	\$49	%	1.3		
1,2-DICHLOROETHANE-D4	\$45	%	1.3		
TOLUENE-DB	\$47	%	1.3		
P-BROMOFLUOROBENZENE	\$43	%	1.3		

Report Notes: \$



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-8
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 84
Method: SW8260
Date Analyzed: 5/28/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB03-0506	SL	5/18/99	5/19/99	5/28/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.1	6	5
TOLUENE	<6	ug/Kg	1.1	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.1	6	5
ETHYLBENZENE	<6	ug/Kg	1.1	6	5
NAPHTHALENE	10	ug/Kg	1.1	6	5
MTBE	<6	ug/Kg	1.1	6	5
TOTAL XYLENES	<6	ug/Kg	1.1	6	5
DIBROMOFLUOROMETHANE	12	%	1.1		
1,2-DICHLOROETHANE-D4	18	%	1.1		
TOLUENE-D8	\$2	%	1.1		
P-BROMOFLUOROBENZENE	\$5	%	1.1		

Report Notes: \$



CLIENT: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr., Suite 102
 Tallahassee, FL 32308

Lab Number : WP-2502-16
 Report Date: 07/19/99
 PO No. : N7912-P99264
 Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 13 of 18

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED					
32SLB09-0506	Solid	CLIENT	05/18/99	05/19/99				
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	84.	wt %	1.0	0.10	CLP/CIP SOW	05/20/99	JF	1

* PQL (Practical Quantitation Level) represents laboratory reporting limits and may not reflect sample-specific reporting limits. Sample-specific limits are indicated by results annotated with '<' values.
 (1) Sample Preparation on 05/19/99 by JF

07/19/99

LJO/baeajc(dw)/msm
 PE19TSS1
 CC: MS. LEE LECK
 TETRA TECH NUS
 FOSTER PLAZA 7
 661 ANDERSEN DR.



**KATAHDIN ANALYTICAL SERVICES
REPORT OF ANALYTICAL RESULTS**

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-16
SDG: WP2502
Report Date: 7/19/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 82
Method: EPA 8270
Date Analyzed: 7/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB09-0506	SL	5/18/99	5/19/99	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample	Method
				PQL	PQL
NAPHTHALENE	<400	ug/Kg	1.2	400	330
2-METHYLNAPHTHALENE	<400	ug/Kg	1.2	400	330
ACENAPHTHYLENE	<400	ug/Kg	1.2	400	330
ACENAPHTHENE	<400	ug/Kg	1.2	400	330
FLUORENE	<400	ug/Kg	1.2	400	330
PHENANTHRENE	<400	ug/Kg	1.2	400	330
ANTHRACENE	<400	ug/Kg	1.2	400	330
FLUORANTHENE	<400	ug/Kg	1.2	400	330
PYRENE	<400	ug/Kg	1.2	400	330
BENZO[A]ANTHRACENE	<400	ug/Kg	1.2	400	330
CHRYSENE	<400	ug/Kg	1.2	400	330
BENZO[B]FLUORANTHENE	<400	ug/Kg	1.2	400	330
BENZO[K]FLUORANTHENE	<400	ug/Kg	1.2	400	330
BENZO[A]PYRENE	<400	ug/Kg	1.2	400	330
INDENO[1,2,3-CD]PYRENE	<400	ug/Kg	1.2	400	330
DIBENZ[A,H]ANTHRACENE	<400	ug/Kg	1.2	400	330
BENZO[G,H,I]PERYLENE	<400	ug/Kg	1.2	400	330
NITROBENZENE-D5	67	%	1.2		
2-FLUOROBIPHENYL	63	%	1.2		
TERPHENYL-D14	77	%	1.2		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-16
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 82
Method: SW8260
Date Analyzed: 6/1/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
32SLB09-0506	SL	5/18/99	5/19/99	6/1/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<6	ug/Kg	1.3	6	5
TOLUENE	<6	ug/Kg	1.3	6	5
1,2-DIBROMOETHANE	<6	ug/Kg	1.3	6	5
ETHYLBENZENE	<6	ug/Kg	1.3	6	5
NAPHTHALENE	<6	ug/Kg	1.3	6	5
MTBE	<6	ug/Kg	1.3	6	5
TOTAL XYLENES	<6	ug/Kg	1.3	6	5
DIBROMOFLUOROMETHANE	96	%	1.3		
1,2-DICHLOROETHANE-D4	94	%	1.3		
TOLUENE-D8	90	%	1.3		
P-BROMOFLUOROBENZENE	72	%	1.3		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: WP2502-19
 SDG: WP2502
 Report Date: 6/26/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: -
 Method: SW8260
 Date Analyzed: 5/26/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
04TL00104	SL	5/3/99	5/19/99	5/26/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kgdrywt	1.0	5	5
TOLUENE	<5	ug/Kgdrywt	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kgdrywt	1.0	5	5
ETHYLBENZENE	<5	ug/Kgdrywt	1.0	5	5
NAPHTHALENE	<5	ug/Kgdrywt	1.0	5	5
MTBE	<5	ug/Kgdrywt	1.0	5	5
TOTAL XYLENES	<5	ug/Kgdrywt	1.0	5	5
DIBROMOFLUOROMETHANE	83	%	1.0		
1,2-DICHLOROETHANE-D4	83	%	1.0		
TOLUENE-D8	86	%	1.0		
P-BROMOFLUOROBENZENE	81	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-20
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 5/26/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
01E00101	AQ	5/18/99	5/19/99	5/26/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample	Method
				PQL	PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	83	%	1.0		
1,2-DICHLOROETHANE-D4	82	%	1.0		
TOLUENE-D8	88	%	1.0		
P-BROMOFLUOROBENZENE	84	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: WP2502-21
SDG: WP2502
Report Date: 6/26/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 5/26/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
01F00101	AQ	5/18/99	5/19/99	5/26/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample	Method
				PQL	PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	83	%	1.0		
1,2-DICHLOROETHANE-D4	82	%	1.0		
TOLUENE-DB	88	%	1.0		
P-BROMOFLUOROBENZENE	83	%	1.0		

Report Notes:

Method Blank and Laboratory Control Sample Results

Client:	Tetra Tech NUS
Work Order:	WP2502

*METHOD BLANK RESULTS**LABORATORY CONTROL SAMPLE RESULTS*

Parameter	Date of Prep	Date of Analysis	Units	Concentration			Practical Quantitation Level**	LABORATORY CONTROL SAMPLE RESULTS						
				Measured in Blank	Acceptance Range	Acceptance Range		Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)	
TS -Total Residue	19-May-99	20-May-99	wt %	<	0.10	<	0.10	0.10	wt %	90	89.8	100	80-120	
	19-May-99	20-May-99	wt %	<	0.10	<	0.10	0.10	wt %	90	90	100	80-120	
TCO-Total Combustible Organics	04-Jun-99	07-Jun-99	wt %	<	0.10	<	0.10	0.10	wt %	NA	NA	NA		

** Practical quantitation level is the lowest concentration measurable for samples with normal chemical and physical composition during routine laboratory operations.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory and method specified acceptance range except as noted.



Duplicate and Matrix Spike/Matrix Spike Duplicate Results

Client:	Tetra Tech NUS
Work Order:	WP2502

DUPLICATE RESULTS

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Parameter	Sample No	Sample Measurements		Mean Conc	RPD (%)	Acceptance Range for RPD (%)	Concentration or Quantity				Matrix Spike Recovery (%)		RPD (%)	Acceptance Range (%)	
		Rep 1	Rep 2				Units	Sampl Only	Spike Added	Sample +Spike Dup 1	Sample +Spike Dup 2	Sample +Spike Dup 1			Sample +Spike Dup 2
TS	WP2502-6	wt%	78.6	78.9	78.8	0.4	0-20	MS/MSD Not Applicable for this Parameter							
TS	WP2502-16	wt%	83.6	82.2	82.9	1.7	0-20	MS/MSD Not Applicable for this Parameter							

RPD = Relative percent difference, which is the absolute value of the difference between two replicate results divided by the mean concentration then multiplied by 100%.

DATA QUALITY COMMENTS:

Results of all quality control measurements are within the laboratory or contract specified acceptance range except as noted. The laboratory does not use the sample duplicate and matrix spike acceptance ranges as acceptance criteria for a specific analysis. Sample duplicate and matrix spike data are used to evaluate method performance in the environmental sample matrix only. Please refer to LCS data for assessment of quality control for each parameter.

2A
SOIL SEMIVOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2502

Matrix: SOIL

Client Sample ID	Lab Sample ID	SMC1 (NBZ) #	SMC2 (FBP) #	SMC3 (TPH) #	Total Out
SBLK;052999	SBLK;052999	74	79	86	0
LCS;052999	LCS;052999	68	70	72	0
32SLB04-0506	WP2502-3	59	62	64	0
32SLB03-0506D	WP2502-5	64	58	70	0
32SLB01-0506	WP2502-4	76	78	86	0
32SLB03-0506	WP2502-8	59	63	74	0
34SLB01-0203	WP2502-1	54	54	70	0
34SLB01-0203MS	WP2502-1MS	58	59	74	0
34SLB01-0203MSD	WP2502-1MSD	68	70	72	0
33SLB05-0304	WP2502-11	78	68	84	0
33SLB04-0304D	WP2502-12	83	80	89	0
33SLB06-0405	WP2502-14	85	80	90	0
33SLB04-0304	WP2502-13	78	73	84	0
32SLB09-0506	WP2502-16	67	63	77	0
33SLB08-0405	WP2502-18	68	79	68	0
34SLB04-0304	WP2502-10	62	61	67	0
33SLB05-0304	WP2502-11RA	82	57	86	0
33SLB04-0304D	WP2502-12RA	64	55	77	0
33SLB04-0304	WP2502-13RA	71	62	75	0
33SLB06-0405	WP2502-14RA	71	66	71	0
34SLB03-0304	WP2502-6	62	57	69	0
34SLB02-0304D	WP2502-7	58	55	79	0
33SLB08-0405	WP2502-18RA	99	81	124 *	1
SBLKA;052999	SBLKA;052999	85	82	88	0
34SLB02-0304	WP2502-9	68	64	75	0
33SLB01-0304	WP2502-15	72	71	85	0
32SLB02-0506	WP2502-2	DL	DL	DL	0
34SLB05-0203	WP2502-17	DL	DL	DL	0

QC LIMITS

SMC1 (NBZ) = NITROBENZENE-D5 (14-107)
 SMC2 (FBP) = 2-FLUOROBIPHENYL (32-109)
 SMC3 (TPH) = TERPHENYL-D14 (26-116)

Column to be used to flag recovery value

* Values are outside of QC limits



**KATAHDIN ANALYTICAL SERVICES
REPORT OF ANALYTICAL RESULTS**

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308
 Proj. ID: CNC CHARLESTON

Lab Number: SBLK;052999
 SDG: WP2502
 Report Date: 7/19/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 100
 Method: EPA 8270
 Date Analyzed: 7/3/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;052999	SL	-	-	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
NAPHTHALENE	<330	ug/Kg	1.0	330	330
2-METHYLNAPHTHALENE	<330	ug/Kg	1.0	330	330
ACENAPHTHYLENE	<330	ug/Kg	1.0	330	330
ACENAPHTHENE	<330	ug/Kg	1.0	330	330
FLUORENE	<330	ug/Kg	1.0	330	330
PHENANTHRENE	<330	ug/Kg	1.0	330	330
ANTHRACENE	<330	ug/Kg	1.0	330	330
FLUORANTHENE	<330	ug/Kg	1.0	330	330
PYRENE	<330	ug/Kg	1.0	330	330
BENZO[A]ANTHRACENE	<330	ug/Kg	1.0	330	330
CHRYSENE	<330	ug/Kg	1.0	330	330
BENZO[B]FLUORANTHENE	<330	ug/Kg	1.0	330	330
BENZO[K]FLUORANTHENE	<330	ug/Kg	1.0	330	330
BENZO[A]PYRENE	<330	ug/Kg	1.0	330	330
INDENO[1,2,3-CD]PYRENE	<330	ug/Kg	1.0	330	330
DIBENZ[A,H]ANTHRACENE	<330	ug/Kg	1.0	330	330
BENZO[G,H,I]PERYLENE	<330	ug/Kg	1.0	330	330
NITROBENZENE-D5	74	%	1.0		
2-FLUOROBIPHENYL	79	%	1.0		
TERPHENYL-D14	86	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Owen Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: SBLKA;052999
 SDG: WP2502
 Report Date: 7/19/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 100
 Method: EPA 8270
 Date Analyzed: 7/8/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLKA;052999	SL	-	-	5/29/99	DPD	EPA 3550	KRT

Compound	Result	Units	DF	Sample	Method
				PQL	PQL
NAPHTHALENE	<330	ug/Kg	1.0	330	330
2-METHYLNAPHTHALENE	<330	ug/Kg	1.0	330	330
ACENAPHTHYLENE	<330	ug/Kg	1.0	330	330
ACENAPHTHENE	<330	ug/Kg	1.0	330	330
FLUORENE	<330	ug/Kg	1.0	330	330
PHENANTHRENE	<330	ug/Kg	1.0	330	330
ANTHRACENE	<330	ug/Kg	1.0	330	330
FLUORANTHENE	<330	ug/Kg	1.0	330	330
PYRENE	<330	ug/Kg	1.0	330	330
BENZO[A]ANTHRACENE	<330	ug/Kg	1.0	330	330
CHRYSENE	<330	ug/Kg	1.0	330	330
BENZO[B]FLUORANTHENE	<330	ug/Kg	1.0	330	330
BENZO[K]FLUORANTHENE	<330	ug/Kg	1.0	330	330
BENZO[A]PYRENE	<330	ug/Kg	1.0	330	330
INDENO[1,2,3-CD]PYRENE	<330	ug/Kg	1.0	330	330
DIBENZ[A,H]ANTHRACENE	<330	ug/Kg	1.0	330	330
BENZO[G,H,I]PERYLENE	<330	ug/Kg	1.0	330	330
NITROBENZENE-D5	85	%	1.0		
2-FLUOROBIPHENYL	82	%	1.0		
TERPHENYL-D14	88	%	1.0		

Report Notes:

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: K1561

Sample ID: LCS;052999

Date Run: 7/3/99

Analyst: KRT

Time Injected: 6:47:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	1667	1200	72	60-140
ACENAPHTHENE	1667	1290	77	60-140
ACENAPHTHYLENE	1667	1170	70	60-140
ANTHRACENE	1667	1240	74	60-140
BENZO[A]ANTHRACENE	1667	1290	77	60-140
BENZO[A]PYRENE	1667	1220	74	60-140
BENZO[B]FLUORANTHENE	1667	1240	74	60-140
BENZO[G,H,I]PERYLENE	1667	1500	90	60-140
BENZO[K]FLUORANTHENE	1667	1340	81	60-140
CHRYSENE	1667	1330	80	60-140
DIBENZ[A,H]ANTHRACENE	1667	1390	84	60-140
FLUORANTHENE	1667	1390	84	60-140
FLUORENE	1667	1200	72	60-140
INDENO[1,2,3-CD]PYRENE	1667	1530	92	60-140
NAPHTHALENE	1667	1220	73	60-140
PHENANTHRENE	1667	1320	79	60-140
PYRENE	1667	1130	68	60-140

* Out of Limits

1

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP2502-1	K1572	7/6/99	2:44:00 PM	KRT	SL	8270_99
WP2502-1MS	K1573	7/6/99	3:30:00 PM	KRT	SL	8270_99
WP2502-1MSD	K1574	7/6/99	4:17:00 PM	KRT	SL	8270_99

Compound Name	Native (ug/Kg)	MS Spk Amount (ug/Kg)	MSD Spk Amount (ug/Kg)	MS Result (ug/Kg)	MSD Result (ug/Kg)	MS REC (%)	MSD REC (%)	Recovery Limits (%)	RPD (%)	RPD Limit (%)
CHRYSENE	0	2320	2320	1580	1730	68	75	60-140	9.1	50
ACENAPHTHENE	0	2320	2320	1500	1700	64	73	60-140	12	50
ACENAPHTHYLENE	0	2320	2320	1440	1620	62	70	60-140	12	50
ANTHRACENE	0	2320	2320	1540	1660	66	72	60-140	7.5	50
BENZO[A]ANTHRACENE	0	2320	2320	1590	1640	68	71	60-140	3.1	50
BENZO[A]PYRENE	0	2320	2320	1530	1750	66	75	60-140	13	50
BENZO[B]FLUORANTHENE	0	2320	2320	1630	1960	70	84	60-140	18	50
2-METHYLNAPHTHALENE	0	2320	2320	1370	1500	*59	65	60-140	9.0	50
BENZO[K]FLUORANTHENE	0	2320	2320	1750	1940	76	84	60-140	10	50
PYRENE	0	2320	2320	1560	1500	67	64	60-140	3.9	50
DIBENZ[A,H]ANTHRACENE	0	2320	2320	1320	1400	*57	60	60-140	5.9	50
FLUORANTHENE	0	2320	2320	1660	1800	72	77	60-140	8.1	50
FLUORENE	0	2320	2320	1560	1690	67	73	60-140	8.0	50
INDENO[1,2,3-CD]PYRENE	0	2320	2320	1290	1240	*56	*53	60-140	4.0	50
NAPHTHALENE	0	2320	2320	1360	1540	*59	66	60-140	12	50
PHENANTHRENE	0	2320	2320	1590	1780	69	77	60-140	11	50
BENZO[G,H,I]PERYLENE	0	2320	2320	1320	1490	*57	64	60-140	12	50

RPD = [(ms res - msd res) / (ms res + msd res) / 2] * 100

* Out of Limits

1

2A
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2502

Matrix: WATER

Client Sample ID	Lab Sample ID	SMC1 (DFM) #	SMC2 (DCA) #	SMC3 (TOL) #	SMC4 (BFB) #	Total Out
LCSF26B	LCSF26B	85	83	86	90	0
VBLKF26B	VBLKF26B	84	84	87	82	0
01E00101	WP2502-20	83	82	88	84	0
01F00101	WP2502-21	83	82	88	83	0
LCSF01A	LCSF01A	92	98	88	96	0
VBLKF01A	VBLKF01A	89	91	91	86	0
LCSQ28A	LCSQ28A	104	100	97	100	0
VBLKQ28A	VBLKQ28A	93	90	97	95	0

QC LIMITS

SMC1 (DFM) = DIBROMOFLUOROMETHANE (75-129)
 SMC2 (DCA) = 1,2-DICHLOROETHANE-D4 (65-135)
 SMC3 (TOL) = TOLUENE-D8 (82-120)
 SMC4 (BFB) = P-BROMOFLUOROBENZENE (69-125)

Column to be used to flag recovery value

* Values are outside of QC limits

2A
SOIL VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2502

Matrix: SOIL

Client Sample ID	Lab Sample ID	SMC1 (DFM) #	SMC2 (DCA) #	SMC3 (TOL) #	SMC4 (BFB) #	Total Out
04TL00104	WP2502-19	83	83	86	81	0
32SLB02-0506DL	WP2502-2DL	88	89	87	130	0
MBLK060199	MBLK060199	90	88	86	83	0
LCSM27C	LCSM27C	121	126	120	119	0
VBLKM27C	VBLKM27C	122	122	122	120	0
33SLB05-0304	WP2502-11	88	104	62 *	60 *	2
33SLB04-0304D	WP2502-12	89	109	80	77	0
33SLB04-0304	WP2502-13	94	109	80	57 *	1
34SLB01-0203	WP2502-1	92	87	94	97	0
LCSZ27B	LCSZ27B	94	92	96	81	0
VBLKZ27A	VBLKZ27A	105	104	105	83	0
32SLB04-0506	WP2502-3	88	86	92	88	0
32SLB01-0506	WP2502-4	90	87	78	67	0
32SLB03-0506D	WP2502-5	95	88	94	83	0
34SLB02-0304D	WP2502-7	88	83	82	75	0
32SLB03-0506	WP2502-8	12 *	18 *	2 *	5 *	4
34SLB04-0304	WP2502-10	84	76	77	52 *	1
33SLB01-0304	WP2502-15	80	74	76	62 *	1
SZ28A	LCSZ28A	96	92	109	102	0
VBLKZ28A	VBLKZ28A	86	90	85	90	0
34SLB03-0304	WP2502-6	84	79	96	135	0
32SLB03-0506RE	WP2502-8RE	49 *	45 *	47 *	43 *	4
34SLB02-0304	WP2502-9	79	82	86	66	0
34SLB04-0304RE	WP2502-10RE	70	65 *	61 *	36 *	3
33SLB05-0304RE	WP2502-11RE	81	85	73	59 *	1
33SLB04-0304DRE	WP2502-12RE	64 *	64 *	43 *	17 *	4
33SLB04-0304RE	WP2502-13RE	84	85	68 *	52 *	2
LCSZ29A	LCSZ29A	104	103	103	89	0
VBLKZ29B	VBLKZ29B	120	119	102	79	0
32SLB01-0506RE	WP2502-4RE	74	73	60 *	44 *	2
LCSZ01A	LCSZ01A	89	97	87	90	0
VBLKZ01A	VBLKZ01A	103	103	108	90	0
32SLB02-0506	WP2502-2	105	103	109	198 *	1

QC LIMITS

- SMC1 (DFM) = DIBROMOFLUOROMETHANE (69-148)
- SMC2 (DCA) = 1,2-DICHLOROETHANE-D4 (66-149)
- SMC3 (TOL) = TOLUENE-D8 (68-147)
- SMC4 (BFB) = P-BROMOFLUOROBENZENE (64-152)

Column to be used to flag recovery value

* Values are outside of QC limits

2A
SOIL VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Katahdin Analytical Services

SDG No.: WP2502

Matrix: SOIL

Client Sample ID	Lab Sample ID	SMC1 (DFM) #	SMC2 (DCA) #	SMC3 (TOL) #	SMC4 (BFB) #	Total Out
33SLB06-0405	WP2502-14	91	84	86	60 *	1
34SLB05-0203	WP2502-17	96	88	96	73	0
33SLB08-0405	WP2502-18	47 *	48 *	13 *	1 *	4
33SLB06-0405RE	WP2502-14RE	86	83	70	43 *	1
32SLB09-0506	WP2502-16	96	94	90	72	0
33SLB08-0405RE	WP2502-18RE	24 *	28 *	4 *	1 *	4
33SLB01-0304RE	WP2502-15RE	97	91	86	57 *	1
LCS	LCS	109	106	116	167 *	1
LCSD	LCSD	112	108	117	109	0

QC LIMITS

SMC1 (DFM) = DIBROMOFLUOROMETHANE (69-148)
 SMC2 (DCA) = 1,2-DICHLOROETHANE-D4 (66-149)
 SMC3 (TOL) = TOLUENE-D8 (68-147)
 SMC4 (BFB) = P-BROMOFLUOROBENZENE (64-152)

Column to be used to flag recovery value

* Values are outside of QC limits



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKF26B
SDG: WP2502
Report Date: 6/25/99
PO No.: N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 5/26/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF26B	AQ	-	-	5/26/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	84	%	1.0		
1,2-DICHLOROETHANE-D4	84	%	1.0		
TOLUENE-D8	87	%	1.0		
P-BROMOFLUOROBENZENE	82	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Owen Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKZ27A
 SDG: WP2502
 Report Date: 6/25/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 100
 Method: SW8260
 Date Analyzed: 5/27/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ27A	SL	-	-	5/27/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	105	%	1.0		
1,2-DICHLOROETHANE-D4	104	%	1.0		
TOLUENE-D8	105	%	1.0		
P-BROMOFLUOROBENZENE	83	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Owen Park Dr.
 Suite 102
 Tallahassee, FL 32308
Proj. ID: CNC CHARLESTON

Lab Number: VBLKM27C
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 5/27/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKM27C	SL	-	-	5/27/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	122	%	1.0		
DICHLOROETHANE-D4	122	%	1.0		
TOLUENE-D8	122	%	1.0		
P-BROMOFLUOROBENZENE	120	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKQ28A
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 5/28/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKQ28A	AQ	-	-	5/28/99	HMP	5030	HMP

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	93	%	1.0		
1,2-DICHLOROETHANE-D4	90	%	1.0		
TOLUENE-D8	97	%	1.0		
P-BROMOFLUOROBENZENE	95	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES
REPORT OF ANALYTICAL RESULTS

nt: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Lab Number: VBLKZ28A
 SDG: WP2502
 Report Date: 6/25/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 100
 Method: SW8260
 Date Analyzed: 5/28/99

Proj. ID: CNC CHARLESTON

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ28A	SL	-	-	5/28/99	JSS	5030	JSS

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	86	%	1.0		
DICHLOROETHANE-D4	90	%	1.0		
TOLUENE-D8	85	%	1.0		
P-BROMOFLUOROBENZENE	90	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKZ29B
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 5/29/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ29B	SL	-	-	5/29/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	120	%	1.0		
1,2-DICHLOROETHANE-D4	119	%	1.0		
TOLUENE-D8	102	%	1.0		
P-BROMOFLUOROBENZENE	79	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

nt: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKZ01A
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/1/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ01A	SL	-	-	6/1/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/Kg	1.0	5	5
TOLUENE	<5	ug/Kg	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/Kg	1.0	5	5
ETHYLBENZENE	<5	ug/Kg	1.0	5	5
NAPHTHALENE	<5	ug/Kg	1.0	5	5
MTBE	<5	ug/Kg	1.0	5	5
TOTAL XYLENES	<5	ug/Kg	1.0	5	5
DIBROMOFLUOROMETHANE	103	%	1.0		
DICHLOROETHANE-D4	103	%	1.0		
TOLUENE-D8	108	%	1.0		
P-BROMOFLUOROBENZENE	90	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
Tetra Tech NUS
1401 Oven Park Dr.
Suite 102
Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: VBLKF01A
SDG: WP2502
Report Date: 6/26/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/1/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF01A	AQ	-	-	6/1/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<5	ug/L	1.0	5	5
TOLUENE	<5	ug/L	1.0	5	5
1,2-DIBROMOETHANE	<5	ug/L	1.0	5	5
ETHYLBENZENE	<5	ug/L	1.0	5	5
NAPHTHALENE	<5	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	89	%	1.0		
1,2-DICHLOROETHANE-D4	91	%	1.0		
TOLUENE-D8	91	%	1.0		
P-BROMOFLUOROBENZENE	86	%	1.0		

Report Notes:



KATAHDIN ANALYTICAL SERVICES

REPORT OF ANALYTICAL RESULTS

Client: Paul Calligan
 Tetra Tech NUS
 1401 Oven Park Dr.
 Suite 102
 Tallahassee, FL 32308

Proj. ID: CNC CHARLESTON

Lab Number: MBLK060199
SDG: WP2502
Report Date: 6/25/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/1/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
MBLK060199	SL	-	-	6/1/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<600	ug/Kgdrywt	120	600	5
TOLUENE	<600	ug/Kgdrywt	120	600	5
1,2-DIBROMOETHANE	<600	ug/Kgdrywt	120	600	5
ETHYLBENZENE	<600	ug/Kgdrywt	120	600	5
NAPHTHALENE	<600	ug/Kgdrywt	120	600	5
MTBE	<600	ug/Kgdrywt	120	600	5
TOTAL XYLENES	<600	ug/Kgdrywt	120	600	5
DIBROMOFLUOROMETHANE	90	%	120		
1,1-DICHLOROETHANE-D4	88	%	120		
1,2-DICHLOROETHANE-D6	86	%	120		
P-BROMOFLUOROBENZENE	83	%	120		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: M0484

Sample ID: LCSM27C

Date Run: 5/27/99

Analyst: JSS

Time Injected 5:24:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	57.1	114	60-140
BENZENE	50	53.4	107	60-140
ETHYLBENZENE	50	52.0	104	60-140
MTBE	50	58.1	116	60-140
NAPHTHALENE	50	59.8	120	60-140
TOLUENE	50	54.3	108	60-140
TOTAL XYLENES	150	152	102	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F0520

Sample ID: LCSF26B

Date Run: 5/26/99

Analyst: JSS

Time Injected 5:55:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	43.4	87	60-140
BENZENE	50	42.0	84	60-140
ETHYLBENZENE	50	43.7	87	60-140
MTBE	50	45.0	90	60-140
NAPHTHALENE	50	45.2	90	60-140
TOLUENE	50	43.3	87	60-140
TOTAL XYLENES	150	130	86	60-140

* Out of Limits

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0870

Sample ID: LCSZ27B

Date Run: 5/27/99

Analyst: JSS

Time Injected 4:25:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	44.8	90	60-140
BENZENE	50	44.0	88	60-140
ETHYLBENZENE	50	51.3	102	60-140
MTBE	50	50.4	101	60-140
NAPHTHALENE	50	48.0	96	60-140
TOLUENE	50	43.4	87	60-140
TOTAL XYLENES	150	157	105	60-140

* Out of Limits

1

4000077

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0889

Sample ID: LCSZ28A

Date Run: 5/28/99

Analyst: JSS

Time Injected 9:14:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	46.8	94	60-140
BENZENE	50	51.2	102	60-140
ETHYLBENZENE	50	66.3	133	60-140
MTBE	50	55.7	111	60-140
NAPHTHALENE	50	78.8	*158	60-140
TOLUENE	50	52.5	105	60-140
TOTAL XYLENES	150	204	136	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Q5312

Sample ID: LCSQ28A

Date Run: 5/28/99

Analyst: HMP

Time Injected 9:39:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	47.7	95	60-140
BENZENE	50	49.2	98	60-140
ETHYLBENZENE	50	50.0	100	60-140
MTBE	50	43.5	87	60-140
NAPHTHALENE	50	46.5	93	60-140
TOLUENE	50	48.6	97	60-140
TOTAL XYLENES	150	136	91	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0917

Sample ID: LCSZ29A

Date Run: 5/29/99

Analyst: KRT

Time Injected 5:45:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	50.9	102	60-140
BENZENE	50	54.6	109	60-140
ETHYLBENZENE	50	61.2	122	60-140
MTBE	50	47.1	94	60-140
NAPHTHALENE	50	40.7	81	60-140
TOLUENE	50	57.1	114	60-140
TOTAL XYLENES	150	184	123	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0922

Sample ID: LCSZ01A

Date Run: 6/1/99

Analyst: KRT

Time Injected 7:46:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	52.5	105	60-140
BENZENE	50	48.7	97	60-140
ETHYLBENZENE	50	59.1	118	60-140
MTBE	50	56.7	113	60-140
NAPHTHALENE	50	56.0	112	60-140
TOLUENE	50	52.5	105	60-140
TOTAL XYLENES	150	183	122	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F0637

Sample ID: LCSF01A

Date Run: 6/1/99

Analyst: KRT

Time Injected 11:12:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	46.3	93	60-140
BENZENE	50	43.4	87	60-140
ETHYLBENZENE	50	46.0	92	60-140
MTBE	50	47.4	95	60-140
NAPHTHALENE	50	43.4	87	60-140
TOLUENE	50	44.8	90	60-140
TOTAL XYLENES	150	132	88	60-140

* Out of Limits

1

Katahdin Analytical Services

LCS/LCSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
LCS	Z0934	6/1/99	15:42	KRT	SL	8260
LCSD	Z0935	6/1/99	16:19	KRT	SL	8260

Compound Name	Spk Amt ug/Kg	LCS Result ug/Kg	LCSD Result ug/Kg	LCS Rec (%)	LCSD Rec (%)	Rec. Limits (%)	RPD (%)	RPD Limit (%)
1,2-DIBROMOETHANE	50	52.8	53.0	100	110	60-140	9.5	30
BENZENE	50	55.7	57.0	110	110	60-140	0	30
ETHYLBENZENE	50	66.6	67.2	130	130	60-140	0	30
MTBE	50	50.2	53.6	100	110	60-140	9.5	30
NAPHTHALENE	50	49.8	54.3	100	110	60-140	9.5	30
TOLUENE	50	60.1	60.5	120	120	60-140	0	30
TOTAL XYLENES	150	207	208	140	140	60-140	0	30

$RPD = (lcs\ rec - lcsd\ rec) / [(lcsd\ rec + lcsd\ rec) / 2] * 100$

* Out of Limits

1



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

June 2, 1999

Ms. Andrea Colby
Katahdin Analytical
340 County Rd
Westbrook, ME 04092

Dear Ms. Colby:

Enclosed is a data package for samples from the former Charleston Naval Complex site. The samples were analyzed for general chemistry.

General Engineering Laboratories appreciates this opportunity to provide you with analytical results, and trusts that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171.

Yours very truly,

Valerie S. Davis
Project Manager

enclosure



CASE NARRATIVE
for
Katahdin Analytical
Former Charleston Naval Complex Site
SDG #95606

June 2, 1999

Laboratory Identification:

General Engineering Laboratories, Inc. (GEL)

Mailing Address:

PO Box 30712
Charleston, SC 29417

Express Mail Delivery and Shipping Address:

2040 Savage Rd
Charleston, SC 29414

Telephone Number:

(843) 769-7391

Summary:

Sample receipt

The samples from the former Charleston Naval Complex site arrived at General Engineering Laboratories, Inc., Charleston, SC on May 18, 1999, for environmental analyses. The sample containers arrived without any visible signs of tampering or breakage. The samples were delivered with chain of custody documentation and signatures.

The following samples were received by the laboratory:

<u>Laboratory</u> <u>Identification</u>	<u>Sample</u> <u>Description</u>
9905606-01	17SLB03-0506
9905606-02	18SLB03-0506
9905606-03	19SLB16-0203
9905606-04	32SLB03-0506
9905606-05	34SLB03-0304
9905606-06	33SLB05-0304



General Narrative:

Sample analyses were conducted using methodology as outlined in General Engineering Laboratories Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are listed in the analytical case narratives.

Internal Chain of Custody:

Custody was maintained for the samples.

Data Package:

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, and General Chemistry.

The following are definitions of reporting limits used at General Engineering Laboratories:

DL Detection Limit: The minimum level of an analyte that can be determined (identified not quantified) with 99% confidence. The values are normally achieved by preparing and analyzing seven aliquots of laboratory water spiked 1 to 5 times the estimated MDL, taking the standard deviation and multiplying it against the one-tailed t-statistic at 99%. This computed value is then verified for reasonableness by repeating the study using the concentration found in the initial study, calculating an F-ratio, and computing the final limit. Sample specific preparation and dilution factors are applied to these limits when they are reported.

The detection limit is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is above zero. It answers the question "Is It Present".

QL Quantitation Limit: The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The QL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the QL analyte concentration is selected as the lowest non-zero standard in the calibration curve.

Sample QL's are highly matrix-dependent. Sample specific preparation and dilution factors are applied to these limits when they are reported.

The QL is always \geq DL.

This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.



Valerie S. Davis
Project Manager

fc:9905606%

Case Narrative for
KATA
SDG# 95606

TOTAL ORGANIC CARBON

Analytical Batch Number: 150121

Analytical Method: SW846 9060 Modified

<u>Laboratory Number</u>	<u>Sample Description</u>
9905606-01	17SLB03-0506
9905606-02	18SLB03-0506
9905606-03	19SLB16-0203
9905606-04	32SLB03-0506
9905606-05	34SLB03-0304
9905606-06	33SLB05-0304
QC615649	Duplicate of 9905519-05
QC615649	Post Spike of 9905519-05
QC615647	Blank
QC615650	Laboratory Control Sample

Sample Preparation:

The method quoted is for aqueous samples only. It is modified to accommodate soils analysis.

Instrument Calibration:

The instrument used was a Dohrmann DC-80 TOC analyzer. The instrument was properly calibrated.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The post spike was run on the following Sample Number.

9905519-05

The analyte recovery in the post spike was within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

TOTAL PETROLEUM HYDROCARBONS

Analytical Batch Number: 150797

Analytical Method: SW846 9071A

<u>Laboratory Number</u>	<u>Sample Description</u>
9905606-01	17SLB03-0506
9905606-04	32SLB03-0506
9905606-05	34SLB03-0304
9905606-06	33SLB05-0304
QC618246	Blank
QC618247	Laboratory Control Sample
QC618248	Matrix Spike of 9905606-06
QC618249	Duplicate of 9905606-06

Instrument Calibration:

The instrument was properly calibrated.

Holding Time:

All samples were analyzed within the required holding time.

Blanks:

No target analytes were detected in the method blank above the required acceptance limit.

Spike Analyses:

The matrix spike was run on the following Sample Number.

9905606-06

The analyte recovery in the matrix spike was within the required acceptance limits.

Laboratory Control Samples:

All analyte recoveries in the laboratory control sample were within the required acceptance limits.

Sample Duplicates:

All sample duplicate results were within the required acceptance limits.

9905606-06

Dilutions:

None of the samples were diluted.

Non Conformance Reports:

There were no Nonconformance Reports associated with this batch.

The above narrative has been reviewed by: Jan A. A Date: 05/13/11

General Engineering Labor: i, Inc.
 2040 Savage Road
 Charleston, South Carolina 29407
 P.O. Box 30712
 Charleston, South Carolina 29417
 (803) 556-8171

CHAIN OF CUSTODY RECORD

9905606 1/2

Page 1 of 1

Client Name/Facility Name			# OF CONTAINERS				SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods														Remarks	
Collected by/Company							pH, conductivity	TOC/DOC	TOX	Chloride, Fluoride, Sulfide	Nitrite/Nitrate	VOC - Specify Method required	METALS - specify	Pesticide	Herbicide	Total Phenol	Acid Extractables	B/N Extractables	PCB's	Cyanide		Coliform - specify type
SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB																
01 17SLB03-0506	5/17	1210	X	X			2	X													X	
02 18SLB03-0506	5/17	1550	X	X			1	X														
03 19SLB16-0203	5/17	1640	X	X			1	X														
04 32SLB03-0506	5/18	0850	X	X			2	X													X	
05 34SLB03-0304	5/18	1025	X	X			2	X													X	
06 33SLB05-D304	5/18	1235	X	X			2	X													X	
Relinquished by:	Date:	Time:	Received by:				Relinquished by:	Date:	Time:	Received by:												
<i>[Signature]</i>	5/18/99	3:55 pm	<i>[Signature]</i>																			
Relinquished by:	Date:	Time:	Received by lab by:				Date:	Time:	Remarks:													
			<i>[Signature]</i>				5/18/99	1553														

40326
 .1
 .2
 .2
 .1
 .1
 .1

FEDERAL SAMPLE RECEIPT REVIEW

Client KAFIA

Received by [Signature]

Date 5/18/99

GEL COOLER GEL POLY COOLER CLIENT COOLER OTHER

SAMPLE REVIEW CRITERIA	YES	NO	COMMENTS/QUALIFIERS
1. Were shipping containers received intact and sealed? Call Project Manager if No	✓		
2. Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?		✓	
Were the survey results negative? Call Project Manager if No	+		
Are any of the samples identified by the client as radioactive? If yes, did client provide RAD activity?	+		
3. Were chain of custody documents included?	✓		
4. Were chain of custody documents completed properly? (Ink, signed, match containers)	✓		
5. Did all samples container arrive intact? (sealed, unbroken)? Call Project Manager if No	✓		
6. Were all sample containers properly labeled?	✓		
7. Were proper sample containers received?	✓		
8. Preserved samples checked for proper pH?	+		
9. Were samples preserved properly? If no, list samples & tests	+		3012
10. Shipping container temperature checked?	✓		
11. Was shipping container temperature within specifications (4±2C)? If no, Call Project Manager	+		4°C
12. Were samples received within holding time? if No, Call Project Manager	✓		
13. Were VOA vials free of headspace?	+		
14. ARCO# IF REQUIRED	+		
15. SDG# IF REQUIRED	✓		

REVIEW [Signature] DATE 5/18/99

SA - SEALS ATTACHED NSA - NO SEALS ATTACHED

Client: Katahdin Analytical
 340 County Road
 Westbrook, Maine 04092
 Contact: Ms. Andrea Colby
 Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 13, 1999

Page 1 of 2

Sample ID : 32SLB03-0506
 Lab ID : 9905606-04
 Matrix : Soil
 Date Collected : 05/18/99
 Date Received : 05/18/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		381	119	238	mg/kg	1.0	AAT	06/11/99	1030	150797	1
Evaporative Loss @ 105 C		16.0	1.00	1.00	wt%	1.0	GJ	05/19/99	1540	149550	2
Total Organic Carbon		2180	43.1	100	mg/kg	1.0	LS	05/28/99	1235	150121	3

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550
M 3	SW846 9060 Modified

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

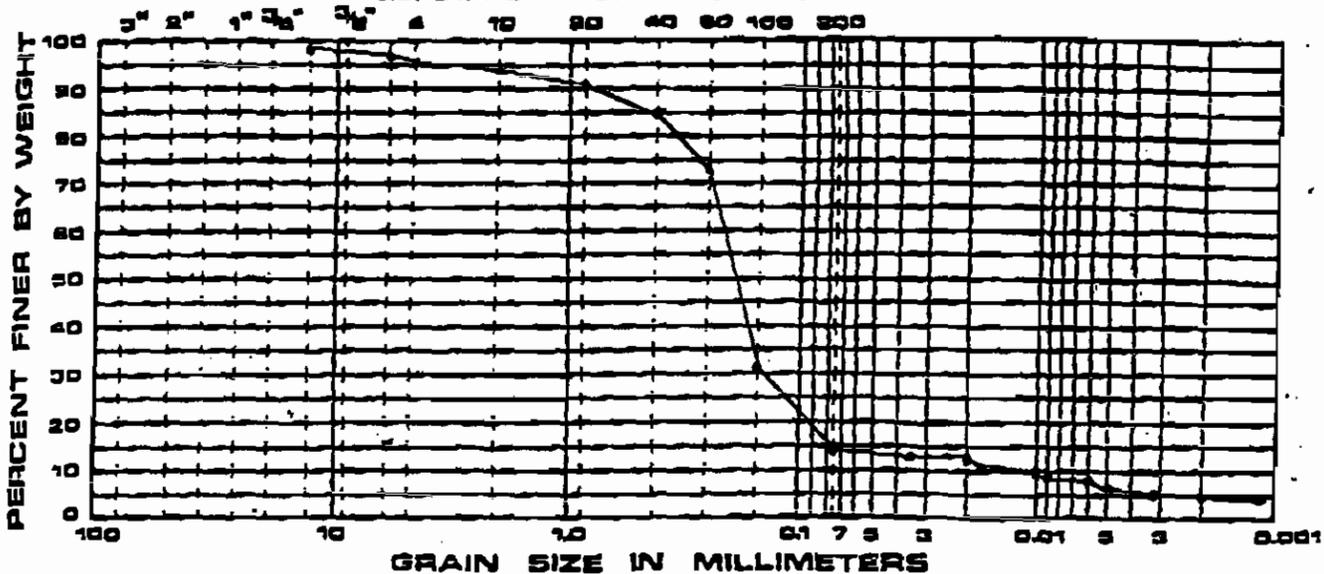
Data reported in mass/mass units is reported as 'dry weight'.



GRAIN SIZE ANALYSIS

COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COA.	MEDIUM	FINE	

U.S. STANDARD SIEVE SIZE NO.

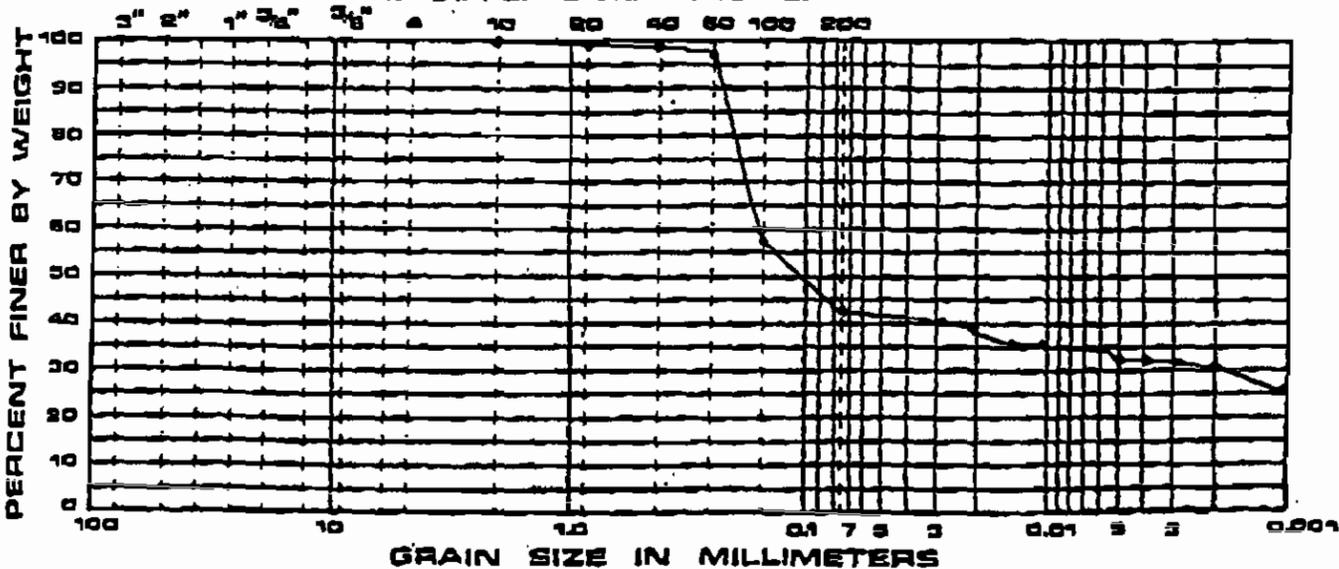


PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	V
•	WASD 116	15			

GRAIN SIZE ANALYSIS

COBBLE	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COA.	MEDIUM	FINE	

U.S. STANDARD SIEVE SIZE NO.



PLOT	SOURCE	SAMP.	DEPTH	CLASSIFICATION	V
•	WASD 116	16			

S. W. COLE ENGINEERING, INC.

R E P O R T O F G R A D A T I O N
ASTM C-117, C-136

Project No. 99008
Date 05/20/1999

Project MISCELLANEOUS
Client KATAHDIN ANALYTICAL
Sample No. 16, CLAY, WP-2502-16

<u>Sieve Size</u>	<u>Percent Passing</u>	<u>PROJECT Specifications %</u>
# 10	100.0	
# 20	99.9	
# 40	99.9	
# 60	97.8	
# 100	57.0	
# 200	43.6	

APPENDIX E

**BORING LOG OF MONITORING WELL USED IN AQUIFER
CHARACTERIZATION EVALUATION**

EnSafe/Allen & Hoshall

Monitoring Well NBCC523001

Project: Zone C - Naval Base Charleston

Coordinates: 2315701.02 E, 370195.11 N

Location: Charleston, SC

Surface Elevation: 8.3 feet msl

Started at 0830 on 4-4-85

TOC Elevation: 7.89 feet msl

Completed at 0935 on 4-4-85

Depth to Groundwater: 4.63 feet TOC Measured: 6-21-85

Drilling Method: 4.25" ID (7.5" OD) HSA with split spoon

Groundwater Elevation: 3.28 feet msl

Drilling Company: Alliance Environmental

Total Well Depth: 12.6 feet bgs

Geologist: Peter Bayley

Well Screen: 2.5 to 12.5 feet bgs

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	% RECOVERY	PTD (ppm)	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)	WELL DIAGRAM
0								Surface conditions: Asphalt		
3.3			1	83	0	SP	SP	Sand: brown, very fine to fine, some silt, soft, wet.	3.3	
4.1									4.1	
10.4			2	38	0	SP	SP	Sand: grayish-brown, very silty, wet, grading to orange-brown with gray laminae, very fine, some silt, wet at 8.3'.	10.4	
13.3									13.3	
13.8			3	92	0	SP	SP	Sand: orange, very fine to medium, trace of silt, wet, soft; grades orange-gray, very fine to fine, silty, trace clay at 13.3'; grades to orange-brown, silty and wet at 13.8'; coarsens to very fine to medium at 14.3'.	13.8	
14.3									14.3	
15.7							SP	Sand: brown, very fine to fine.	15.7	
18.7			4	100	0				18.7	

APPENDIX F

RBSL CALCULATION SPREAD SHEETS

Minimum Construction Worker RBSLs

	Dermal	Incidental Ingestion	Inhalation	Minimum
	RBSL	RBSL	RBSL	RBSL
	mg/L	mg/L	mg/L	mg/L
Benzene	0.85	68.52	0.15	0.15
Toluene	23.98	5677.78	5.38	5.38
Ethylbenzene	6.05	2838.89	14.50	6.05
Xylene	102.33	56777.78	NA*	102.33
Naphthalene	1.63	1135.56	2.63	1.63
MTBE	25.92	141.94	293.44	25.92

*No inhalation reference dose is available for xylenes; therefore, no inhalation RBSL can be calculated.

Prepared By: *Neal Hoels*

Reviewed By: *Paul E. Calfee*

Construction Worker Dermal RBSLs

	Kow	MW	Kp	B	t _{event}	C	b	t*	t _{event}	DAevent
			cm/hr	unitless	hr/event			hr	hr/event	
Benzene	199.526231	78.1	0.11551543	0.39263786	2.87E-01	6.32E-01	6.03E-01	6.90E-01	1	eq 3.3
Toluene	537.031796	92.1	0.25956134	0.95806829	3.44E-01	1.13E+00	1.31E+00	1.33E+00	1	eq 3.2
Ethylbenzene	1412.53754	106.2	0.5692198	2.25615488	4.13E-01	2.36E+00	4.39E+00	1.70E+00	1	eq 3.2
Xylene*	1584.89319	106.2	0.63867512	2.53144742	4.13E-01	2.63E+00	5.31E+00	1.72E+00	1	eq 3.2
Naphthalene	1995.26231	128.2	0.60545239	2.63663896	5.48E-01	2.73E+00	5.69E+00	2.29E+00	1	eq 3.2
MTBE	15.136	88.15	0.00769788	0.0277977	3.27E-01	3.52E-01	3.20E-01	7.85E-01	1	eq 3.3

	BW	AT	EV	ED	EF	SA	CSF derm	Rfd derm	Target	RBSL	RBSL
	kg	day	events/day	yrs	days/yr	cm ²	(mg/kg-day) ⁻¹	mg/kg-day	Risk or HQ	mg/L	mg/L
Benzene	70	25550	1	1	90	4500	2.99E-02	NA	1.00E-06		8.52E-01
Toluene	70	365	1	1	90	4500	NA	1.60E-01	1.0	2.40E+01	
Ethylbenzene	70	365	1	1	90	4500	NA	9.70E-02	1.0	6.05E+00	
Xylene*	70	365	1	1	90	4500	NA	1.84E+00	1.0	1.02E+02	
Naphthalene	70	365	1	1	90	4500	NA	3.20E-02	1.0	1.63E+00	
MTBE	70	365	1	1	90	4500	NA	5.00E-03	1.0	2.59E+01	

Factor A	Factor 1	Factor 2
	7.18E-01	0.782661
4.21E-01		
1.01E+00		
1.13E+00		
1.24E+00		
1.22E-02		

* Kow and MW values for xylene, m-

Prepared By: *Shelley Woods*

Reviewed By: *Paul E. Colfer*

Construction Worker Incidental Ingestion RBSLs

	BW	AT	IR	ED	EF	Target	CSF oral	Rfd oral	RBSL
	kg	day	L/day	yrs	days/yr	Risk or HQ			mg/L
Benzene	70	25550	0.01	1	90	1.00E-06	2.90E-02		6.85E+01
Toluene	70	365	0.01	1	90	1.0	NA	2.00E-01	5677.778
Ethylbenzene	70	365	0.01	1	90	1.0	NA	1.00E-01	2838.889
Xylene	70	365	0.01	1	90	1.0	NA	2.00E+00	56777.78
Naphthalene	70	365	0.01	1	90	1.0	NA	4.00E-02	1135.556
MTBE	70	365	0.01	1	90	1.0	NA	5.00E-03	141.9444

Prepared By: *Paul E. Colfer*

Reviewed By: *Paul E. Colfer*

Construction Worker Inhalation RBSLs

Chemical			Dair	Dwater	H	θ_{acap}	θ_{wcap}	θ_{as}	θ_{ws}	θ_T	Deff-cap	Deff-s
			cm ² /s	cm ² /s	cm ³ /cm ³	cm ² /s	cm ² /s					
Benzene			0.093	1.10E-05	2.26E-01	0.038	0.342	0.33	0.15	0.48	1.35E-05	1.01E-02
Toluene			0.085	9.40E-06	3.01E-01	0.038	0.342	0.33	0.15	0.48	1.07E-05	9.20E-03
Ethylbenzene			0.076	8.50E-06	2.80E-01	0.038	0.342	0.33	0.15	0.48	9.85E-06	8.22E-03
Xylenes			0.072	8.50E-06	2.78E-01	0.038	0.342	0.33	0.15	0.48	9.55E-06	7.79E-03
Naphthalene			0.072	9.40E-06	2.00E-03	0.038	0.342	0.33	0.15	0.48	5.79E-04	7.83E-03
MTBE			0.102	1.05E-05	4.16E-02	0.038	0.342	0.33	0.15	0.48	3.90E-05	1.10E-02

Chemical			hcap	hv	Deff-ws	Uair	δ_{air}	Lgw	W	VFwamb	TR (carc)	HI (nonc)
			cm	cm	cm ² /s	cm/sec	cm	cm	cm	mg/m ³ /mg/L		
Benzene			5	117	3.18E-04	225	200	122	1500	1.97E-05	1.00E-06	NA
Toluene			5	117	2.54E-04	225	200	122	1500	2.09E-05	NA	1
Ethylbenzene			5	117	2.34E-04	225	200	122	1500	1.79E-05	NA	1
Xylenes			5	117	2.27E-04	225	200	122	1500	1.72E-05	NA	1
Naphthalene			5	117	5.17E-03	225	200	122	1500	2.83E-06	NA	1
MTBE			5	117	8.79E-04	225	200	122	1500	9.99E-06	NA	1

Chemical	TR (carc)	HI (nonc)	BWadult	AT	Sfi (carc)	RfD (nonc)	IR air	EF	ED	RBSLair	H	RBSLwater
			kg	yr	[mg/kg-day] ⁻¹	[mg/kg-day]	m ³ /day	day/yr	yr	mg/m ³	cm ³ /cm ³	mg/L
Benzene	1.00E-06	NA	70	70	2.90E-02	NA	20	90	1	3.43E-02	2.26E-01	0.15
Toluene	NA	1	70	1	NA	1.14E-01	20	90	1	1.62E+00	3.01E-01	5.38
Ethylbenzene	NA	1	70	1	NA	2.86E-01	20	90	1	4.06E+00	2.80E-01	14.50
Xylenes	NA	1	70	1	NA	NA*	20	90	1	NA*	2.78E-01	NA*
Naphthalene	NA	1	70	1	NA	3.71E-04	20	90	1	5.27E-03	2.00E-03	2.63
MTBE	NA	1	70	1	NA	8.60E-01	20	90	1	1.22E+01	4.16E-02	293.443

*No inhalation reference dose is available for xylenes; therefore, no RBSL can be calculated for xylene.

Construction Worker Inhalation RBSLs

Chemical	Dair	Dwater	H	θ_{acap}	θ_{wcap}	θ_{sa}	θ_{ws}	θ_T	Deff-cap	Deff-s
	cm ² /s	cm ² /s	cm ³ /cm ³	cm ² /s	cm ² /s					
Benzene	0.093	1.10E-05	2.20E-01	0.038	0.342	0.33	0.15	0.48	1.36E-05	1.01E-02
Toluene	0.085	9.40E-06	2.60E-01	0.038	0.342	0.33	0.15	0.48	1.13E-05	9.20E-03
Ethylbenzene	0.076	8.50E-06	3.20E-01	0.038	0.342	0.33	0.15	0.48	9.39E-06	8.22E-03
Xylenes	0.072	8.50E-06	2.90E-01	0.038	0.342	0.33	0.15	0.48	9.40E-06	7.79E-03
Naphthalene	0.072	9.40E-06	4.90E-02	0.038	0.342	0.33	0.15	0.48	2.92E-05	7.79E-03

Chemical	hcap	hv	Deff-ws	Uair	δ_{air}	Lgw	W	VFwamb	TR (carc)	HI (nonc)
	cm	cm	cm ² /s	cm/sec	cm	cm	cm	mg/m ³ /mg/L		
Benzene	5	117	3.22E-04	225	200	122	1500	1.94E-05	1.00E-06	NA
Toluene	5	117	2.68E-04	225	200	122	1500	1.90E-05	NA	1
Ethylbenzene	5	117	2.23E-04	225	200	122	1500	1.95E-05	NA	1
Xylenes	5	117	2.23E-04	225	200	122	1500	1.77E-05	NA	1
Naphthalene	5	117	6.55E-04	225	200	122	1500	8.77E-06	NA	1

Chemical	BWadult	AT	Sfi (carc)	RfD (nonc)	IR air	EF	ED	RBSLair	RBSLwater
	kg	yr	[mg/kg-day] ⁻¹	[mg/kg-day]	m ³ /day	day/yr	yr	mg/m ³	mg/L
Benzene	70	70	2.90E-02	NA	20	90	1	3.43E-02	1769.4
Toluene	70	1	NA	1.14E-01	20	90	1	1.62E+00	8.51E+04
Ethylbenzene	70	1	NA	2.86E-01	20	90	1	4.06E+00	2.08E+05
Xylenes	70	1	NA	NA*	20	90	1	NA*	NA*
Naphthalene	70	1	NA	3.71E-04	20	90	1	5.27E-03	6.00E+02

*No inhalation reference dose is available for xylenes; therefore, no RBSL can be calculated for xylene.

Volatilization Factor: Groundwater to Ambient Air (VFwamb)

Chemical	Dair	Dwater	H	θ_{wcap}	θ_{wcap}	θ_{ss}	θ_{ws}	θ_T	Def-cap	Def-g
	cm ² /s	cm ² /s	cm ³ /cm ³	cm ² /s	cm ² /s					
Benzene	0.093	1.10E-05	2.20E-01	0.038	0.342	0.33	0.15	0.48	1.36E-05	1.01E-02
Toluene	0.085	9.40E-06	2.60E-01	0.038	0.342	0.33	0.15	0.48	1.13E-05	9.20E-03
Ethylbenzene	0.076	8.50E-06	3.20E-01	0.038	0.342	0.33	0.15	0.48	9.39E-06	8.22E-03
Xylenes	0.072	8.50E-06	2.90E-01	0.038	0.342	0.33	0.15	0.48	9.40E-06	7.79E-03
Naphthalene	0.072	9.40E-06	4.90E-02	0.038	0.342	0.33	0.15	0.48	2.92E-05	7.79E-03

Chemical	hcap	hv	Def-ws	Uair	δ_{air}	Lgw	W	VFwamb	TR (carc)	HI (nonc)
	cm	cm	cm ² /s	cm/sec	cm	cm	cm	mg/m ³ /mg/L		
Benzene	5	117	3.22E-04	225	200	122	1500	1.94E-05	1.00E-06	NA
Toluene	5	117	2.68E-04	225	200	122	1500	1.90E-05	NA	1
Ethylbenzene	5	117	2.23E-04	225	200	122	1500	1.95E-05	NA	1
Xylenes	5	117	2.23E-04	225	200	122	1500	1.77E-05	NA	1
Naphthalene	5	117	6.55E-04	225	200	122	1500	8.77E-06	NA	1

Chemical	BWadult	AT	SI (carc)	RfD (nonc)	IR air	EF	ED	RBSL air	RBSL water
	kg	yr	[mg/kg-day] ⁻¹	[mg/kg-day]	m ³ /day	day/yr	yr	mg/m ³	mg/L
Benzene	70	70	2.90E-02	NA	20	90	1	3.43E-02	1769.4
Toluene	70	1	NA	1.14E-01	20	90	1	1.62E+00	8.51E+04
Ethylbenzene	70	1	NA	2.86E-01	20	90	1	4.06E+00	2.08E+05
Xylenes	70	1	NA	NA*	20	90	1	NA*	NA*
Naphthalene	70	1	NA	3.71E-04	20	90	1	5.27E-03	6.00E+02

Reference: American Society for Testing and Materials (ASTM). 1997. *Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites*. Designation E 1739-95⁶¹

*No inhalation reference dose is available for xylenes; therefore, no RBSLs can be calculated.

	= South Carolina value
	= Site-specific value or based on site-specific value
	= Calculated value
	= ASTM default value
	= Value from EPA Integrated Risk Information System
	= Assumptions for construction worker scenario

APPENDIX G
SOIL LEACHABILITY MODEL

**SOIL LEACHABILITY MODEL FOR NAPHTHALENE
RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES**

SITE INFORMATION:

Site:	Site 32, Building 54
Location:	Charleston Naval Complex, North Charleston, SC

REFERENCES:

- (1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
- (2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 2.
- (3) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Input Parameters.
- (4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
- (5) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 2.
- (6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
- (7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
- (8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.

INPUT:

	NAPHTHALENE	
COC Chemical of Concern	g/cm ³	1.63
Bd Soil Bulk Density (1)	mg/L	1.63
Crsbl Risk Based Screening Level	mg/kg	42
Cs Concentration of COC in soil	unitless	2
DAF Dilution/Attenuation Factor (2)	mg/kg	2180
foc Organic Carbon Content in Soil (3)	unitless	0.002
H' Henry's Law Constant (4)	cm	-15
Hf Wetting front suction head (always negative) (5)	cm	25
Hw Average Annual Recharge (3)	cm/s	0.0001
Kf Soil Hydraulic Conductivity (6)	ml/g	1543
Koc Soil/Water Partioning Coefficient (2)	cm	0
L Depth between soil sample with greatest COC concentration to groundwater.	unitless	0.43
Ø Porosity (7)	days	48
t1/2 Biodegradation "half life" (2)	mg/kg	381
TPH Total Petroleum Hydrocarbons, EPA Method 3550	volume fraction	0.10
Wr Residual Water Content (8)		

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partitioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

$$fcs = (foc + TPH/1.724) * 1E-6 = \underline{0.0024} \text{ decimal \%}$$

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

$$Cw = Cs * ((Wr * 1g/cc + Bd) / ((Bd * Koc * fcs) + Wr + ((\phi - Wr) * H))) = \underline{1.12} \text{ mg/l}$$

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

$$f = \phi - Wr = \underline{0.33} \text{ decimal \%}$$

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

$$t = (f / Kf) * (L - (Hw - Hf)) * (\ln(Hw + ((L - Hf) / (Hw - Hf)))) = \underline{0} \text{ seconds}$$

Step 3 - Determine the velocity of the water (Vw) in feet per year.

$$Vw = (L / 30.48 \text{ cm/ft}) / (t / 31,500,000 \text{ sec/year}) = \underline{25054117} \text{ ft/year}$$

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

$$Kd = Koc * foc * 1E-6 = \underline{3.36374} \text{ ml/g}$$

Step 2 - Calculate the retardation effect of natural soil organic matter on COC migration.

$$Vc = Vw * (1 + ((Bd * Kd) / \phi)) = \underline{1,821,996} \text{ ft/year}$$

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

$$T_c = 365 \text{ day/yr} \cdot ((L/30.48 \text{ cm/ft})/V_c) = \underline{\quad 0.00 \quad} \text{ days}$$

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

$$C_p = 10^{(\log(C_{rsbl}) + ((T_c/2.3) \cdot (0.693/t^{1/2})))} = \underline{\quad 1.63 \quad} \text{ mg/l}$$

COC concentration in soil pore water (Cp) is greater than Crsbl, therefore the SSTL must be calculated.

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

$$\begin{array}{l} \text{Csstl for APHTHALENE} \\ \text{in soil} \end{array} = C_p \cdot \text{DAF} \cdot (((Bd \cdot Koc \cdot fcs) + Wr + (F \cdot H''')) / (Wr \cdot 1 \text{ g/cc} + Bd)) = \underline{\underline{\quad 11.569015 \quad}} \text{ mg/kg}$$

PREPARED BY:

Amal Gondi

Date

CHECKED BY:

Paul E. Colby

Date

IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

Site Data

SITE ID # 0
FACILITY NAME Site 32, Building 54

Instructions

Provide results, separately, for each constituent in the worst case soil analysis.

Data

List Constituent:	<u>NAPHTHALENE</u>		381	
(BTEX, Napth.)			60	Table
Bioremediation "half-life"	<u>40</u> days	t 1/2		1
Soil/water partitioning coefficient	<u> </u> ml/g	K oc		1

Results

1.8

				Equation Set	Step
Total Organic Carbon Content	<u>42</u>	0.0024 decimal %	f cs	I	1
Leachate Concentration	<u>2180.000</u>	mg/l	C w	I	2
Air Filled Porosity	<u>0.33</u>	decimal %	f	II	1
Infiltration Rate Time	<u>0</u>	seconds	t	II	2
Velocity of Water	<u>5</u>	ft/year	V w	II	3
Soil/Water Distribution Coefficient	<u>1.63</u>	ml/g	K d	III	1
Contaminant Percolation Rate	<u>15</u>	ft/year	V c	III	2
Time to Reach Groundwater	<u>0</u>	days	T c	IV	1
Concentration reaching Groundwater	<u>0.43</u>	mg/l	C p	IV	2
Site Specific Target Level	<u>12</u>	mg/kg	C sstl	V	

Conclusions

Does concentration of chemical of concern in soil exceed SSTL? YES

Risk of Human Exposure due to contaminated soil.

 X YES NO

IN-SITU SOIL RISK EVALUATION

IN-SITU SOIL RISK EVALUATION

SOUTH CAROLINA
 Department of Health and Environmental Control (DHEC)

Site Data

SITE ID # _____ COUNTY Charleston
 FACILITY NAME Site 32, Building 54
 STREET ADDRESS Charleston Naval Complex, North Charleston, SC

Soil Risk Evaluation Data

			<u>Figure</u>
TPH		<u>381</u> mg/kg	
Soil % SAND (Estimated)		<u>60</u> %	
Soil % CLAY (Estimated)		<u>40</u> %	
Worst Case	Benzene	_____ mg/kg	Cs
Soil Analyses	Toluene	_____ mg/kg	Cs
	Ethylbenzene	<u>1.8</u> mg/kg	Cs
	Xylenes	_____ mg/kg	Cs
	Naphthalene	<u>42</u> mg/kg	Cs
	MTBE	_____ mg/kg	Cs
Natural Organic Carbon Content		<u>2180</u> mg/kg	foc
Average Annual Recharge		<u>25</u> cm	Hw
Distance from highest Soil Impact to water table		<u>0.001</u> cm	L
Bulk Density of Soil		<u>1.63</u> g/cc	Bd
Wetting Front Suction		<u>15</u> cm	Hf
Soil Hydraulic Conductivity		<u>1.00E-04</u> cm/sec	Kf
Porosity		<u>0.43</u> decimal %	Φ
Residual Water Content		<u>0.10</u> decimal %	Wr

List possible human exposure pathways from surface soil.
 Soil leaching to groundwater - utility trench

Bold indicates site specific data

IN-SITU SOIL RISK EVALUATION

**SOIL LEACHABILITY MODEL FOR ETHYLBENZENE
RISK-BASED CORRECTIVE ACTION FOR PETROLEUM RELEASES**

SITE INFORMATION:

Site:	Site 32, Building 54
Location:	Charleston Naval Complex, North Charleston, SC

REFERENCES:

- (1) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 1.
- (2) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 2.
- (3) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Input Parameters.
- (4) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Table 1.
- (5) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 2.
- (6) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 3.
- (7) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 4.
- (8) SCDHEC, RBCA For Petroleum Releases, June 1995, Appendix B, Figure 5.

INPUT:

	ETHYLBENZENE	
COC Chemical of Concern		
Bd Soil Bulk Density (1)	g/cm ³	1.63
Crsbl Risk Based Screening Level	mg/L	6.05
Cs Concentration of COC in soil	mg/kg	1.8
DAF Dilution/Attenuation Factor (2)	unitless	8
foc Organic Carbon Content in Soil (3)	mg/kg	2180
H' Henry's Law Constant (4)	unitless	0.28
Hf Wetting front suction head (always negative) (5)	cm	-15
Hw Average Annual Recharge (3)	cm	25
Kf Soil Hydraulic Conductivity (6)	cm/s	0.0001
Koc Soil/Water Partioning Coefficient (2)	ml/g	175
L Depth between soil sample with greatest COC concentration to groundwater.	cm	0
∅ Porosity (7)	unitless	0.43
t1/2 Biodegradation "half life" (2)	days	10
TPH Total Petroleum Hydrocarbons, EPA Method 3550	mg/kg	381
Wr Residual Water Content (8)	volume fraction	0.10

CALCULATIONS:

Equation Set I - Determine soil pore water concentration resulting from physical partitioning (Cw).

Step 1 - Calculate the total organic carbon content (fcs) of the soil.

$$fcs = (foc + TPH/1.724) * 1E-6 = \underline{0.0024} \text{ decimal \%}$$

Step 2 - Calculate the concentration of COC in soil pore water (Cw) directly in contact with the contaminate soil.

$$Cw = Cs * ((Wr * 1g/cc + Bd) / ((Bd * Koc * fcs) + Wr + ((\emptyset - Wr) * H))) = \underline{0.3329557} \text{ mg/l}$$

Equation Set II - Determine the velocity of the soil pore water (Vw)

Step 1 - Calculate the air filled porosity (f) in decimal percent.

$$f = \emptyset - Wr = \underline{0.33} \text{ decimal \%}$$

Step 2 - Determine the time for water to percolate through the vadose zone soil (from depth of worst case soil sample to the water table at site).

$$t = (L/Kf) * (L - (Hw - Hf)) * (\ln(Hw / ((L - Hf) / (Hw - Hf)))) = \underline{0} \text{ seconds}$$

Step 3 - Determine the velocity of the water (Vw) in feet per year.

$$Vw = (L/30.48cm/ft) / (t/31,500,000sec/year) = \underline{25,054,117} \text{ ft/year}$$

Equation Set III - Determine the organic retardation effect (Vc) of the contaminant.

Step 1 - Calculate the soil/water distribution coefficient (Kd) (ml/g) for uncontaminated soil.

$$Kd = Koc * foc * 1E-6 = \underline{0.38368} \text{ ml/g}$$

Step 2 - Calculate the retardation effect of natural soil organic matter on COC migration.

$$Vc = Vw * (1 + ((Bd * Kd) / \emptyset)) = \underline{10,207,776} \text{ ft/year}$$

Equation Set IV - Determine biodegradation rates and provide final COC concentration (Cf) at depth of concern.

Step 1 - Calculate the time (Tc) in days required for the COC to reach groundwater.

$$T_c = 365 \text{ day/yr} \cdot ((L/30.48 \text{ cm/ft})/V_c) = \underline{\quad 0.00 \quad} \text{ days}$$

Step 2 - Calculate estimated concentration of COC in the soil pore water (Cp) necessary to protect groundwater.

$$C_p = 10^{(\log(C_{rsbl}) + ((T_c/2.3) \cdot (0.693/t_{1/2})))} = \underline{\quad 6.05 \quad} \text{ mg/l}$$

COC concentration in soil pore water (Cp) is greater than Crsbl, therefore the SSTL must be calculated.

Equation Set V - Calculate the Site Specific Target Level (SSTL) for the COC in soil.

$$C_{sstl} \text{ for HYL BENZENE in soil} = C_p \cdot DAF \cdot (((Bd \cdot Koc \cdot fcs) + Wr + (F \cdot H'')) / (Wr \cdot 1 \text{ g/cc} + Bd)) = \underline{\underline{\quad 24.653175 \quad}} \text{ mg/kg}$$

PREPARED BY:

Mark Hood

Date

CHECKED BY:

Paul E. Caff

Date