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STANDARD LIMITED ASSESSMENT REPORT FOR SITE 15 QUARTERS O ZONE B CNC
CHARLESTON SC
2/1/2000
TETRA TECH

**Standard Limited
Assessment Report
for
Site 15, Quarters O**

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



**Southern Division
Naval Facilities Engineering Command
Contract Number N62467-94-D-0888
Contract Task Order 0092**

February 2000

**STANDARD LIMITED ASSESSMENT REPORT
FOR
SITE 15, QUARTERS O**

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

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

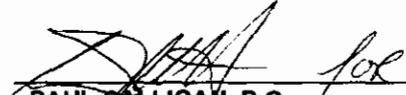
**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406**

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

**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0092**

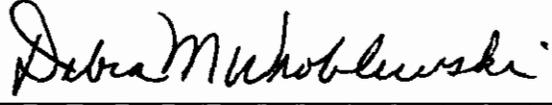
FEBRUARY 2000

PREPARED UNDER THE SUPERVISION OF:



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PITTSBURGH, PENNSYLVANIA**

EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (TtNUS) has completed a Rapid Assessment for Site 15 which includes one underground storage tank (UST) system for Quarters O Housing at Charleston Naval Complex (CNC) Zone B, in North Charleston, South Carolina. The UST was used as fuel oil for the boiler of Quarters O in the Naval housing area. The 550-gallon steel UST was removed in April 1998. The assessment was performed under the direction of the South Carolina Department of Health and Environmental Control (SCDHEC) Rapid Assessment guidance dated June 20, 1997, and approval letter dated April 7, 1999. After determining all laboratory analytical results for soil, and all but one analytical result for groundwater, were below risk-based screening levels (RBSLs), the reporting format was reduced from a Rapid Assessment Report to a Standard Limited Assessment (SLA) report format. In addition, a Tier I and a Tier II Evaluation was performed for the chemicals of concern (CoCs) in groundwater that exceeded the RBSL.

TtNUS performed the following actions during the Rapid Assessment:

- Reviewed available Navy documents to identify potential sources and receptors for petroleum hydrocarbons in the vicinity, to evaluate public and private potable wells, to locate utility line areas, to locate nearby surface water bodies, and to determine surface hydrology and drainage.
- Reviewed the previously prepared Underground Storage Tank Assessment Report for UST Quarters O to determine boring locations and monitoring well placement.
- Conducted site survey to identify utilities and to construct a site plan.
- Installed four shallow soil borings 8 feet below land surface (bls) and one deep vertical delineation soil boring to a depth of 28 feet bls using direct push technology (DPT).
- Collected soil samples for field screening using an organic vapor analyzer.
- Installed a temporary piezometer inside a selected soil boring.
- Collected soil and groundwater samples from each DPT boring for on-site mobile laboratory screening analysis for benzene, toluene, ethylbenzene, and total xylenes (BTEX); naphthalene; and diesel range organics.
- Collected and analyzed three soil samples at a fixed-base analytical laboratory for BTEX and naphthalene using U.S. Environmental Protection Agency (USEPA)

Method 8260 and polynuclear aromatic hydrocarbons (PAHs) using USEPA Method 8270.

- Collected and analyzed one soil sample for total organic carbon using USEPA Method 415.1, total recoverable petroleum hydrocarbons using USEPA Method 9071, and grain size analysis using sieve and hydrometer methods.
- Installed three shallow permanent monitoring wells to a depth of 13.5 to 14.5 feet bls using hollow stem augers.
- Collected groundwater samples from newly installed, permanent monitoring wells for laboratory analysis at a fixed-base analytical laboratory.
- Analyzed groundwater samples for BTEX, methyl tert-butyl ether, and naphthalene using USEPA Method 8260 and PAHs using USEPA Method 8270.
- Surveyed monitoring well and top of casing elevation and collected depth to groundwater measurements to evaluate groundwater flow direction.

Conclusions

Three soil samples were collected on May 2, 1999, and were analyzed for BTEX and PAHs by a fixed-base laboratory. Soil concentrations were reported below laboratory practical quantitation limits in all borings.

One groundwater sampling event was conducted on September 8, 1999. Three newly installed monitoring wells were sampled. Naphthalene was detected in MW-01 at a concentration of 30 µg/L, which exceeds the soil leaching RBSL.

Tier I Evaluation

A site conceptual model identified two possible receptors with their respective pathways present for Site 15. The receptors and associated pathways are:

Construction Worker in a Utility Trench

1. Potentially ingesting and/or having dermal contact with contaminated groundwater.

Surface Water (Noisette Creek)

1. Impacted by groundwater migrating from the source area at the site to the creek.

Tier II Evaluation

The calculated RBSL for construction worker exposure to groundwater was greater than the maximum concentration of naphthalene detected in groundwater on-site. Therefore, a construction worker in a utility trench is not threatened by naphthalene-contaminated groundwater.

The calculated site-specific target level (SSTL) for surface water exposure was greater than the maximum concentration of naphthalene detected in groundwater on-site. Therefore, Noisette Creek is not at-risk because of any groundwater contamination at Site 15.

Recommendations for Further Action

Preparation of an intrinsic Corrective Action Plan is recommended.

Southern Division, Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

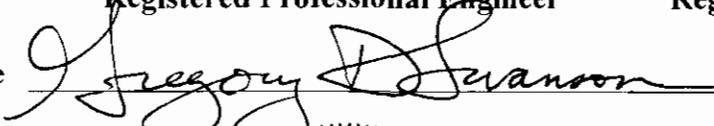
STANDARD LIMITED ASSESSMENT REPORT

Site 15
Housing Quarters O
1599 Hobson Avenue
Charleston Naval Base Complex
North Charleston, South Carolina 29405-2413

Site ID # 01088

Submitted to:
Bureau of Underground Storage Tank Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

This report has been reviewed by:

Name	Gregory D. Swanson, PE	17132	1/26/00
	Registered Professional Engineer	Registration #	Date
Signature			1/26/00
			Date

REGISTERED
PROFESSIONAL SEAL



SCDHEC Certificate # 24

STANDARD LIMITED ASSESSMENT REPORT OF FINDINGS

I INTRODUCTION

A. Owner/Operator Information

Name: Southern Division, Naval Facilities Engineering Command

Address: 2155 Eagle Drive, North Charleston, South Carolina, 29406

Telephone Number: 803-743-9985

B. Property Owner Information

Name (if different from above): Same as above

Address:

Telephone Number:

C. Contractor Information

Name: Tetra Tech NUS

Address: 661 Andersen Drive, Foster Plaza 7, Pittsburgh, PA 15220

Telephone Number: 412-921-7090

D. Site Information

Address: 1599 Hobson Avenue; North Charleston, South Carolina 29405-2413

Description of Adjacent Land Use (Commercial, residential, rural, etc.) Include documentation (e.g. zoning regulations) as appropriate:

The CNC is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina. 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.

The areas surrounding CNC are "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. While

ownership has changed over time, the land adjacent to NAVBASE remains dedicated to chemical, fertilizer, oil refining, metallurgy, and lumber operations

Predicted Future Land Use (include site and adjacent area):

Zone B consists primarily of former officer's quarters and a golf course and contains properties identified in the *Final Environmental Impact Statement for Disposal and Reuse of the Charleston Naval Base* (Ecology & Environment, Inc., June 1995) to be used for active recreation (e.g., golf course) or a cultural park or a waterfront park.

E. Site History

Date Release Reported to SCDHEC: May 22, 1998

Estimated Quantity of Product Released: Unknown

Cause of Release: Unknown. At removal, UST Quarters O was covered with a protective coating of pitch. The tank was in good condition and contained no holes and only patches of corrosion. The steel ventilation pipe contained mild corrosion throughout its length, but no holes were found. The copper supply and return lines were in good condition. In confirmation samples taken after the tank removal, there was a slightly elevated detection of xylenes in the sample collected at the south end of the tank (6.68 µg/kg). This concentration is below all soil RBSLs. In addition, although all results for the sample collected from the supply/ return pipe run were below detection, the detection limits for this sample were elevated due to matrix interference. The limits approached or exceeded screening levels. This indicated additional action at this site was warranted.

UST #	Product	Date Installed	Currently in use (Yes or No)	If not in use, Date Removed
1	Fuel Oil	Unknown ⁽¹⁾	No	4/20/98

(1) Quarters O was built in 1937. It served as base housing until closure. UST Quarters O was in use until March 1998.

Other Releases at this site? Yes _____ No X

If yes, Date Release Reported to SCDHEC: Not Applicable

Status of Release: Corrective Action

No Further Action Date: Not Applicable

II. SITE CHARACTERISTICS

A. Site Geography

Describe the topography of the site and surrounding area (slope, vegetation, bodies of water, major land features, etc.): Site 15, 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 [Ensafe/Allen & Hoshall, Inc.], 1996. *Final RCRA Facility Investigation for Zone B, Naval Base Charleston, Charleston, South Carolina*, November 21, 1996).

Site 15 is located in Zone B of the CNC. The site and adjacent areas have long been developed. Land use in Zone B consisted of officer's quarters and a golf course, and vegetation is consistent with that use. Noisette Creek is located approximately 725 feet northwest of the former UST location. An additional surface water body, The Cooper River, flows approximately 2,200 feet to the east of the site.

Mean Elevation of Site: 11 feet above mean sea level (msl)

Additional Comments:

B. Exposure Analysis

Potential receptors and preferential pathways within a 1000-foot radius of the site:

Description of Receptor	Distance/Direction from Site
Visitor/Recreator	On-site -- no complete pathway
On-site Resident	On-site -- no complete pathway
Off-site Resident	Nearest building ~75 feet west -- no complete pathway
Construction Worker	On-site
Commercial Worker	On-site -- no complete pathway
Surface Water	UST O to Noisette Creek - ~725 feet

Provide any additional comments necessary to complete the exposure analysis:

Visitor/Recreator –

This property is expected to be a recreational area (golf course and park); therefore, a visitor/recreator was considered as a potential receptor. There is no soil impact above RBSLs at the site, so no complete soil pathways exist. Drinking water at this site is provided by the city; therefore, ingestion of groundwater is not a complete exposure pathway. The building foundation is assumed to be sufficient to prevent volatilization from groundwater into a building, and there is no history of vapors in the building. It is unlikely that any additional exposure pathways will exist; therefore, no complete pathways exist for visitors/recreators.

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 be a recreational area; however, it is possible that it is currently used to house personnel from ships being serviced at the base. Therefore, a current resident was considered as a potential receptor. There is no soil impact above RBSLs at the site so no complete soil pathways exist. Drinking water to the site is provided by the city; therefore ingestion of groundwater is not a complete exposure pathway. The building foundation is assumed to be sufficient to prevent volatilization from groundwater into a building, and there is no history of vapors in the building. It is unlikely that any additional exposure pathways will exist; therefore, no complete pathways exist for on-site residents.

Off-site Residents –

All pathways for off-site resident would be the same as those for an on-site resident. As no complete pathways exist for an on-site resident, this receptor was not considered further.

Construction Worker –

An on-site construction worker is defined as a laborer who would be involved in intrusive activities 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 volatiles from soil, dermal contact with soil, and incidental ingestion of soil. There is no soil impact above RBSLs at the site. On-site construction workers could be exposed to constituents in shallow groundwater by the following pathways: inhalation of volatiles from groundwater, dermal contact with groundwater, and incidental ingestion of groundwater. There is a water line and a sanitary sewer within 5 to 10 feet of the area of groundwater impact; therefore, the point of exposure location for the on-site construction worker was considered to be at the source.

Commercial Worker –

An on-site commercial or industrial worker is defined as a business employee who works in a commercial/industrial capacity at the site. The future use of the property is expected to be recreational but may possibly be industrial or commercial; therefore, an on-site worker was considered as a potential receptor. There is no soil impact above RBSLs at the site, so no complete soil pathways exist. Drinking water to the site is provided by the city; therefore ingestion of groundwater is not a complete exposure pathway. The building foundation is assumed to be sufficient to prevent volatilization from groundwater into a building, and there is no history of vapors in the building. It is unlikely that any additional exposure pathways will exist; therefore, no complete pathways exist for commercial workers.

Surface Water –

Noisette Creek is located approximately 725 feet northwest of the site. Although the direction of groundwater flow is unknown, this exposure pathway was considered for ingestion of surface water as a conservative measure.

C. Utilities Survey

Utilities on site, and adjacent to the site within a 250-foot radius:

Utility	On-site or Distance/Direction from site	Depth to Utility
Water	At former UST location	See note
Electric	Northeast corner of Quarters O running to the east. The former UST location is southwest of Quarters O.	See note
Sanitary Sewer	At former UST location	See note
Storm Drain	150 feet northwest and 175 feet southwest of the former UST locations	See note

Additional Comments: Specific information concerning the depth of utilities below land surface is currently unavailable. However, according to facility personnel typically utility lines are located approximately 2 to 6 feet bls. (SPORTENDETHASN, 1999. Personal Contact between Paul Calligan TtNUS and Copes Wannamacker SPORTENDETHASN, June 17, 1999.)

D. Site Geology

Provide a brief description of the regional geology and hydrogeology:

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, 1996a).

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 which includes 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, 1996).

Provide a brief description of the site geology and stratigraphy:

Five direct push soil borings were advanced at Site 15 under the supervision of a TtNUS geologist on May 16, 1999. Four of these borings were 8 feet deep and the fifth was 28 feet deep. During the drilling process, lithologic samples were collected using a split-spoon sampler to characterize the subsurface lithology.

Based on lithologic descriptions from the soil borings and monitoring wells, below the topsoil was a layer of loose, medium brown silt with rootlets. From 1 feet bls to 8 feet bls, the soil generally

consists of fine to very fine light gray or tan sand or medium brown or tan sandy silt. Below 8 feet bls, there are alternating layers of sandy clay and sand. Boring logs are presented in Appendix A.

E. Soil Boring Data

Drilling Dates: May 16, 1999

Provide a brief justification for the location of the soil borings

SB-1 CNC15B01 next to former fuel dispenser line

SB-2 CNC15B02 east of former UST and next to former fuel dispenser line

SB-3 CNC15B03 south of former UST

SB-4 CNC15B04 west of former UST

SB-5 CNC15B05 north of former UST

Borehole SB – CNC15-B01 Sampling Date - 5/16/99 Sample Depth - 4-5 feet bgs

Split Spoon Interval (feet)	Field Screening Results (mg/kg)	Lithology (soil type, color, rocks/minerals present)	Soil Conditions (dry, moist, etc; petroleum odor)
0-1	0	Loose, medium brown topsoil, silt, rootlets	Slightly moist
1-2	0	Loose, light gray sand, fine	Slightly moist
2-3	0	Loose silt, medium brown to tan, sandy, very fine to fine	Moist
4-5	0	Same as above	
5-6	0	Same as above	Wet @ 5.5-6.0 feet
7-8		Firm, tan to light gray silt, clayey becoming clay, silty, slightly sandy mottled red-brown to orange-brown	Moist

Borehole SB – CNC15-B02 Sampling Date - 5/16/99 Sample Depth - 4-5 feet bgs

Split Spoon Interval (feet)	Field Screening Results (mg/kg)	Lithology (soil type, color, rocks/minerals present)	Soil Conditions (dry, moist, etc; petroleum odor)
0-1	0	Loose medium brown at top – silt with rootlets	Slightly moist
1-2		Loose tan sand, fine to very fine	Slightly moist
2-3	0	Loose medium brown to tan silt, sandy	Slightly moist to moist
4-5	0		
6-7		Firm tan to light gray silt, clayey becoming clay	Wet @ 6.5 feet
7-8	0		Slightly moist to moist

Borehole SB – CNC15B03 Sampling Date - 5/16/99 Sample Depth - 5-6 feet

Split Spoon Interval (feet)	Field Screening Results (mg/kg)	Lithology (soil type, color, rocks/minerals present)	Soil Conditions (dry, moist, etc; petroleum odor)
0-1	0	Loose medium brown at top – silt with rootlets and oyster shells	Slightly moist
1-2	0	Loose tan sand, very fine grain	Slightly moist
2-3	0	Loose medium brown to tan silt, sandy, grading to sand	Slightly moist
4-5	0	Same as above	Moist
6-8	0	Same as above	Wet @ 6.5 feet

Borehole SB – CNC15B04 Sampling Date - 5/16/99 Sample Depth - 4-5 feet bgs

Split Spoon Interval (ft.)	Field Screening Results (mg/kg)	Lithology (soil type, color, rocks/minerals present)	Soil Conditions (dry, moist, etc; petroleum odor)
0-1	0	Loose medium brown at top – silt with rootlets	Slightly moist
1-2	0	Loose medium brown silt, slightly sandy	Slightly moist
2-4		Same as above	
4-5	0	Tan sand, very fine	Moist
6-8	0	Same as above	Wet @ 6.5 feet

Borehole SB – CNC15B05 Sampling Date - 5/16/99 Sample Depth - 5-6 feet bgs

Split Spoon Interval (feet)	Field Screening Results (mg/kg)	Lithology (soil type, color, rocks/minerals present)	Soil Conditions (dry, moist, etc; petroleum odor)
0-1	0	Loose medium brown at top – silt with rootlets.	Slightly moist
1-2	0	Firm tan silt, slightly sandy becoming fine sand base with rootlets	Slightly moist
4-5	0	Same as above	Slightly moist to moist
6-7		Same as above	Wet @ 6.5 – 7.0 feet bgs
7-8	0	Same as above	
9-10	0	Firm tan clay, sandy	Moist
11-12	0	Loose light gray to tan sand, fine	Wet
14-15	0	Firm light gray clay, sandy	Moist
16-17		Loose tan sand, fine	Wet
20-21	0	Firm light gray sandy clay to clayey sand	Moist
22-23		Loose tan sand, fine to very fine	Wet
25-26	0	Loose tan to white sand	Wet

Soil analytical data for each soil boring and the appropriate RBSL for the soil type from Tables 4 through 8 in SCDHEC Risk-Based Corrective Action (RBCA) for Petroleum Releases Guidance Document.

CoC	RBSL ⁽¹⁾	SB-1	SB-2	SB-2D	SB-4
Benzene	5	<6	<6	<6	<6
Toluene	1622	<6	<6	<6	<6
Ethylbenzene	1260	<6	<6	<6	<6
Xylenes	42471	<6	<6	<6	<6
Naphthalene	210	<6	<6	<6	<6

Note: All units µg/kg

⁽¹⁾ SCDHEC Risk-Based Screening Levels for sandy soils; depth to groundwater < 5 feet.

CoC	RBSL ⁽¹⁾	SB-1	SB-2	SB-2D	SB-4
Benzo(a)anthracene	73,084	<360	<360	<360	<360
Benzo(b)fluoranthene	29,097	<360	<360	<360	<360
Benzo(k)fluoranthene	231,109	<360	<360	<360	<360
Chrysene	12,998	<360	<360	<360	<360
Dibenzo(a,h)anthracene	87,866	<360	<360	<360	<360

Note: All units µg/kg

⁽¹⁾ SCDHEC Risk Based Screening Levels for sandy soils; depth to groundwater < 5 feet.

Discuss the horizontal and vertical extent of CoC in the soil:

No CoCs were found above laboratory practical quantitation limits in any soil sample.

Additional Comments: None

F. Chemicals of Concern – Groundwater

Provide well installation information in the table below:

MW No.	Installation Date	Development Date	Sampling Date
01	6/21/99	7/2/99	9/8/99
02	8/25/99	8/26/99	9/8/99
03	8/25/99	8/26/99	9/8/99

Enter the soil analytical data for each monitoring well for all CoC in the table below.

CoC	MW-01	MW-02	MW-03
Depth of sample			
Benzene	<p style="text-align: center;"><i>Soil samples were not collected from boreholes during monitoring well installation. However, soil samples were collected from direct push soil borings located in the immediate vicinity.</i></p> <p style="text-align: center;"><i>See preceding soil analytical data for direct push borings.</i></p>		
Toluene			
Ethylbenzene			
Xylenes			
Naphthalene			
Benzo(a)anthracene			
Benzo(b)fluoranthene			
Benzo(k)fluoranthene			
Chrysene			
Dibenzo(a,h)anthracene			

Summarize the monitoring well and ground water data in the table below.

MW No.	Date Measured	TOC Elevation (feet)	Screened Interval (feet BTOC)	Depth to Water (feet)	Water Table Elevation (feet above msl)
MW01	7/13/99	10.88	4 to 14	7.66	3.22
MW01	9/8/99	10.88	4 to 14	7.75	3.13
MW02	9/8/99	10.04	3 to 13	6.97	3.07
MW03	9/8/99	9.40	4 to 14	6.31	3.09

Field data measurements (temperature, pH, conductivity) taken during well purging are found in Appendix C. Dissolved oxygen measurements for each well are in the table below.

Monitoring Well No.	Dissolved Oxygen (mg/L)
MW-01	2.03
MW-02	0.93
MW-03	1.31

Groundwater analytical data for each monitoring well for all CoCs:

CoC	RBSL (µg/L)	MW-01 (µg/L)	MW-02 (µg/L)	MW-03 (µg/L)
Free Product Thickness	None	0.00	0.00	0.00
Benzene	5	< 5	< 5	< 5
Toluene	1,000	< 5	< 5	< 5
Ethylbenzene	700	4J	< 5	< 5
Xylenes	10,000	< 5	< 5	< 5
MTBE	40	< 5	< 5	< 5
Naphthalene	10	30	< 10	< 10
Benzo(a)anthracene	10	< 10	< 10	< 10
Benzo(b)fluoranthene	10	< 10	< 10	< 10
Benzo(k)fluoranthene	10	< 10	< 10	< 10
Chrysene	10	< 10	< 10	< 10
Dibenzo(a,h)anthracene	10	< 10	< 10	< 10
Nitrate as N	None	< 0.050 mg/L	< 0.050 mg/L	< 0.050 mg/L
Sulfate	None	100 mg/L	100 mg/L	33 mg/L

Additional Comments: J = J flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.

G. Aquifer Characteristics

Hydraulic Conductivity: 0.792 feet/day (Result of slug tests in Zone B RFI for monitoring well NBCB-GDB-002. The geology of this well agrees with the Site 15 geology).

Hydraulic Gradient: 0.0023

Porosity: 0.45 (Grain size analysis from SB-02 at a depth of 4 to 5 feet: 93% Sand, 1% Clay).

Estimated Seepage Velocity: 1.5 feet/year

Tier I Evaluation

Performance of a Site Conceptual Model is required because the RBSLs for groundwater were exceeded. Soil RBSLs were not exceeded. Only one CoC concentration in groundwater exceeded the RBSLs at monitoring well MW-01. Naphthalene was detected at a concentration of 30 µg/L. Exceeding the RBSL for naphthalene requires performance of a Site Conceptual Model (identification of current and future potential receptors and human exposure pathways) as shown below:

A. CURRENT LAND USE – Identify any potential receptors or human exposure pathways (e.g., basements, contaminated soils from UST closures, etc.) within a 1000-foot radius for current land use. Complete the table below. Additional sheets may be attached if necessary.

Media (for exposure)	Exposure Route	Pathway Selected for Evaluation?	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		
Ground-Water	Ingestion	No	No water supply well downgradient	
	Dermal Contact	No		
	Volatile Inhalation	No		
Surface Water	Ingestion	Yes	Noisette Creek 725 feet downgradient	No additional data needed.
	Dermal Contact	Yes		
	Volatile Inhalation	Yes		
Surficial Soil	Ingestion	No	No impacted surface soil	
	Dermal Contact	No		
	Volatile Inhalation	No		
	Leaching to Groundwater	No		
Subsurface Soil	Ingestion	No	No impacted subsurface soil	
	Dermal Contact	No		
	Volatile Inhalation	No		
	Leaching to Groundwater	No		

B. FUTURE LAND USE – identify any potential receptors of human exposure pathways (e.g. basements, contaminated soils from UST closures, etc.) within a 1000-foot radius for projected future land use. Complete the table below. Additional sheets may be attached if necessary.

Media (for exposure)	Exposure Route	Pathway Selected for Evaluation?	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	Utility lines within 5 feet of former UST location: therefore, construction worker exposure possible. Naphthalene does not readily volatilize from groundwater.	
	Dermal Contact	Yes		
	Volatile Inhalation	No		
Surface Water	Ingestion	Yes	Noisette Creek 725 feet downgradient	
	Dermal Contact	Yes		
	Volatile Inhalation	Yes		
Surficial Soil	Ingestion	No	No impacted surface soil	
	Dermal Contact	No		
	Volatile Inhalation	No		
	Leaching to Groundwater	No		
Subsurface Soil	Ingestion	No	No impacted subsurface soil	
	Dermal Contact	No		
	Volatile Inhalation	No		
	Leaching to Groundwater	No		

Recommendations for further action:

The Site Conceptual Model identified one possible receptor with two pathways:

1. A construction worker in a utility trench who might ingest and have dermal contact with groundwater.
2. Impact to Noisette Creek from groundwater.

Based on the identification of possible receptors, a Tier 2 evaluation was performed and is presented in the next section.

III. Tier 2 Evaluation

RBSLs FOR CONSTRUCTION WORKER EXPOSURE

Groundwater RBSLs provided by SCDHEC are for ingestion only. Groundwater 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 the procedures in *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 one event/day and the event duration was assumed to be 1 hour/event. The skin surface area available for contact was 4500 cm², 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).

The inhalation RBSLs were calculated using equations 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).

The minimum RBSL for the three pathways was chosen as the RBSL for the construction worker. The following tables show the calculated RBSLs for each pathway along with the selected (minimum) RBSL:

CoC	Dermal RBSL (mg/L)	Incidental Ingestion RBSL (mg/L)	Inhalation RBSL (mg/L)	Selected (Minimum) RBSL (mg/L)	Maximum Concentration (mg/L)
Naphthalene	1.63	113.56	2.63	1.63	0.030

Appendix F provides the calculations used in determining the RBSLs.

The calculated RBSL for construction worker exposure was not exceeded by on-site concentration of naphthalene in groundwater; therefore, a construction worker in a utility trench is not threatened by naphthalene leaching to the groundwater.

SSTLS FOR SURFACE WATER (NOISETTE CREEK) IMPACT

Site-specific target levels (SSTLs) were not required for soil because soil concentrations did not exceed RBSLs.

The Domenico model was the fate and transport model used to determine groundwater SSTLs in the risk analysis. The Domenico dilution/attenuation model is presented in the SCDHEC guidance document, *South Carolina Risk-Based Corrective Action for Petroleum Releases* (SCDHEC 1998). This model is very conservative in that it assumes an infinite mass, areal source condition through which groundwater flows. The model incorporates biological decay effects through a first-order decay process; however, this mechanism was ignored because SCDHEC guidance specifies that the decay rate must be assumed to be zero if site-specific decay rates have not been determined.

The impacted groundwater source area was modeled as 50 feet (15 meters) wide and 6.56 feet (2 meters) deep; these values are conservative defaults suggested by the ASTM *Standard Guide for Risk-Based Corrective Action Applied to Petroleum Release Sites* (ASTM 1997). The maximum source concentration (30 µg/L of naphthalene) is assumed to exist throughout the source area, further compounding the conservatism of the estimate.

Site-specific data were used for saturated hydraulic conductivity, hydraulic gradient, and fraction of organic carbon in soil (2.8E-06 meters/sec, 0.0023 feet/feet, and 8.44-E-03 g-C/g-soil, respectively). The soil bulk density (1.55 g/cm³) and porosity (0.45 cm³/cm³) were determined from Figures C-1 and C-3 in SCDHEC RBCA (1998).

The following estimates of dispersivity were used in the Domenico model as given in SCDHEC (1998):

Parameter	Estimate
Longitudinal Dispersivity, α_x	$x/10$, where x = distance between the point of exposure and the source or compliance point
Transverse Dispersivity, α_y	$\alpha_x/3$
Vertical Dispersivity, α_z	$\alpha_x/20$

The Domenico model as described above was used to determine a groundwater SSTL for naphthalene. The distance from the former UST locations to Noisette Creek, which is the nearest point of exposure, was estimated to be 725 feet. Using the values of RBSL (0.01 mg/L for naphthalene) at the point of exposure, the SSTL at the source was calculated and compared with the calculated source concentrations. The SSTL at the compliance well was also calculated using the values of the RBSL at the point of exposure. The distance from the compliance well to the point of exposure was estimated to be 700 feet (213.4 meters).

Groundwater SSTLs were determined to be:

Chemical of Concern	Source SSTL (mg/L)	Maximum Source Concentration (mg/L)	Compliance Point SSTL (mg/L)	Compliance Point Concentration (mg/L)
Naphthalene	1.326	0.030	1.272	Not Available

Appendix F provides the Domenico model calculations generating SSTLs.

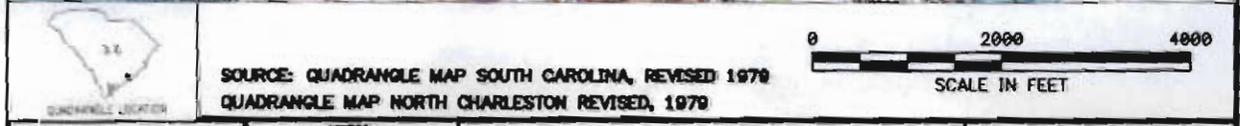
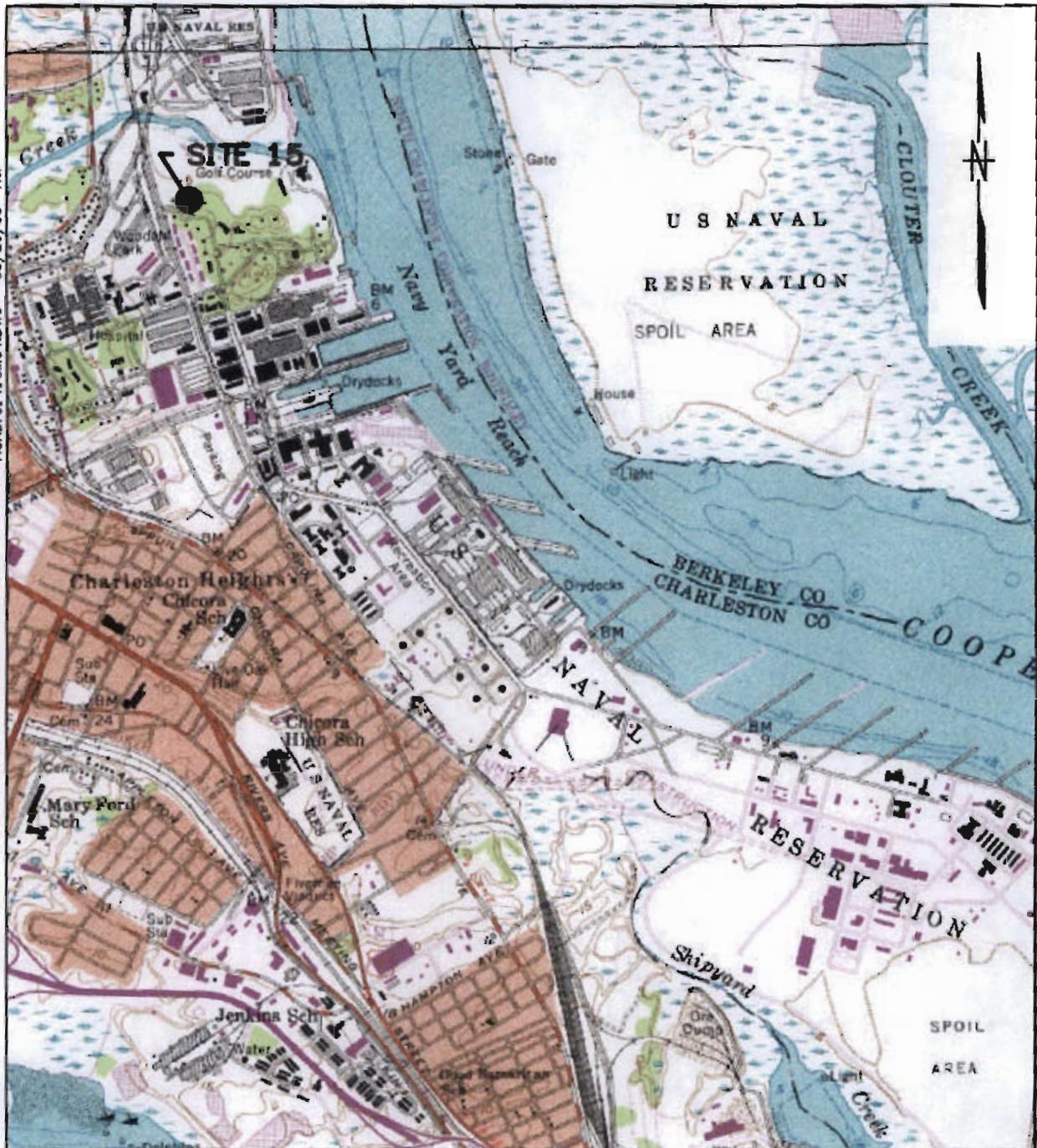
The calculated SSTL for surface water exposure was not exceeded by on-site concentration of naphthalene in groundwater. Noisette Creek is not at risk because of the groundwater contamination at Site 15.

Recommendations for Further Action

Because the maximum groundwater concentration of naphthalene (0.030 mg/L) found during the site assessment does not exceed the calculated RBSL for naphthalene (1.63 mg/L), the construction worker is not at risk if exposed to groundwater by dermal contact, incidental ingestion, or inhalation. In addition, because the naphthalene groundwater concentration did not exceed the calculated SSTL for naphthalene (1.326 mg/L), Noisette Creek is not at risk from exposure to contaminated groundwater. Further analysis is not necessary. Preparation of an intrinsic Corrective Action Plan is recommended.

FIGURES

ACAD: 01 41 CMP4.DWG 08/20/99 HJP

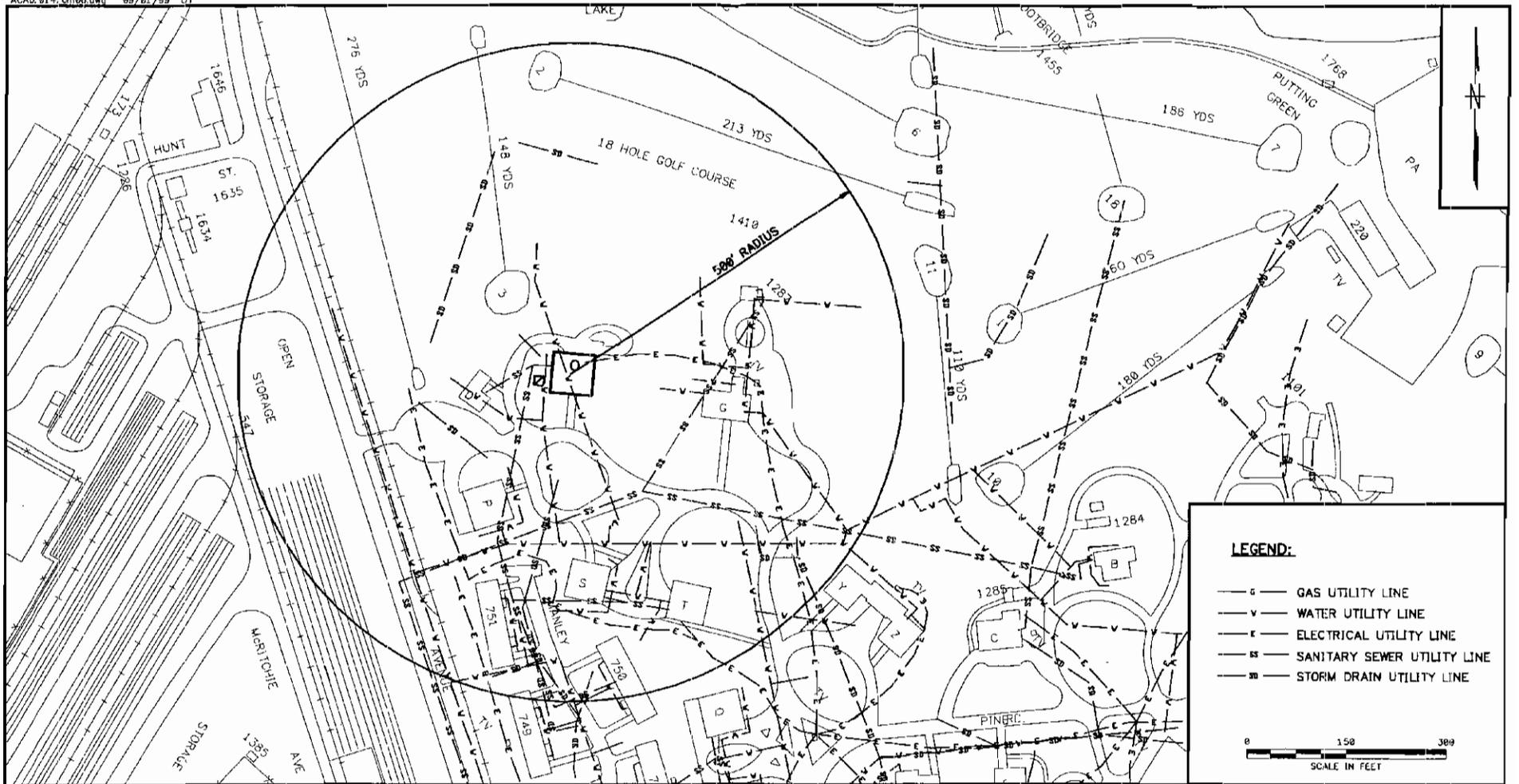


DRAWN BY HJP	DATE 8/20/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



**SITE LOCATION MAP
SITE 15, BUILDING 0, ZONE B
CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SC**

CONTRACT NO. N0141	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 1	REV. 0



LEGEND:

- G — GAS UTILITY LINE
- V — WATER UTILITY LINE
- E — ELECTRICAL UTILITY LINE
- SS — SANITARY SEWER UTILITY LINE
- SD — STORM DRAIN UTILITY LINE

0 150 300
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DATE
DLT 9/1/99

CHECKED BY DATE

COST/SCHED-AREA

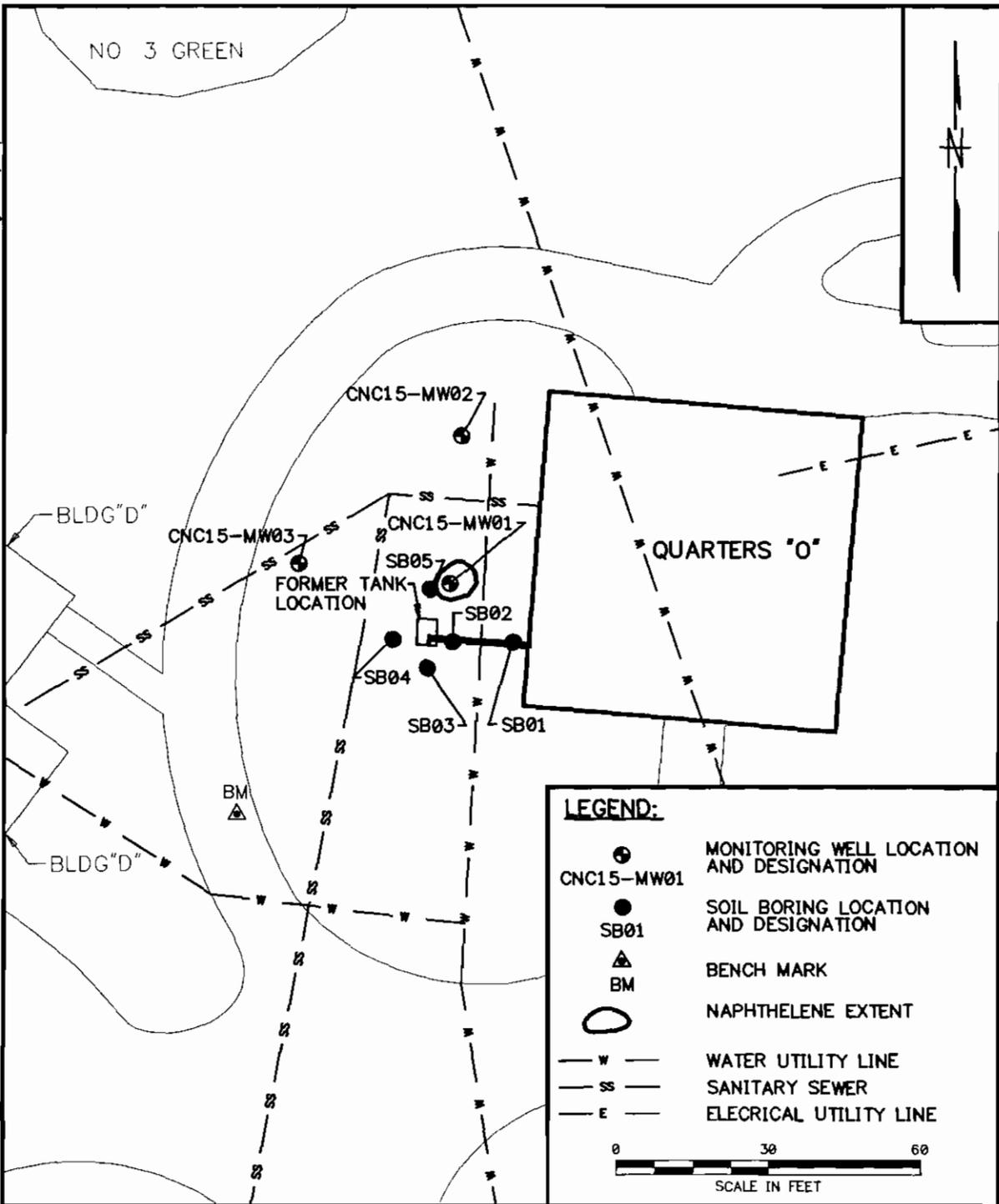
SCALE AS NOTED



SITE VICINITY MAP
SITE 15, QUARTERS O
ZONE B, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0141	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 2	REV. 0

ACAD:0141GM02.dwg 10/26/99 HJP



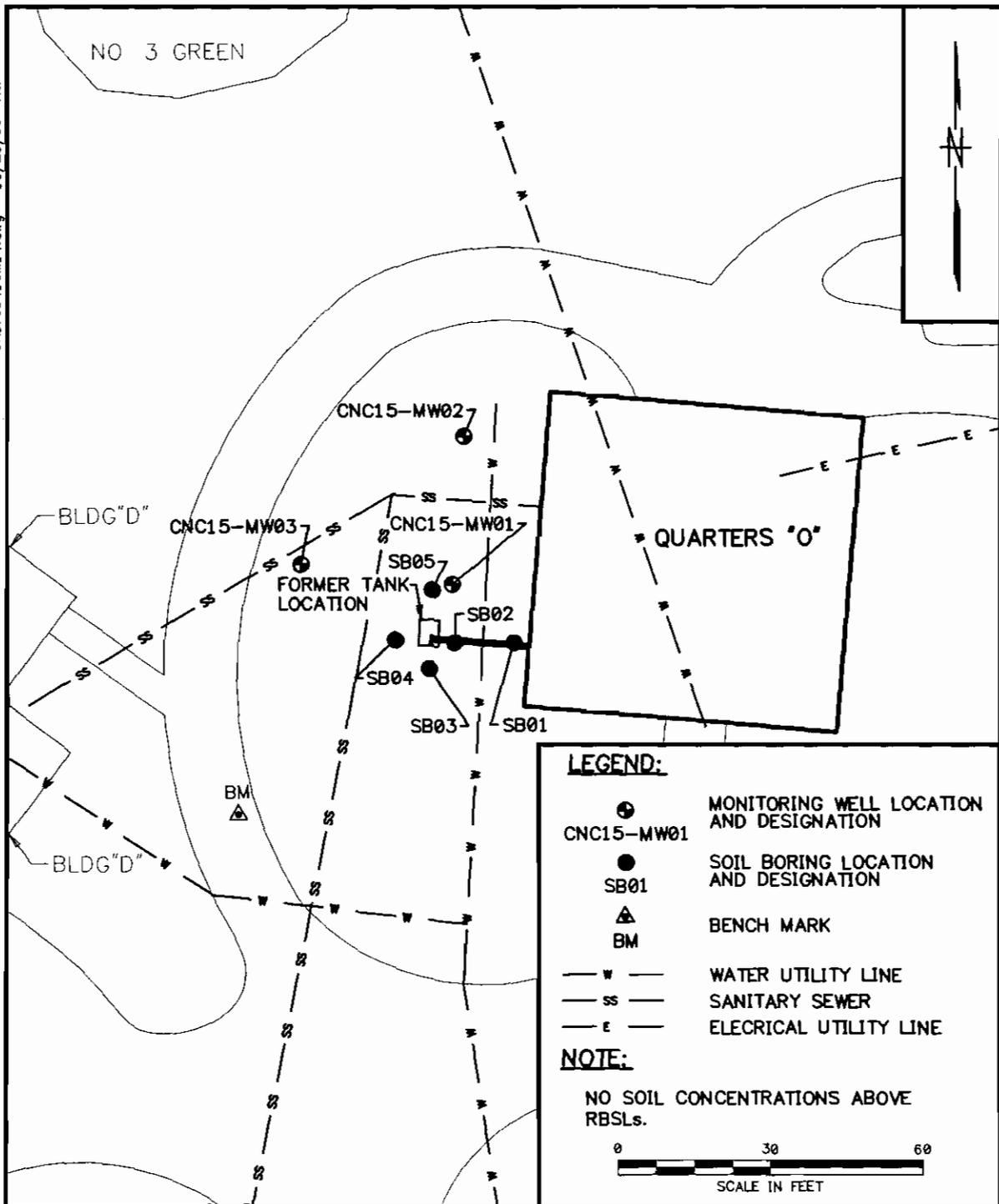
DRAWN BY HJP	DATE 10/25/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



GROUNDWATER COC MAP
 SITE 15, QUARTERS "O"
 ZONE B, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0141	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 5	REV. 0

10/26/99 HJP
 0141CM14.dwg



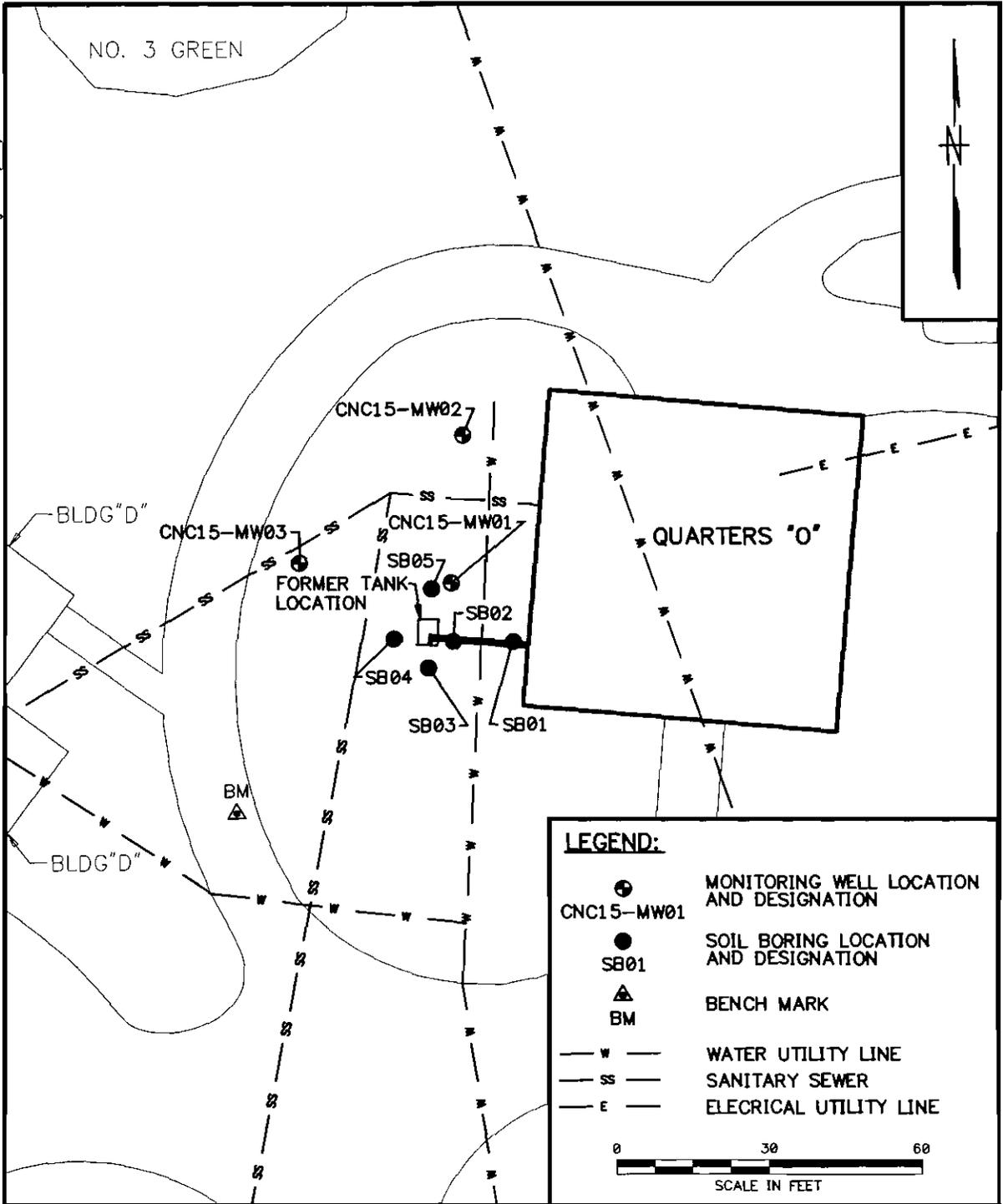
DRAWN BY HJP	DATE 10/25/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



SOIL COC MAP
 SITE 15, QUARTERS "O"
 ZONE B, CHARLESTON NAVAL COMPLEX
 NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0141	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 4	REV. 0

ACAD:0141CM13.dwg 10/26/99 HJP



LEGEND:

- MONITORING WELL LOCATION AND DESIGNATION
CNC15-MW01
- SOIL BORING LOCATION AND DESIGNATION
SB01
- BENCH MARK
BM
- WATER UTILITY LINE
- SANITARY SEWER
- ELECTRICAL UTILITY LINE

0 30 60
SCALE IN FEET

DRAWN BY	DATE
HJP	10/25/99
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



SITE MAP
SITE 15, QUARTERS "O"
ZONE B, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0141	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. FIGURE 3	REV. 0

APPENDICES

APPENDIX A

SOIL BORING LOGS

BORING LOG

PROJECT NAME: Site 35 BORING NUMBER: CNC15804
 PROJECT NUMBER: 0141 DATE: 5/16/99
 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**	
				0-8'	Loose ^{red} brn		Sop soil, silt w/ roots		sl. moist					0
			4 1/4'		red brn		Silt, sl. silty		sl. moist					0
	4						↓							
							fine sand, v.f. grad		155FB040405 moist					0
			1 9/4'						wet @ ~ 6.5'					
	8													0
							TD 8'							

S1 @ B4
 S2 @ 1345

* When rock conng, enter rock brokeness

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

Remarks: _____

Drilling Area
Background (ppm):

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

BORING LOG

PROJECT NAME: Site 15 BORING NUMBER: CNC 15 B05
 PROJECT NUMBER: 0141 DATE: 5/16/99
 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**
5-1 1410	4	/	4 1/4'	0.7'	loose	tan	loose, silty, shaly		sl. moist	0/3			0
					fin tan	silt, sl. shaly		sl. moist	0				
						bearing f. sh @ base w/ nodules		sl. moist to moist	0/3		0		
5-2 1415	8	/	2 1/4'						Next @ 6.5'-7.0'				
											0		
5-3	12	/	4 1/4'	9.2'	fin tan		clay, shaly		moist				
					loose	tan	sand, fine grad		wet	0			
5-4	16	/	4 1/4'	14.2'	fin tan		clay, sandy		moist				
					loose	tan	sand, fine grad		wet	0			
5-5	20	/	4 1/4'	15.3'	fin tan		clay, sandy		moist				
					loose	tan	sand, fine grad		wet				
5-6	24	/	4 1/4'	20.2'	fin tan		clay, shaly to silty		moist				
					loose	tan	sand, f. to v.f. grad		wet	0			

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):

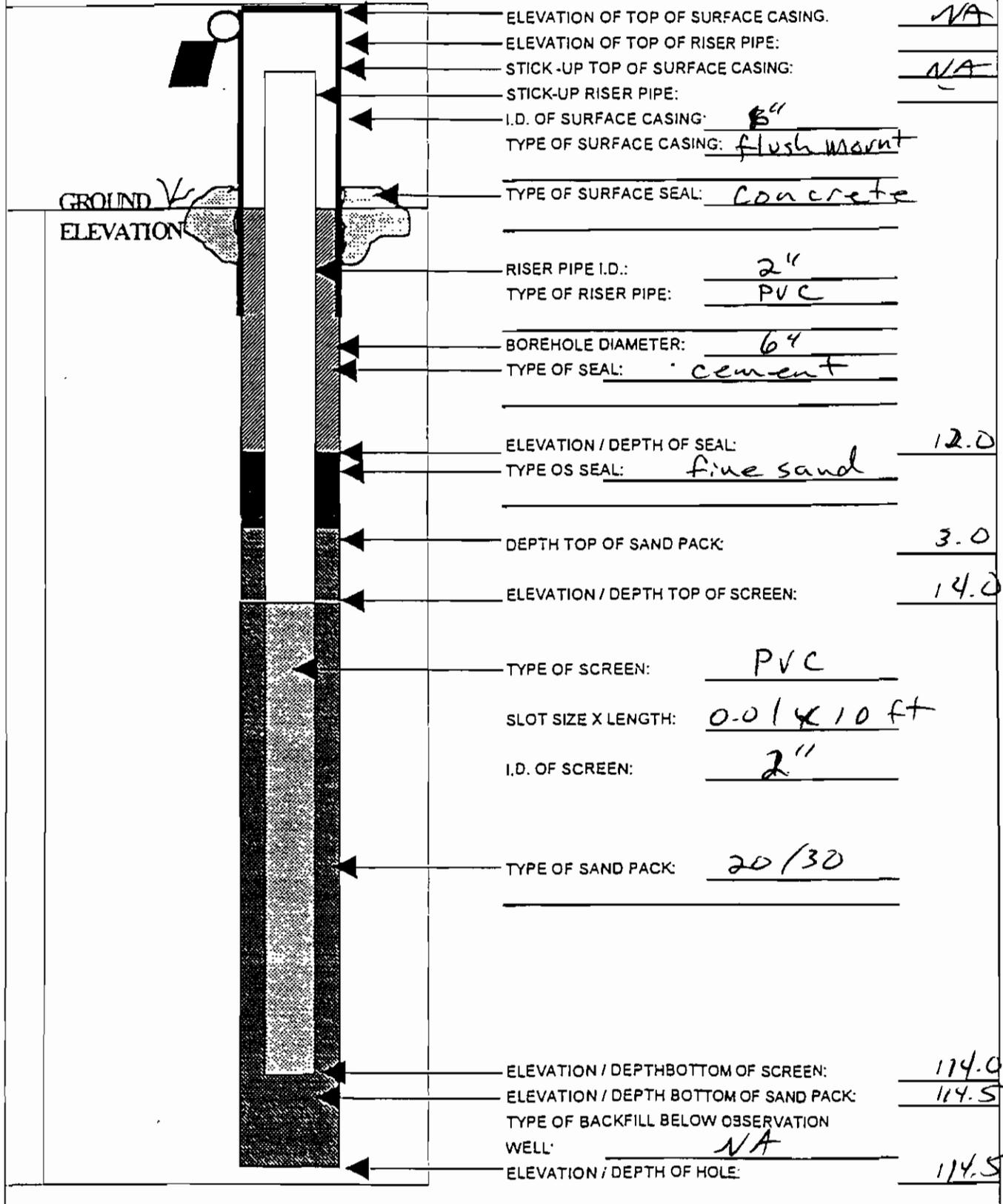
Converted to Well: Yes No Well I.D. #: _____

APPENDIX B

MONITORING WELL CONSTRUCTION LOGS

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>CVC</u>	LOCATION: <u>Site 15</u>	DRILLER <u>R Fuller</u>
PROJECT NO. _____	BORING <u>MW 3</u>	METHOD: <u>OFT</u>
ELEVATION _____	DATE <u>8/25/99</u>	DRILLING <u>HSA</u>
FIELD GEOLOGIST <u>J. Hofer</u>		DEVELOPMENT: <u>NA</u>



ELEVATION OF TOP OF SURFACE CASING: NA

ELEVATION OF TOP OF RISER PIPE: _____

STICK-UP TOP OF SURFACE CASING: NA

STICK-UP RISER PIPE: _____

I.D. OF SURFACE CASING: 8"

TYPE OF SURFACE CASING: flush mount

TYPE OF SURFACE SEAL: concrete

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 6"

TYPE OF SEAL: cement

ELEVATION / DEPTH OF SEAL: 12.0

TYPE OF SEAL: fine sand

DEPTH TOP OF SAND PACK: 3.0

ELEVATION / DEPTH TOP OF SCREEN: 14.0

TYPE OF SCREEN: PVC

SLOT SIZE X LENGTH: 0.01 x 10 ft

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: 20/30

ELEVATION / DEPTH BOTTOM OF SCREEN: 174.0

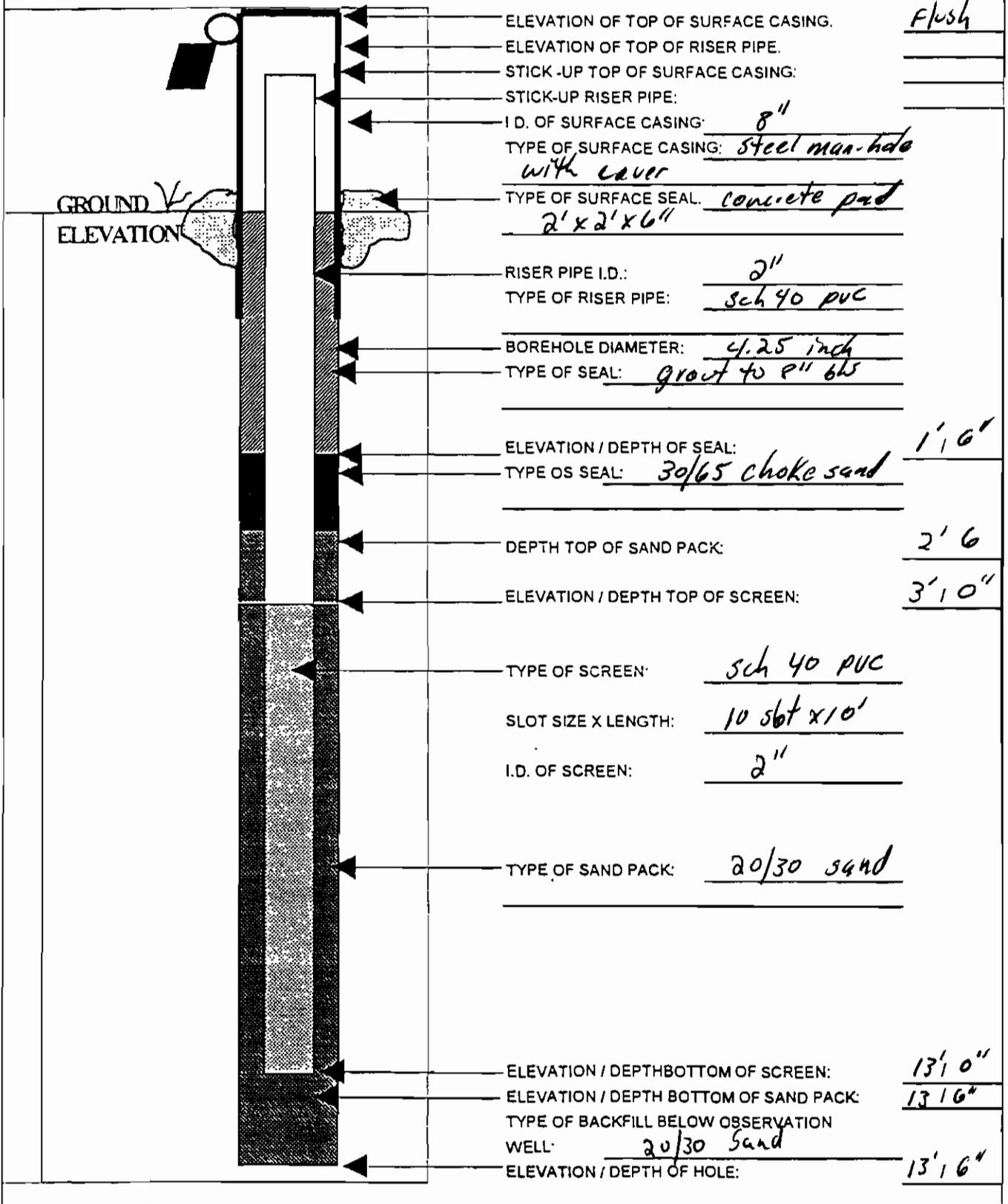
ELEVATION / DEPTH BOTTOM OF SAND PACK: 174.5

TYPE OF BACKFILL BELOW OBSERVATION WELL: NA

ELEVATION / DEPTH OF HOLE: 174.5

OVERBURDEN MONITORING WELL SHEET

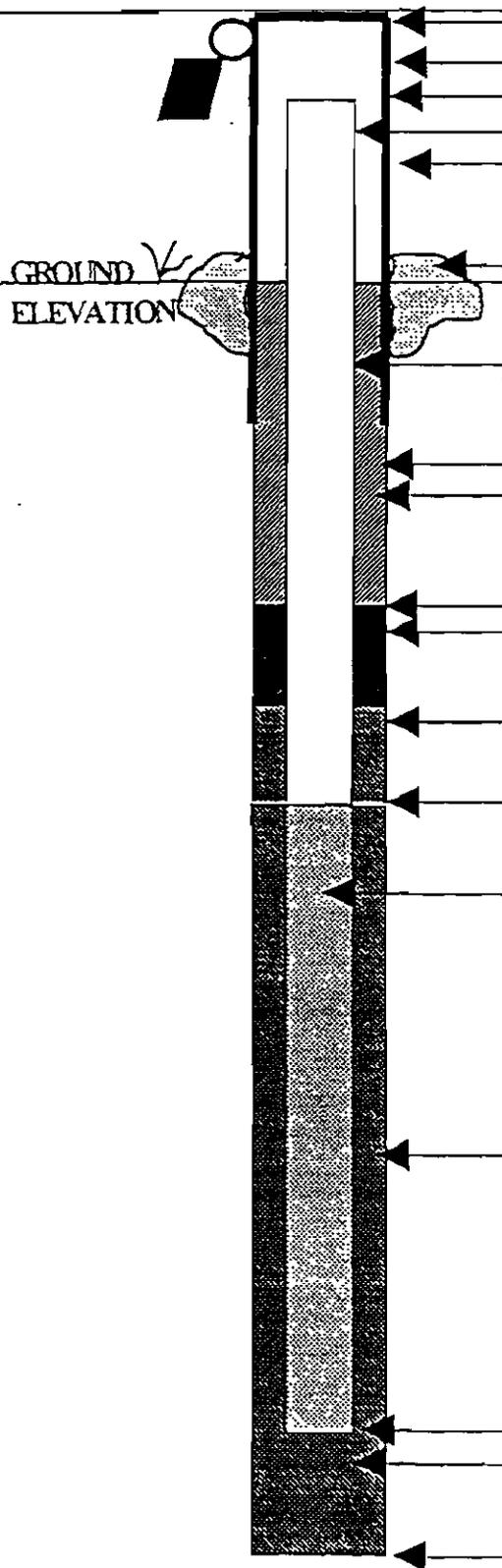
PROJECT	<u>CNC</u>	LOCATION:	<u>CNC15-MW01</u>	DRILLER	<u>Rod</u>
PROJECT NO.	<u>CNC15</u>	BORING	<u>CNC15-MW01</u>	METHOD:	<u>DPT</u>
ELEVATION		DATE	<u>6/21/99</u>	DRILLING	<u>HSA</u>
FIELD GEOLOGIST	<u>Marty Ray</u>			DEVELOPMENT:	<u>NA</u>



BORING NO: _____

OVERBURDEN MONITORING WELL SHEET

PROJECT <u>CDC</u>	LOCATION: <u>Site 15</u>	DRILLER <u>R Fuller</u>
PROJECT NO. _____	BORING <u>MW2</u>	METHOD: <u>DPT</u>
ELEVATION _____	DATE <u>8/25/99</u>	DRILLING <u>HSA</u>
FIELD GEOLOGIST <u>J. Hofer</u>		DEVELOPMENT: <u>NA</u>



ELEVATION OF TOP OF SURFACE CASING:	<u>NA</u>
ELEVATION OF TOP OF RISER PIPE:	_____
STICK-UP TOP OF SURFACE CASING:	<u>NA</u>
STICK-UP RISER PIPE:	_____
I.D. OF SURFACE CASING:	<u>8"</u>
TYPE OF SURFACE CASING:	<u>flush-mount</u>
TYPE OF SURFACE SEAL:	<u>concrete</u>
RISER PIPE I.D.:	<u>2"</u>
TYPE OF RISER PIPE:	<u>PVC</u>
BOREHOLE DIAMETER:	<u>6"</u>
TYPE OF SEAL:	<u>Cement</u>
ELEVATION / DEPTH OF SEAL:	<u>12.5</u>
TYPE OS SEAL:	<u>fine sand</u>
DEPTH TOP OF SAND PACK:	<u>2.5</u>
ELEVATION / DEPTH TOP OF SCREEN:	<u>14.0</u>
TYPE OF SCREEN:	<u>PVC</u>
SLOT SIZE X LENGTH:	<u>0.01 x 10ft</u>
I.D. OF SCREEN:	<u>2"</u>
TYPE OF SAND PACK:	<u>20/30</u>
ELEVATION / DEPTH BOTTOM OF SCREEN:	<u>114.0</u>
ELEVATION / DEPTH BOTTOM OF SAND PACK:	<u>114.5</u>
TYPE OF BACKFILL BELOW OSSERVATION WELL:	<u>NA</u>
ELEVATION / DEPTH OF HOLE:	<u>114.5</u>

APPENDIX C

FIELD SAMPLING LOGS AND LABORATORY DATA

SOIL & SEDIMENT SAMPLE LOG SHEET

Page of

Project Site Name: <u>Zone B</u> Project No.: <u>0</u> <input type="checkbox"/> Surface Soil <input checked="" type="checkbox"/> Subsurface Soil <input type="checkbox"/> Sediment <input type="checkbox"/> Other: <input type="checkbox"/> QA Sample Type:	Sample ID No.: <u>15SLB020405</u> Sample Location: <u>B02</u> Sampled By: <u>JA/RF</u> C.O.C. No.: Type of Sample: <input type="checkbox"/> Low Concentration <input type="checkbox"/> High Concentration
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

GRAB SAMPLE DATA:			
Date: <u>6/29/08</u>	Depth: <u>4-5'</u>	Color: <u>lt. br</u>	Description (Sand, Silt, Clay, Moisture, etc.): <u>Sand + trace silt</u>
Time: <u>1230</u>			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:				
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				<u>2000 + ppm</u>

SAMPLE COLLECTION INFORMATION:			
Analysis	Container Requirements	Collected	Other
<u>PAH (dup)</u>	<u>1 4oz</u>		
<u>TPH (dup)</u>	<u>1 4oz</u>		
<u>BTX/OPP (dup)</u>	<u>1 4oz</u>		
<u>Grain size</u>	<u>4 encores</u>		
	<u>4 encores</u>		
	<u>32oz</u>		

OBSERVATIONS / NOTES: <div style="font-size: 2em; text-align: center; margin-top: 20px;">duplicate taken</div>	MAP:
-----------------------------------------------------------------------------------------------------------------------	------

Circle if Applicable: <input type="checkbox"/> MS/MSD Duplicate ID No.: <u>15SLB020405D</u>	Signature(s):
-----------------------------------------------------------------------------------------------------	-------------------

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: <u>SITE 15</u>	Sample ID No.: <u>15GLM0301</u>
Project No.: <u>0141</u>	Sample Location: <u>CNC15MW3</u>
<input type="checkbox"/> Domestic Well Data	Sampled By: <u>VB/JA</u>
<input checked="" 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 checked="" 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>9/8/99</u>	<u>CLEAN</u>	<u>6.34</u>	<u>.548</u>	<u>23.4</u>	<u>4</u>	<u>1.31</u>	<u>N/A</u>	
<u>12:00 1050</u>								
Method: <u>Low Flow</u>								

PURGE DATA:								
Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method:	Initial							
<u>9/8/99</u>		<u>6.35</u>	<u>.553</u>	<u>23.2</u>	<u>2φ</u>	<u>0.54</u>	<u>NA</u>	
Method: <u>PERIST.</u>								
Monitor Reading (ppm): <u>0.0</u>	1	<u>6.51</u>	<u>.550</u>	<u>23.6</u>	<u>6</u>	<u>1.44</u>	<u>N/A</u>	
Well Casing Diameter & Material	2	<u>6.51</u>	<u>.554</u>	<u>23.4</u>	<u>2</u>	<u>0.47</u>	<u>N/A</u>	
Type: <u>2" PVC</u>	3	<u>6.34</u>	<u>.548</u>	<u>23.4</u>	<u>4</u>	<u>1.31</u>	<u>N/A</u>	
Total Well Depth (TD): <u>14.27</u>								
Static Water Level (WL): <u>6.31</u>								
One Casing Volume(gal/L): <u>1.27</u>								
Start Purge (hrs): <u>0902</u>								
End Purge (hrs): <u>0945</u>								
Total Purge Time (min): <u>43</u>								
Total Vol. Purged (gal/L): <u>5.604</u>								

SAMPLE COLLECTION INFORMATION:			
Analysis	Preservative	Container Requirements	Collected
<u>BTEX + EDB</u>	<u>HCL</u>	<u>3x40ml</u>	<u>YES</u>
<u>PAH</u>	<u>φ</u>	<u>2x 1LTR.</u>	<u>YES</u>
<u>ANIONS</u>	<u>φ</u>	<u>1x 500 ml</u>	<u>YES</u>
<u>DIS. METHANE</u>	<u>HCL</u>	<u>3x 40 ml</u>	<u>YES</u>

OBSERVATIONS / NOTES:

$$\begin{array}{r} 14.27 \\ 6.31 \\ \hline 7.96 \end{array}$$

$$\begin{array}{r} 5.3 \\ 7.96 \\ \hline 11.16 \\ 4276 \\ 7960 \\ \hline 12936 \end{array}$$
1.27

Circle if Applicable:		Signature(s): <u>[Signature]</u>
MS/MSD <u>φ</u>	Duplicate ID No.: <u>φ</u>	



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

13

Page 1 of 2

Tetra Tech NUS, Inc.

Project Site Name: zone B Sample ID No. 15GLM0101
 Project No.: 6141 Sample Location: WX15MW1
 Sampled By: JA PH Duplicate:
 Field Analyst: JA Blank:
 Field Form Checked as per QA/QC Checklist (initials): JA

SAMPLING DATA:

Date: <u>9.8.99</u>	Color (Visual): <u>Cloudy</u>	ORP (Eh) (+/- mv): <u>—</u>	S.C. (mS/cm): <u>0.83</u>	Temp. (°C): <u>23.5</u>	Turbidity (NTU): <u>42</u>	DO (Meter, mg/l): <u>2.05</u>	Sal. (%): <u>—</u>	pH (SU): <u>6.38</u>
Time: <u>12:44</u>	Method: <u>low flow</u>							

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:
 Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 1-12 mg/L) Analysis Time: 1040

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: 3.5 mg/L

Notes:

Alkalinity:
 Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1052
 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 type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	&	x 0.4	= mg/L
<input checked="" type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	& <u>360</u>	x 1.0	= <u>360</u> 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:	<u>∅</u>	<u>∅</u>	<u>360</u>

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: 1120

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 type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2		x 0.2	= mg/L
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0	<u>180</u>	x 1.0	= <u>180</u> mg/L
<input type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0	<u>180</u>	x 2.0	= <u>360</u> mg/L

CHEMetrics: _____ mg/L

Notes:

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



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

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Project Site Name: <u>zone B</u>	Sample ID No.: <u>15GLM0101</u>
Project No.: <u>0141</u>	Sample Location: <u>CNCISMWI</u>
Sampled By: <u>JA/PK</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>JA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <u>JA</u>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S²⁻): 1142

Equipment: DR-700	DR-8 __	HS-C Color Chart	HS-WR Color Wheel	Analysis Time: 1142
Program/Module: 610nm	93		Other: _____	

Concentration: 0.18 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): Analysis Time: 1241

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

Concentration: 0.009 mg/L Reagent Blank Correction:

Standard Solution: Results:

Notes: _____

Nitrate (NO₃⁻-N): Analysis Time: _____

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

Concentration: _____ mg/L 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

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Tetra Tech NUS, Inc.

Page 1 of

Project Site Name: <u>zone B</u>	Sample ID No.: <u>15GLM0101</u>
Project No.: <u>0141</u>	Sample Location: <u>CNC15mw1</u>
Sampled By: <u>JA/PH</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>JA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <u>JA</u>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn²⁺):

Equipment: DR-700 DR-8 __ HACH MN-5 Other: _____ Analysis Time: 1207

Program/Module: 525nm 41

Concentration: 1.9 mg/L Filtered:

Standard Solution: Results: _____ Digestion:

Standard Additions: Reagent Blank Correction:

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

Notes: _____

Ferrous Iron (Fe²⁺):

Equipment: DR-700 DR-8 __ IR-18C Color Wheel Other: _____ Analysis Time: 1219

Program/Module: 500nm 33

Concentration: 3.30 mg/L Filtered:

Notes: "LIMIT"

Hydrogen Sulfide (H₂S):

Equipment: HS-C Other: _____ Analysis Time: 1227

Concentration: 0 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:



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page 1 of 3

Project Site Name: zone B Sample ID No.: 15GLMφ2φ1
 Project No.: φ141 Sample Location: _____
 Sampled By: JA/PH Duplicate:
 Field Analyst: JA Blank:
 Field Form Checked as per QA/QC Checklist (initials): JA

SAMPLING DATA:

Date: <u>9.8.99</u>	Color (Visual): <u>clear</u>	ORP (Eh) (+/- mv): <u>—</u>	S.C. (mS/cm): <u>.291</u>	Temp. (°C): <u>22.8</u>	Turbidity (NTU): <u>3</u>	DO (Meter, mg/l): <u>0.93</u>	Sal. (%): <u>—</u>	pH (SU): <u>4.72</u>
Time: <u>1φφ1</u>								
Method: <u>lowflow</u>								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen: 1-12
 Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1φ35

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: 1.5 mg/L

Notes: tried 0-1 was darker than "1"

Alkalinity: Analysis Time: 11φ7
 Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____ mg/L) Filtered:

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
<input checked="" type="checkbox"/>	10-40 mg/L	100 ml	0.1600 N	0.1	<u>& 32</u>	x 0.1	= <u>3.2</u> mg/L
<input checked="" type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	<u>&</u>	x 0.4	= _____ mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	<u>&</u>	x 1.0	= _____ mg/L
<input type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	<u>&</u>	x 2.0	= _____ mg/L
<input type="checkbox"/>	500-2000 mg/L	20 ml	1.600 N	5.0	<u>&</u>	x 5.0	= _____ mg/L
<input type="checkbox"/>	1000-4000 mg/L	10 ml	1.600 N	10.0	<u>&</u>	x 10.0	= _____ mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	<u>φ</u>	<u>φ</u>	<u>3.2</u>

CHEMetrics: _____ mg/L

Notes: _____

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

Carbon Dioxide: Analysis Time: 1125
 Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____ mg/L)

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 type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2		x 0.2	= _____ mg/L
<input checked="" type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0	<u>415</u>	x 1.0	= <u>415</u> 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**

Tetra Tech NUS, Inc.

Page 2 of 3

Project Site Name: <u>Zone B</u>	Sample ID No.: <u>15GLM0201</u>
Project No.: <u>0141</u>	Sample Location: <u>CN15MW2</u>
Sampled By: <u>JA/PA</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>JA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <u>JA</u>	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S²⁻):

Equipment: DR-700	DR-8 __	HS-C Color Chart	HS-WR Color Wheel	Analysis Time: <u>1143</u>
Program/Module: 610nm	93		Other: _____	
Concentration: <u>0.12</u> mg/L				Filtered: <input type="checkbox"/>
Notes: _____				

Sulfate (SO₄²⁻):

Equipment: DR-700	DR-8 __	Other: _____	Analysis Time: _____
Program/Module: _____	91		
Concentration: _____ mg/L			Filtered: <input type="checkbox"/>
Standard Solution: <input type="checkbox"/>	Results: _____		
Standard Additions: <input type="checkbox"/>	Digits Required: 0.1ml: _____ 0.2ml: _____ 0.3ml: _____		
Notes: _____			

Nitrite (NO₂⁻-N):

Equipment: DR-700	DR-8 __	Other: _____	Analysis Time: <u>1242</u>
Program/Module: _____	60		Filtered: <input type="checkbox"/>
Concentration: <u>0.020</u> mg/L			Reagent Blank Correction: <input type="checkbox"/>
			Standard Solution: <input type="checkbox"/> Results: <input type="checkbox"/>
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: <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: _____			



**FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS**

Tetra Tech NUS, Inc.

Page 3 of 3

Project Site Name: <u>zone B</u>	Sample ID No.: <u>15GLMΦ2Φ1</u>
Project No.: <u>0141</u>	Sample Location: <u>CNC15MW2</u>
Sampled By: <u>JA/PH</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>JS</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <u>[Signature]</u>	

SAMPLE COLLECTION/ANALYSIS INFORMATION

Manganese (Mn²⁺):

Equipment: DR-700	DR-8	HACH MN-5	Other: _____	Analysis Time: <u>1208</u>
Program/Module: 525nm	41			
Concentration: <u>0.2</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>1220</u>
Program/Module: 500nm	33			
Concentration: <u>3.30</u> mg/L				Filtered: <input type="checkbox"/>

Notes: "LIMIT"

Hydrogen Sulfide (H₂S):

Equipment: HS-C	Other: _____	Analysis Time: <u>1230</u>
Concentration: <u>0.2</u> 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

Tetra Tech NUS, Inc.

Page 1 of 3

Project Site Name: <u>Zone B</u>	Sample ID No.: <u>15GLM4341</u>
Project No.: <u>0141</u>	Sample Location: _____
Sampled By: <u>JA/PH</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>JA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): <u>JA</u>	

Date:	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
<u>9.8.99</u>	<u>clear</u>	<u>—</u>	<u>.548</u>	<u>23.8</u>	<u>4</u>	<u>1.31</u>	<u>N/A</u>	
<u>1050</u>								
Method: <u>lowflow</u>								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:
 Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1042

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: 1.5 mg/L

Notes: _____

Alkalinity:
 Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____ mg/L) Analysis Time: 1100
 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 type="checkbox"/>	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	= _____ mg/L
<input type="checkbox"/>	100-400 mg/L	100 ml	1.600 N	1.0	_____ & _____	x 1.0	= _____ mg/L
<input checked="" type="checkbox"/>	200-800 mg/L	50 ml	1.600 N	2.0	_____ & <u>135</u>	x 2.0	= <u>270</u> 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:	<u>0</u>	<u>0</u>	<u>270</u>

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: 1128

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 type="checkbox"/>	20-100 mg/L	100 ml	0.3636 N	0.2	_____	x 0.2	= _____ mg/L
<input type="checkbox"/>	100-400 mg/L	200 ml	3.636 N	1.0	_____	x 1.0	= _____ mg/L
<input checked="" type="checkbox"/>	200-1000 mg/L	100 ml	3.636 N	2.0	<u>108</u>	x 2.0	= <u>216</u> mg/L

CHEMetrics: _____ mg/L

Notes: _____

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



FIELD ANALYTICAL LOG SHEET GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page 2 of 3

Project Site Name: <u>Zone B</u>	Sample ID No.: <u>15GLM0301</u>
Project No.: <u>0141</u>	Sample Location: <u>CNCISAW3</u>
Sampled By: <u>JA/PH</u>	Duplicate: <input type="checkbox"/>
Field Analyst: <u>JA</u>	Blank: <input type="checkbox"/>
Field Form Checked as per QA/QC Checklist (initials): JA	

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S²⁻):

Equipment: DR-700 DR-8 __ HS-C Color Chart HS-WR Color Wheel Analysis Time: 1144

Program/Module: 610nm 93 Other: _____

Concentration: 0.04 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: 1243

Program/Module: _____ 60 Filtered:

Concentration: 0.025 mg/L Reagent Blank Correction:

Standard Solution: Results:

Notes: _____

Nitrate (NO₃⁻-N):

Equipment: DR-700 DR-8 __ Other: _____ Analysis Time: _____

Program/Module: _____ 55 Filtered:

Concentration: _____ mg/L Nitrite Interference Treatment:

Standard Solution: Results: _____ Reagent Blank Correction:

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

Notes: _____



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

Sample Receipt

The following samples were received on June 3, 1999 and were logged in under Katahdin Analytical Services work order number WP2729 for a hardcopy due date of July 3, 1999.

<u>KATAHDIN</u> <u>Sample No.</u>	<u>TTNUS</u> <u>Sample Identification</u>	<u>GEL</u> <u>Sample No.</u>
WP2729-1	14SLB020203	9906097-01
WP2729-2	14SLB020203D	9906097-02
WP2729-3	14SLB060405	
WP2729-4	15SLB020405D	9906097-06
WP2729-5	15SLB040405	
WP2729-6	14SLB040304	
WP2729-7	15SLB020405	9906097-05
WP2729-8	14SLB050304	9906097-03
WP2729-9	15SLB010405	9906097-04
WP2729-10	14TL00401	
WP2729-11	29SLB050809	9906097-07

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

One aqueous and nine soil samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on June 3, 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 5972-F and 5972-Z instruments. 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 was performed on any sample in this workorder.

0000007

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%.

Two initial calibration curves are reported in this workorder. Both calibrations had several analytes exceeding the maximum allowable 15% RSD. The average %RSD for the 5972-F was 13.4%, and the 5972-Z had an average %RSD of 14.8%.

Sample WP2729-1, 2, 3, 5, 6, 7,8, and 9 required reanalysis due to surrogate or internal standard recovery deviations in the initial analysis to confirm matrix interference, both analyses are included.

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 Extraction and Analysis

Nine soil/sediment samples were received by Katahdin Analytical Services laboratory on June 3, 1999 for analysis in accordance with 8270C for the PAH list of analytes.

Extraction of the samples occurred following USEPA method 3540 on June 8, 1999. A laboratory control spike consisting of all PAH analytes spiked into organic free sand, was extracted in the batch.

The initial calibration curves analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

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, the average %RSD for all analytes was 9.4% and 11.5%, making the curves acceptable.

Initial analysis of sample WP2729-2 yielded internal standard area recovery deviations and target analyte concentrations over the upper limit of the calibration curve. Reanalysis occurred at a 1:5 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

0000003

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

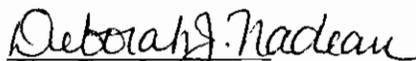
For work order WP2729 the analyses for Total Combustible Organics (TCO) have been performed in accordance with the "Annual Book of ASTM Standards", 1987. Analyses for Solids-Total Residue (TS) for work order WP2729 samples have been performed in accordance with "Contract Laboratory Program Statement of Work for Inorganic Analysis".

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

Subcontracted Analysis

Analyses for Total Organic Carbon, Total Petroleum Hydrocarbons and Grain size were subcontracted to outside laboratories. All 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.


Authorized Signature
729-99

0000004

KATAHDIN ANALYTICAL SERVICES, INC.

SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400

Fax (207) 775-4029

LAB (WORK ORDER) # WP 2729

PAGE: 1 OF 1

COOLER: 1 OF 1

COC# —

SDG# —

DATE / TIME RECEIVED: 6-3-99 0945

DELIVERED BY: FedEx

RECEIVED BY: Saw

LIMS ENTRY BY: Saw

LIMS REVIEW BY / PM: APC

CLIENT: Tetra Tech

PROJECT: 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 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>3.9</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 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 <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

[Empty box for log-in notes]

500000

⁽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.

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

ORDER NO WP-2729

Project Manager: Andrea J. Colby

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

ORDER DATE: 06/03/99
 PHONE: 850/385-989
 FAX: 850/385-9866
 DUE: 03 JUL
 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: R. FRANKLIN

DELIVERED BY: FEDEX

DISPOSE: AFTER 02 AUG

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP2729-3	14SLB060405	02 JUN 1540	03 JUN	SL
	WP2729-5	15SLB040405	02 JUN 1245		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	135.00	270.00
Volatile Organics by 8260B	SW8260	2	85.00	170.00
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
2 WP2729-6	14SLB040304	02 JUN 1505	03 JUN	ST

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Wet Lab Subcontract		1	110.00	110.00
TOTALS		1	330.00	330.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3 WP2729-8	14SLB050304	02 JUN 1525	03 JUN	SL
WP2729-9	15SLB010405	02 JUN 1220		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	135.00	270.00
Volatile Organics by 8260B	SW8260	2	85.00	170.00
Solids-Total Residue (TS)	CLP/CIP SO	2	0.00	0.00
Total Combustible Organics	ASTM D2974	2	30.00	60.00
Wet Lab Subcontract		2	60.00	120.00
TOTALS		2	310.00	620.00

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Mr. Calligan

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

ORDER NO WP-2729

Project Manager: Andrea J. Colby

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

ORDER DATE: 06/03/99
 PHONE: 850/385-9899
 FAX: 850/385-9860
 DUE: 03 JUL
 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: R. FRANKLIN

DELIVERED BY: FEDEX

DISPOSE: AFTER 02 AUG

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4 WP2729-10	14TL00401	02 JUN	03 JUN	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
5 WP2729-11	29SLB050809	02 JUN 1055	03 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Wet Lab Subcontract		1	75.00	75.00

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
6 WP2729-1	14SLB020203	02 JUN 1450	03 JUN	SL
WP2729-2	14SLB020203D	02 JUN 1450		
WP2729-4	15SLB020405D	02 JUN 1230		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	3	135.00	405.00
Volatile Organics by 8260B	SW8260	3	85.00	255.00
Solids-Total Residue (TS)	CLP/CIP SO	3	0.00	0.00
Wet Lab Subcontract		3	75.00	225.00

TOTALS		3	295.00	885.00
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includes

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

Page 3

ORDER NO WP-2729

Project Manager: Andrea J. Colby

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

ORDER DATE: 06/03/99
PHONE: 850/385-989
FAX: 850/385-986
DUE: 03 JUL
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: R. FRANKLIN

DELIVERED BY: FEDEX

DISPOSE: AFTER 02 AUG

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
7 WP2729-7	15SLB020405	02 JUN 1230	03 JUN	SL

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	135.00	135.00
Volatile Organics by 8260B	SW8260	1	85.00	85.00
Solids-Total Residue (TS)	CLP/CIP SO	1	0.00	0.00
Wet Lab Subcontract		1	185.00	185.00
TOTALS		1	405.00	405.00

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 \$2,840.00
This is NOT an Invoice

AJC/BKR/WEST.AJC(dw)

06-14Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi

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by: [signature]



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

Lab Number : WP-2729-4
 Report Date: 07/28/99
 PO No. : N7912-P99264
 Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 8 of 9

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED			
15SLB020405D	Solid	R. FRANKLIN		06/02/99	06/03/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	92.	wt %	1.0	0.10	CLP/CIP SOW	06/07/99 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 06/04/99 by JF

07/28/99

LJO/baeajc(dw)/msm
 PF04TSS0
 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: WP2729-4
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 92
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB020405D	SL	6/2/99	6/3/99	6/5/99	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	<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	133	%	1.3		
1,2-DICHLOROETHANE-D4	133	%	1.3		
TOLUENE-D8	103	%	1.3		
P-BROMOFLUOROBENZENE	70	%	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: WP2729-4
SDG: WP2729
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 92

Method: EPA 8270
Date Analyzed: 7/15/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB020405D	SL	6/2/99	6/3/99	6/8/99	GST	EPA 3540	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	63	%	1.1		
2-FLUOROBIPHENYL	64	%	1.1		
TERPHENYL-D14	77	%	1.1		

Report Notes:

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

Lab Number : WP-2729-5
 Report Date: 07/28/99
 PO No. : N7912-P99264
 Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 2 of 9

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED			
15SLB040405	Solid	R. FRANKLIN		06/02/99	06/03/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	88.	wt %	1.0	0.10	CLP/CIP SOW	06/07/99 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 06/04/99 by JF

07/28/99

LJO/baeajc(dw)/msm
 PF04TSS0
 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: WP2729-5
SDG: WP2729
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 88
Method: EPA 8270
Date Analyzed: 7/15/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB040405	SL	6/2/99	6/3/99	6/8/99	GST	EPA 3540	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
PERYRENE	<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	61	%	1.1		
TERPHENYL-D14	74	%	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: WP2729-5
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 88
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB040405	SL	6/2/99	6/3/99	6/5/99	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	115	%	1.2		
1,2-DICHLOROETHANE-D4	114	%	1.2		
TOLUENE-D8	87	%	1.2		
P-BROMOFLUOROBENZENE	\$55	%	1.2		

Report Notes: \$, O-13



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: WP2729-5RA
 SDG: WP2729
 Report Date: 7/6/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 88
 Method: SW8260
 Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB040405	SL	6/2/99	6/3/99	6/7/99	KRT	5030	KRT

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	\$32	%	1.2		
1,1-DICHLOROETHANE-D4	\$40	%	1.2		
1,1-DICHLOROETHANE-D8	\$7	%	1.2		
P-BROMOFLUOROBENZENE	\$2	%	1.2		

Report Notes: \$

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

Lab Number : WP-2729-7
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 9 of 9

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED			
15SLB020405	Solid	R. FRANKLIN		06/02/99	06/03/99		
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Solids-Total Residue (TS)	91.	wt %	1.0	0.10	CLP/CIP SOW	06/07/99 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 06/04/99 by JF

07/28/99

LJO/baeajc(dw)/msm
PF04TSS0
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: WP2729-7
 SDG: WP2729
 Report Date: 7/27/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 91
 Method: EPA 8270
 Date Analyzed: 7/15/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB020405	SL	6/2/99	6/3/99	6/8/99	GST	EPA 3540	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
PERYLENE	<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	62	%	1.1		
2-FLUOROBIPHENYL	66	%	1.1		
TERPHENYL-D14	87	%	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: WP2729-7
 SDG: WP2729
 Report Date: 7/6/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 91
 Method: SW8260
 Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB020405	SL	6/2/99	6/3/99	6/5/99	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	<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	87	%	1.3		
1,2-DICHLOROETHANE-D4	93	%	1.3		
TOLUENE-D8	\$50	%	1.3		
P-BROMOFLUOROBENZENE	\$22	%	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: WP2729-7RA
 SDG: WP2729
 Report Date: 7/6/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 91
 Method: SW8260
 Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB020405	SL	6/2/99	6/3/99	6/7/99	KRT	5030	KRT

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	\$68	%	1.2		
1,2-DICHLOROETHANE-D4	71	%	1.2		
LUENE-D8	\$37	%	1.2		
BROMOFLUOROBENZENE	\$14	%	1.2		

Port Notes: \$



Lab Number : WP-2729-9
Report Date: 07/28/99
PO No. : N7912-P99264
Project : CTO #68

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

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 5 of 9

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY		SAMPLED DATE RECEIVED				
15SLB010405	Solid	R. FRANKLIN		06/02/99	06/03/99			
PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Solids-Total Residue (TS)	94.	wt %	1.0	0.10	CLP/CIP SOW	06/08/99	JF	1
Total Combustible Organics	20.	wt %	1.0	0.1	ASTM D2974-8	06/08/99	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 06/07/99 by JF

07/28/99

LJO/baeajc (dw) /msm
PF07TSS1
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: WP2729-9
SDG: WP2729
Report Date: 7/27/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 94

Method: EPA 8270
Date Analyzed: 7/15/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB010405	SL	6/2/99	6/3/99	6/8/99	GST	EPA 3540	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
NZO[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
DIBENZO[A,H]ANTHRACENE	<360	ug/Kg	1.1	360	330
BENZO[G,H,I]PERYLENE	<360	ug/Kg	1.1	360	330
NITROBENZENE-D5	66	%	1.1		
2-FLUOROBIPHENYL	66	%	1.1		
TERPHENYL-D14	80	%	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: WP2729-9
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 94
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB010405	SL	6/2/99	6/3/99	6/5/99	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	145	%	1.2		
1,2-DICHLOROETHANE-D4	146	%	1.2		
TOLUENE-D8	115	%	1.2		
P-BROMOFLUOROBENZENE	73	%	1.2		

Report Notes: O-13



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: WP2729-9RA
 SDG: WP2729
 Report Date: 7/6/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 94
 Method: SW8260
 Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15SLB010405	SL	6/2/99	6/3/99	6/7/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample PQL	Method PQL
BENZENE	<7	ug/Kg	1.4	7	5
TOLUENE	<7	ug/Kg	1.4	7	5
1,2-DIBROMOETHANE	<7	ug/Kg	1.4	7	5
ETHYLBENZENE	<7	ug/Kg	1.4	7	5
NAPHTHALENE	<7	ug/Kg	1.4	7	5
MTBE	<7	ug/Kg	1.4	7	5
TOTAL XYLENES	<7	ug/Kg	1.4	7	5
DIBROMOFLUOROMETHANE	140	%	1.4		
1,2-DICHLOROETHANE-D4	140	%	1.4		
TOLUENE-D8	105	%	1.4		
BROMOFLUOROBENZENE	70	%	1.4		

Port Notes: O-13



Method Blank and Laboratory Control Sample Results

Client:	Tetra Tech NUS
Work Order:	WP2729

Parameter	Date of Prep	Date of Analysis	METHOD BLANK RESULTS					LABORATORY CONTROL SAMPLE RESULTS				
			Units	Concentration Measured in Blank	Acceptance Range	Practical Quantitation Level**	Units	True Value	Measured Value	Percent Recovered	Acceptance Range (%)	Acceptance Range (mg/kg)
TS -Total Residue	04-Jun-99	07-Jun-99	wt %	< 0.10	< 0.10	0.10	wt %	90	89.5	99.4	80-120	
	07-Jun-99	08-Jun-99	wt %	< 0.10	< 0.10	0.10	wt %		NA		80-120	
TCO	07-Jun-99	08-Jun-99	wt %	< 0.10	< 0.10	0.10	wt %				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.



Duplicate and Matrix Spike/Matrix Spike Duplicate Results

Client:	Tetra Tech NUS
Work Order:	WP2729

*DUPLICATE RESULTS**MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS*

Parameter	Sample No	Sample Measurements		Mean	Acceptance Range		Concentration or Quantity				Matrix Spike Recovery (%)			RPD (%)	Acceptance Range (%)		
		Units	Rep 1	Rep 2	Conc	RPD (%)	for RPD (%)	Units	Sampl Only	Spike Added	Sample +Spike	Sample +Spike	Sample +Spike			Sample +Spike	Acceptance Range (%)
TS	WP2729-9	wt%	94.2	94.3	94.3	0.1	0-20	MS/MSD Not Applicable for this Parameter									
TCO	WP2729-9	wt%	20.4	20.4	20.4	0.0	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.



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;060899
 SDG: WP2729
 Report Date: 7/27/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: 100
 Method: EPA 8270
 Date Analyzed: 7/6/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;060899	SL	-	-	6/8/99	GST	EPA 3540	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	71	%	1.0		
TERPHENYL-D14	71	%	1.0		

Report Notes:

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: X2090

Sample ID: LCS;060899

Date Run: 7/6/99

Analyst: KRT

Time Injected 1:10:00 PM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	1667	1370	82	60-140
ACENAPHTHENE	1667	1310	78	60-140
ACENAPHTHYLENE	1667	1280	77	60-140
ANTHRACENE	1667	1270	76	60-140
BENZO[A]ANTHRACENE	1667	1130	68	60-140
BENZO[A]PYRENE	1667	1090	65	60-140
BENZO[B]FLUORANTHENE	1667	1130	68	60-140
BENZO[G,H,I]PERYLENE	1667	934	*56	60-140
BENZO[K]FLUORANTHENE	1667	1160	70	60-140
CHRYSENE	1667	1080	65	60-140
DIBENZ[A,H]ANTHRACENE	1667	912	*55	60-140
FLUORANTHENE	1667	1320	80	60-140
FLUORENE	1667	1410	84	60-140
INDENO[1,2,3-CD]PYRENE	1667	1020	61	60-140
NAPHTHALENE	1667	1200	72	60-140
PHENANTHRENE	1667	1300	78	60-140
PYRENE	1667	1140	68	60-140

* Out of Limits

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: VBLKZ04A
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/4/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ04A	SL	-	-	6/4/99	KMC	5030	KMC

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		
1,2-DICHLOROETHANE-D4	124	%	1.0		
TOLUENE-D8	113	%	1.0		
P-BROMOFLUOROBENZENE	109	%	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: VBLKZ05A
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/5/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ05A	SL	-	-	6/5/99	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	117	%	1.0		
1,2-DICHLOROETHANE-D4	116	%	1.0		
LUENE-D8	114	%	1.0		
BROMOFLUOROBENZENE	107	%	1.0		

Port 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: VBLKF07A
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF07A	AQ	-	-	6/7/99	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	88	%	1.0		
1,2-DICHLOROETHANE-D4	80	%	1.0		
TOLUENE-D8	85	%	1.0		
P-BROMOFLUOROBENZENE	79	%	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: VBLKZ07A
SDG: WP2729
Report Date: 7/6/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: 100
Method: SW8260
Date Analyzed: 6/7/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKZ07A	SL	-	-	6/7/99	KRT	5030	KRT

Compound	Result	Units	DF	Sample	Method
				PQL	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	125	%	1.0		
1,2-DICHLOROETHANE-D4	130	%	1.0		
TOLUENE-D8	105	%	1.0		
1,2-DIBROMOETHANE	99	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0972

Sample ID: LCSZ04A

Date Run: 6/4/99

Analyst: KMC

Time Injected 9:27:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	58.3	116	60-140
BENZENE	50	54.8	110	60-140
ETHYLBENZENE	50	65.9	132	60-140
MTBE	50	56.5	113	60-140
NAPHTHALENE	50	50.5	101	60-140
TOLUENE	50	59.1	118	60-140
TOTAL XYLENES	150	202	135	60-140

* Out of Limits

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z0988

Sample ID: LCSZ05A

Date Run: 6/5/99

Analyst: JSS

Time Injected 11:30:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	49.9	100	60-140
BENZENE	50	48.3	97	60-140
ETHYLBENZENE	50	55.2	110	60-140
MTBE	50	52.5	105	60-140
NAPHTHALENE	50	45.8	92	60-140
TOLUENE	50	49.2	98	60-140
TOTAL XYLENES	150	165	110	60-140

*** Out of Limits**

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F0796

Sample ID: LCSF07A

Date Run: 6/7/99

Analyst: KRT

Time Injected 10:00:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	46.3	92	60-140
BENZENE	50	47.2	94	60-140
ETHYLBENZENE	50	47.9	96	60-140
MTBE	50	45.7	91	60-140
NAPHTHALENE	50	46.8	94	60-140
TOLUENE	50	47.1	94	60-140
TOTAL XYLENES	150	141	94	60-140

*** Out of Limits**

1

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: Z1004

Sample ID: LCSZ07A

Date Run: 6/7/99

Analyst: KRT

Time Injected 9:18:00 AM

Matrix: SL

Compound Name	Spike Amt (ug/Kg)	Result (ug/Kg)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	49.5	99	60-140
BENZENE	50	48.2	96	60-140
ETHYLBENZENE	50	56.5	113	60-140
MTBE	50	44.9	90	60-140
NAPHTHALENE	50	35.6	71	60-140
TOLUENE	50	51.3	102	60-140
TOTAL XYLENES	150	172	114	60-140

*** Out of Limits**

1

CASE NARRATIVE
for
Katahdin Analytical
Westbrook, ME
Former Charleston Naval Complex Site
SDG #96058S

June 21, 1999

Laboratory Identification:

General Engineering Laboratories, Inc. (GEL)

Mailing Address:

P.O. Box 30712
Charleston, SC 29417

Express Mail Delivery and Shipping Address:

2040 Savage Rd
Charleston, SC 29414

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

The samples from the former Charleston Naval Complex site arrived at General Engineering Laboratories, Inc., Charleston, SC on June 1 and 2, 1999, for environmental analyses. All 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 Identification</u>	<u>Sample Description</u>
9906058-01	29SLB060809
9906097-01	14SLB020203
9906097-02	14SLB020203D
9906097-03	14SLB050304
9906097-04	15SLB010405

9906097-05
9906097-06
9906097-07

15SLB020405
15SLB020405D
29SLB050809

Case 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 below by analytical parameter.

Internal Chain of Custody:

Custody was maintained for all 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:saic9906058%



Case Narrative for
KATA
SDG# 96058S

TOTAL PETROLEUM HYDROCARBONS

Analytical Batch Number: 151686

Analytical Method: SW846 9071A

<u>Laboratory Number</u>	<u>Sample Description</u>
9906097-01	14SLB020203
9906097-02	14SLB020203D
9906097-05	15SLB020405
9906097-06	15SLB020405D
9906097-07	29SLB050809
QC621595	Blank
QC621596	Laboratory Control Sample
QC621597	Matrix Spike of 9906097-01
QC621598	Duplicate of 9906097-01
QC621599	Matrix Spike of 9906242-01
QC621600	Duplicate of 9906242-01

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 spikes were run on the following Sample Numbers.

9906097-01 and 9906242-01

All analyte recoveries in the matrix spikes were 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 ORGANIC CARBON

Analytical Batch Number: 150724

Analytical Method: SW846 9060 Modified

<u>Laboratory Number</u>	<u>Sample Description</u>
9906058-01	29SLB060809
9906097-03	14SLB050304
9906097-04	15SLB010405
QC617934	Blank
QC617935	Duplicate of 9906058-01
QC617936	Post Spike of 9906058-01
QC617937	Laboratory Control Sample

Sample Preparation:

All samples were prepared in accordance with accepted procedures. The method quoted is only for liquid samples. It is modified to handle soils analysis.

Instrument Calibration:

The instrument used was a Dohrmann DC-190 high temperature combustion TOC analyzer with a Dohrmann solids boat sampler. The instrument was properly calibrated on the day of the analysis.

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.

9906058-01

All analyte recoveries in the post spike were 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.

Additional Comments:

TOC solid samples are tested to determine if inorganic carbon such as carbonates and bicarbonates are present in the sample. If so, the sample is acidified to remove the inorganic carbon, then dried in a low temperature oven. Because the sample portion is dried before analysis, the percent moisture correction is not applied to the TOC solid result.

The preceding narratives have been reviewed by: Janet M. U Date: 06/27/99

CHAIN OF CUSTODY RECORD

99060587

Client Name/Facility Name <i>Kutahadin</i>			SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods														Remarks			
Collected by/Company <i>Tetra Tech NUS</i>			# OF CONTAINERS	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
<i>OR 29SLB060807</i>	<i>6/1</i>	<i>1520</i>																		
<i>OR 29SLB0608095</i>	<i>6/1</i>	<i>1520</i>																		
<i>OR 29SLB060809M</i>	<i>6/1</i>	<i>1520</i>																		
Relinquished by: <i>[Signature]</i>	Date: <i>6/1/99</i>	Time: <i>1750</i>	Received by:									Relinquished by:	Date:	Time:	Received by:					
Relinquished by:	Date:	Time:	Received by lab by: <i>[Signature]</i>									Date: <i>6/1/99</i>	Time: <i>1750</i>	Remarks:						

40599
-1
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White = sample collector Yellow = file Pink = with report

CHAIN OF CUSTODY RECORD

Page _____ of _____

99060971

Client Name/Facility Name <i>Katahdin Analytical</i>				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		
Collected by/Company <i>Tetra Tech NUS</i>				# OF CONTAINERS	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	TPH		Remarks	
SAMPLE ID	DATE	TIME	WELL																		SOIL		COMP
-01	14SLB020203	6/29	1450																				
-02	14SLB020203D	6/29	1450																				
-03	14SLB050304	"	1525																				
-04	15SLB010405	"	1220																				
-05	15SLB020405	"	1230																				
-06	15SLB020405D	"	1230																				
-07	29SLB050809	"	1055																				
Relinquished by: <i>[Signature]</i>				Date: 6/29/99	Time: 1940	Received by:				Relinquished by:				Date:	Time:	Received by:							
Relinquished by:				Date:	Time:	Received by lab by: <i>[Signature]</i>				Date: 6/29/99	Time: 1216	Remarks:											

4625
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White = sample collector Yellow = file Pink = with report

FEDERAL SAMPLE RECEIPT REVIEW

Client KATA

Received by [Signature]

Date 6/2/99

GEL COOLER GEL POLY COOLER CLIENT COOLER OTHER

SAMPLE REVIEW CRITERIA	YES	NO	COMMENTS/QUALIFIERS
1. Were shipping containers received intact and sealed? If no, notify Project Manager	✓		
2. Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?	✓		
Were the survey results negative? If no, notify Project Manager	✓		
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 correctly? (Ink, signed, match containers)	✓		
5. Were all sample containers properly labeled?	✓		
6. Were proper sample containers received?	✓		
7. Preserved samples checked for pH?	✓		
8. Were samples preserved correctly? If no, list samples & tests	✓		
9. Shipping container temperature checked?	✓		
10. Was shipping container temperature within specifications (4°± 2° C) If no, notify Project Manager	✓		4°c
11. Is temperature documented on the Chain of Custody?	—		
12. Were samples received within holding time? if No, notify Project Manager	✓		
13. Were VOA vials free of headspace?	—		
14. ARCO# IF REQUIRED	—		
15. SDG# IF REQUIRED	✓		

REVIEW [Signature] DATE 6/2/99

SA - SEALS ATTACHED NSA - NO SEALS ATTACHED

FEDERAL SAMPLE RECEIPT REVIEW

Client KATA

Received by CG

Date 6/2/99

GEL COOLER GEL POLY COOLER CLIENT COOLER OTHER

SAMPLE REVIEW CRITERIA	YES	NO	COMMENTS/QUALIFIERS
1. Were shipping containers received intact and sealed? If no, notify Project Manager	✓		
2. Was the Shipment screened following the radiochemistry survey procedure (EPI SOP S-007)?	✓		
Were the survey results negative? If no, notify Project Manager	✓		
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 correctly? (Ink, signed, match containers)	✓		
5. Were all sample containers properly labeled?	✓		
6. Were proper sample containers received?	✓		
7. Preserved samples checked for pH?			
8. Were samples preserved correctly? If no, list samples & tests	-		Soil
9. Shipping container temperature checked?	✓		
10. Was shipping container temperature within specifications ($4^{\circ} \pm 2^{\circ} \text{C}$)? If no, notify Project Manager	✓		4°C
11. Is temperature documented on the Chain of Custody?	-		
12. Were samples received within holding time? if No, notify Project Manager	✓		
13. Were VOA vials free of headspace?	-		
14. ARCO# IF REQUIRED	-		
15. SDG# IF REQUIRED	✓		96097

REVIEW Shaw

DATE 6/2/99

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 22, 1999

Page 1 of 1

Sample ID : 29SLB060809
 Lab ID : 9906058-01
 Matrix : Soil
 Date Collected : 06/01/99
 Date Received : 06/01/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		8.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		6780	43.1	100	mg/kg	1.0	LS	06/18/99	1725	150724	2

M = Method	Method-Description
M 1	EPA 3550
M 2	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.

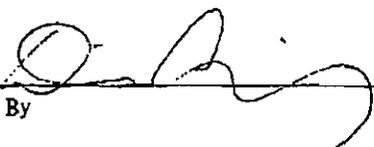
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

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'.

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, Valerie Davis at (843) 769-7391.

Reviewed By 



0006058 01

Client: Katahdin Analytical
 340 County Road
 Westbrook, Maine 04092
 Contact: Ms. Andrea Colby
 Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 29SLB050809
 Lab ID : 9906097-07
 Matrix : Soil
 Date Collected : 06/02/99
 Date Received : 06/02/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		9150	54.0	108	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		7.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

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).

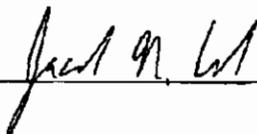
U indicates that the analyte was not detected at a concentration greater than the detection limit.

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

Data reported in mass/mass units is reported as 'dry weight'.

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, Valerie Davis at (843) 769-7391.

Reviewed By




Client: Katahdin Analytical
 340 County Road
 Westbrook, Maine 04092
 Contact: Ms. Andrea Colby
 Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 14SLB050304
 Lab ID : 9906097-03
 Matrix : Soil
 Date Collected : 06/02/99
 Date Received : 06/02/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		13.0	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		11900	43.1	100	mg/kg	1.0	LS	06/18/99	1836	150724	2

M = Method	Method-Description
M 1	EPA 3550
M 2	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).

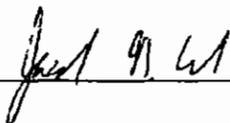
U indicates that the analyte was not detected at a concentration greater than the detection limit.

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

Data reported in mass/mass units is reported as 'dry weight'.

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, Valerie Davis at (843) 769-7391.

Reviewed By




9906097-03

Client: Katahdin Analytical
 340 County Road
 Westbrook, Maine 04092
 Contact: Ms. Andrea Colby
 Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 15SLB010405
 Lab ID : 9906097-04
 Matrix : Soil
 Date Collected : 06/02/99
 Date Received : 06/02/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Evaporative Loss @ 105 C		6.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	1
Total Organic Carbon		8440	43.1	100	mg/kg	1.0	LS	06/18/99	1909	150724	2

M = Method	Method-Description
M 1	EPA 3550
M 2	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).

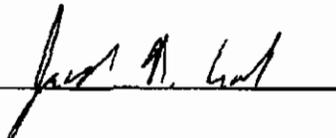
U indicates that the analyte was not detected at a concentration greater than the detection limit.

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

Data reported in mass/mass units is reported as 'dry weight'.

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, Valerie Davis at (843) 769-7391.

Reviewed By




Client: Katahdin Analytical
 340 County Road
 Westbrook, Maine 04092
 Contact: Ms. Andrea Colby
 Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 15SLB020405
 Lab ID : 9906097-05
 Matrix : Soil
 Date Collected : 06/02/99
 Date Received : 06/02/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		261	55.5	111	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		10.0	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method	Method-Description
M 1	SW846 9071A
M 2	EPA 3550

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).

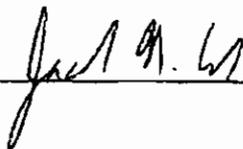
U indicates that the analyte was not detected at a concentration greater than the detection limit.

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

Data reported in mass/mass units is reported as 'dry weight'.

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, Valerie Davis at (843) 769-7391.

Reviewed By




Client: Katahdin Analytical
 340 County Road
 Westbrook, Maine 04092
 Contact: Ms. Andrea Colby
 Project Description: Former Naval Complex

cc: KATA00199

Report Date: June 22, 1999

Page 1 of 1

Sample ID : 1SSLB020405D
 Lab ID : 9906097-06
 Matrix : Soil
 Date Collected : 06/02/99
 Date Received : 06/02/99
 Priority : Routine
 Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
General Chemistry											
Total Rec. Petro. Hydrocarbons		231	55.0	110	mg/kg	1.0	AAT	06/22/99	0950	151686	1
Evaporative Loss @ 105 C		9.00	1.00	1.00	wt%	1.0	GJ	06/03/99	1500	150650	2

M = Method

Method-Description

M 1 SW846 9071A
 M 2 EPA 3550

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).

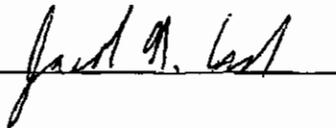
U indicates that the analyte was not detected at a concentration greater than the detection limit.

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

Data reported in mass/mass units is reported as 'dry weight'.

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, Valerie Davis at (843) 769-7391.

Reviewed By




QC Summary Report

Project Description: Former Naval Complex

cc: KATA00199

Lab. Sample ID: 9906097%

Report Date: June 22, 1999

Page 1 of 1

Sample/Parameter	Type	Batch	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Analyst	Date	Time
General Chemistry													
QC621595	BLANK	151686											
Total Rec. Petro. Hydrocarbons						0.00	mg/kg				AAT	06/22/99	0950
QC621598	9906097-01DUP	151686											
Total Rec. Petro. Hydrocarbons				783		1020	mg/kg	26.3					
QC621600	9906242-01DUP	151686											
Total Rec. Petro. Hydrocarbons				1560		1910	mg/kg	20.0					
QC621596	LCS	151686											
Total Rec. Petro. Hydrocarbons			11000			9840	mg/kg		89.6	(70.0 - 116.)			
QC621597	9906097-01MS	151686											
Total Rec. Petro. Hydrocarbons			13200	783		12600	mg/kg		90.0	(70.0 - 130.)			
QC621599	9906242-01MS	151686											
Total Rec. Petro. Hydrocarbons			12100	1560		13000	mg/kg		94.6	(70.0 - 130.)			
QC617634	BLANK	150650											
Evaporative Loss @ 105 C						0.00	wt%				GJ	06/03/99	1500
QC617632	9906058-01DUP	150650											
Evaporative Loss @ 105 C				8.00		8.00	wt%	0.00					
QC617934	BLANK	150724											
Total Organic Carbon						-2.83	mg/kg				LS	06/18/99	1628
QC617935	9906058-01DUP	150724											
Total Organic Carbon				6780		6830	mg/kg	0.764			LS	06/18/99	1740
QC617937	LCS	150724											
Total Organic Carbon			3750			4420	mg/kg		118	(88.0 - 130.)	LS	06/18/99	1612
QC617936	9906058-01PS	150724											
Total Organic Carbon			10000	6780		16200	mg/kg		94.2	(73.0 - 129)	LS	06/18/99	1747

Notes:

The qualifiers in this report are defined as follows:

J indicates presence of analyte < RL (Report Limit)

U indicates presence of analyte < DL (Detect Limit)

n/a indicates that spike recovery limits do not apply when
sample concentration exceeds spike conc by a factor of 4 or more

S. W. COLE ENGINEERING, INC.

Site A SLB-04
03'-04'

REPORT OF GRADATION
ASTM C-117, C-136

Project No. 99008
Date 06/07/1999

Project MISCELLANEOUS
Client KATAHDIN ANALYTICAL
Sample No. 19, SANDY GRAVEL, WP2729-6

<u>Sieve Size</u>	<u>Percent Passing</u>	<u>PROJECT Specifications %</u>
3/4 "	100.0	
1/2 "	96.9	
1/4 "	91.1	
# 4	88.6	
# 10	77.6	
# 20	62.7	
# 40	51.8	
# 60	44.0	
# 100	27.7	
# 200	10.4	

SITE 15

S. W. COLE ENGINEERING, INC.

SLB-02
04' to 05'

REPORT OF GRADATION
ASTM C-117, C-136

Project No. 99008
Date 06/07/1999

Project MISCELLANEOUS
Client KATAHDIN ANALYTICAL
Sample No. 20, SAND, WP2729-7

<u>Sieve Size</u>	<u>Percent Passing</u>	<u>PROJECT Specifications %</u>
1/2 "	100.0	
1/4 "	99.7	
# 4	99.5	
# 10	98.3	
# 20	95.8	
# 40	90.4	
# 60	78.0	
# 100	29.8	
# 200	6.8	

HYDROMETER ANALYSIS

JOB NO.99-008

BORING NO.

SAMPLE NO.S-19

	DIAMETER	% PASSING	READING
	3.652952E-02	10.13329	2.2
	2.587339E-02	9.479344	2
	1.831047E-02	9.152371	1.9
	1.339429E-02	8.49881	1.7
	9.471192E-03	8.49881	1.7
	.0067193	7.190912	1.3
Clay size	4.762978E-03	6.210377	1
	3.387185E-03	3.921943	.3
	2.398976E-03	3.267994	.1
	1.380011E-03	4.739186	.55

5%

HYDROMETER ANALYSIS

JOB NO.99008

BORING NO.

SAMPLE NO.S-20

	DIAMETER	% PASSING	READING
	3.748418E-02	5.39373	2
	2.654942E-02	4.944107	1.8
	1.881995E-02	4.269942	1.5
	1.374415E-02	4.269942	1.5
	9.750622E-03	3.370696	1.1
	6.92858E-03	2.022096	.5
Clay size ~	4.919103E-03	.8983074 ~ 1%	0



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

Sample Receipt

The following samples were received on September 9, 1999 and were logged in under Katahdin Analytical Services work order number WP3850 for a hardcopy due date of October 8, 1999.

<u>KATAHDIN</u>	<u>TTNUS</u>
<u>Sample No.</u>	<u>Sample Identification</u>
WP3850-1	15GLM0101
WP3850-2	34GLM0101
WP3850-3	34GLM0201
WP3850-4	34GLM0301
WP3850-5	15GLM0201D
WP3850-6	24GLM0301D
WP3850-7	24GLM0501
WP3850-8	24TL00201
WP3850-9	15GLM0201
WP3850-10	15GLM0301
WP3850-11	24GLM0301
WP3850-12	21GLM0101
WP3850-13	21GLM0601
WP3850-14	21GLM0401
WP3850-15	24GLM0101
WP3850-16	24GLM0201

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

Sixteen aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on September 9, 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 5972-F 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. Matrix spike/matrix spike duplicate analyses were performed on samples WP3850-5, and WP3850-9.

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

Eleven aqueous samples were received by Katahdin Analytical Services laboratory on September 9, 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 September 10, 1999. A laboratory control spike was extracted in the batch, along with a site-specific MS/MSD pair on sample WP3850-6.

Analysis of sample WP3850-9 yielded a low recovery of the surrogate terphenyl-d14. Reextraction of this sample occurred on September 28, 1999, outside of extraction holding times, following USEPA method 3510. Surrogate recoveries in this reextracted sample met QC limits. Both sets of data for this sample 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.

Metals Analysis

The samples of Katahdin Work Order WP3850 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

Aqueous-matrix Katahdin Sample No. WP3850-7 was digested for ICP analysis on 09/10/99 (QC Batch P110ICW1) in accordance with USEPA Method 3010A. The measured barium (8.89 ug/L) and sodium (242 ug/L) concentrations of the preparation blank that is associated with this QC batch exceed the laboratory's acceptance limits. Because the measured barium and sodium concentrations of Katahdin Sample No. WP3850-7 were more than ten times those of the preparation blank, no corrective action was taken.

ICP analyses of Katahdin Work Order WP3850 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

Aqueous-matrix Katahdin Sample No. WP3850-7 was digested for mercury analysis on 09/17/99 (QC Batch PI17HGW0) in accordance with USEPA Method 7470A. This sample was digested with duplicate matrix-spiked aliquots.

Mercury analyses of Katahdin Work Order WP3850 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.

Wet Chemistry Analysis

Due to IC instrument failure, Kelly Johnson-Carper approved alternate methods for the analysis of nitrate and sulfate. The Nitrate analyses (325.5) and the Sulfate analyses (375.4) were performed according to the U.S. EPA, Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020, 1979, Revised 1983. All analyses were performed within analytical hold times.

The Wet Chemistry staff noted no protocol deviations.

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

LAB (WORK ORDER) # WP3850

PAGE: 1 OF 3

COOLER: 1 OF 3

COC# -

SDG# -

DATE / TIME RECEIVED: 9-9-99 0920

DELIVERED BY: Feal Ex

RECEIVED BY: Sam

LIMS ENTRY BY: BKR

LIMS REVIEW BY / PM: ADG

CLIENT: TetraTech

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>0.7</u>	<u>ASC notified Paul Calligan 9/9/99 was told to proceed</u>
6. SAMPLES RECEIVED AT 4°C ± .2? <u>(ICE)</u> ICE PACKS PRESENT <u>(Y)</u> 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 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 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⁾:

0000067

⁽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.

LAB (WORK ORDER) # WP3850

PAGE: 2 OF 3

COOLER: 2 OF 3

COC# -

SDG# -

DATE / TIME RECEIVED: 9-9-99 0920

DELIVERED BY: FedEx

RECEIVED BY: SA

LIMS ENTRY BY: BEW

LIMS REVIEW BY / PM: AJC

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 type="checkbox"/>	<input checked="" 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°?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	COOLER TEMP (°C)= <u>0.1</u> NA	<u>ASC notified Paul Calligan 9/9/99 e was told to proceed</u>
ICE PACKS PRESENT (Y or N)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	(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 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 <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

LOG - IN NOTES⁽¹⁾:

24 GCM0501: 10FL PAH containers rec'd broken. - ASC notified Paul Calligan 9/9/99

⁽¹⁾ Use this space (and additional sheets if necessary) to document samples that are received broken check if required. If samples require pH adjustment, record volume and type of preservative added.

promised, C-O-C discrepancies, radiation checks, residual chlorine check, results.

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

LAB (WORK ORDER) # WP3850

PAGE: 3 OF 3

COOLER: 3 OF 3

CLIENT: Tetra Tech

COC# -

SDG# -

DATE / TIME RECEIVED: 9-9-99 0920

DELIVERED BY: FedEx

RECEIVED BY: Sam

LIMS ENTRY BY: BKR

LIMS REVIEW BY / PM: ASC

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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	(1)	ASC conducted Vandal Calligan: was told to add samples to COC. ASC notified Vandal Calligan 9/9/99 & was told to proceed
5. TEMPERATURE BLANKS PRESENT?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	TEMP BLANK TEMP (°C) = <u>1.2</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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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 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 <u>NFESC</u> ACOE AFCEE OTHER (STATE OF ORIGIN):					

6900000

LOG - IN NOTES⁽¹⁾:

One sample: 15GLM0201, client wrote 15GLM0301 on 3 voas and ANIONS nutrients bottles. Times determined that samples were, in fact, 15GLM0201

(1) X-TRA samples: Sample IDs: A.) 24GLM0201 (PAH, BTEX, MTBE, ANIONS) sent, but not on C.O.C
 B.) 24GLM0101

⁽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.



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 **TETRA TECH** Contact **Paul Calligan** Phone # **(850) 385-9879** Fax # **(850) 385-9860**

Address **1401 Owen Park Drive, #102** City **Tallahassee** State **FL** Zip Code **32312**

Purchase Order # _____ Proj. Name / No. **CNC / N0141** Katahdin Quote # _____

Bill (if different than above) _____ Address _____

Sampler (Print / Sign) **PAUL HALVERSON** Copies To: _____

LAB USE ONLY WORK ORDER #: **WP3850**
 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.									
				YOYON									
15GLM0101	9/8/99/1260	GW	1	0	0	0	0	0	0	0	0	0	0
15GLM0201	9/8/99/1001	GW	9	1	2	3	3	3	3	3	3	3	3
15GLM0301	9/8/99/1050	GW	9	1	2	3	3	3	3	3	3	3	3
15GLM0201D	9/8/99/0	GW	8	0	2	3	3	3	3	3	3	3	3
24GLM0501	9/8/99/1700	GW	6	0	2	3	3	3	3	3	3	3	3
24GLM0301	9/8/99/1752	GW	9	1	2	3	3	3	3	3	3	3	3
24GLM0301D	9/8/99/0006	GW	5	2	3	3	3	3	3	3	3	3	3
24TL00201	9/8/99/	X	2			2							TRIP BLANK
24GLM0101	9/8/99/1707	GW	9	1	2	3	3	3	3	3	3	3	3
24GLM0201	9/8/99/1705	GW	9	1	2	3	3	3	3	3	3	3	3
/	/												
/	/												
/	/												
/	/												
/	/												
/	/												

COMMENTS **FED EX: 813451738831**

PUT ON ICE 4°C

Relinquished By: (Signature) [Signature]	Date / Time 9/8/99 1240	Received By: (Signature) Fedex 813451738831	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-3850

Project Manager: Andrea J. Colby
 ORDER DATE: 09/09/99
 PHONE: 850/385-9899
 FAX: 850/385-9860
 DUE: 08 OCT
 FAC.ID: CNC CHARLESTON

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

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: P. HALVERSON, JR HEBL, J. KRIEGER, T. THOMPSON DELIVERED BY: FEDEX DISPOSE:

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3850-1	15GLM0101	08 SEP 1200	09 SEP	AQ
	WP3850-2	34GLM0101	08 SEP 1725		
	WP3850-3	34GLM0201	08 SEP 1748		
	WP3850-4	34GLM0301	08 SEP 1848		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Nitrate as N	353.2	4	30.00	120.00
Sulfate	375.4	4	0.00	0.00

TOTALS		4	30.00	120.00
--------	--	---	-------	--------

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
WP3850-5	15GLM0201D	08 SEP	09 SEP	AQ
WP3850-6	24GLM0301D	08 SEP		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	2	125.00	250.00
Volatile Organics by 8260B	SW8260	2	75.00	150.00

TOTALS		2	200.00	400.00
--------	--	---	--------	--------

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
3 WP3850-7	24GLM0501	08 SEP 1700	09 SEP	AQ

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Polynuclear Aromatic Hydrocarbons	EPA 8270	1	125.00	125.00
Volatile Organics by 8260B	SW8260	1	75.00	75.00
Target Analyte List Metals, Total		1	100.00	100.00

TOTALS		1	300.00	300.00
--------	--	---	--------	--------

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

ORDER NO WP-3850

Project Manager: Andrea J. Colby

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

ORDER DATE: 09/09/99

PHONE: 850/385-985

FAX: 850/385-986

DUE: 08 OCT

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: P.HALVERSON, JR HEBL, J.KRIEGER, T.THOMPSON DELIVERED BY: FEDEX DISPOSE:

	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
4	WP3850-8	24TL00201	08 SEP	09 SEP	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
5	WP3850-9	15LGM0201	08 SEP 1001	09 SEP	AQ
	WP3850-10	15GLM0301	08 SEP 1050		
	WP3850-11	24GLM0301	08 SEP 1752		
	WP3850-12	21GLM0101	08 SEP 1040		
	WP3850-13	21GLM0601	08 SEP 1120		
	WP3850-14	21GLM0401	08 SEP 1210		
	WP3850-15	24GLM0101	08 SEP 1707		
	WP3850-16	24GLM0201	08 SEP 1705		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	8	75.00	600.00
Methane Subcontract		8	95.00	760.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	8	125.00	1000.00
Nitrate as N	353.2	8	30.00	240.00
Sulfate	375.4	8	0.00	0.00

TOTALS		8	325.00	2600.00
--------	--	---	--------	---------

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

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 \$3,495.00
 This is NOT an Invoice

AJC/BKR
 09-09 Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note	Note Text
#	#' flag denotes surrogate compound recovery is out of criteria.
J	'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.



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

Lab Number : WP-3850-1
 Report Date: 10/06/99
 PO No. : N7912-P99264
 Project : CIO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 1 of 14

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED	
15GLM0101	Aqueous	P.HALVERSON, JR HEBL, J. KRIEGER, T .THOMPSON	09/08/99	09/09/99

PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED BY	NOTES
Nitrate as N	<0.050	mg/L	1.0	0.050	353.2	09/10/99 KW	
Sulfate	100.	mg/L	10	1.0	375.4	09/18/99 VN	

* 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.

10/06/99

LJO/baeajc(dw)/msm
 PI10NOW1
 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: WP3850-5
 SDG: WP3850
 Report Date: 10/5/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 9/23/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15GLM0201D	AQ	9/8/99	9/9/99	9/10/99	DPD	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	82	%	1.0		
2-FLUOROBIPHENYL	74	%	1.0		
TERPHENYL-D14	46	%	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: WP3850-5
SDG: WP3850
Report Date: 10/1/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 9/9/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15GLM0201D	AQ	9/8/99	9/9/99	9/9/99	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	97	%	1.0		
1,2-DICHLOROETHANE-D4	89	%	1.0		
TOLUENE-D8	87	%	1.0		
P-BROMOFLUOROBENZENE	85	%	1.0		

Report Notes:



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

Lab Number : WP-3850-9
Report Date: 10/06/99
PO No. : N7912-P99264
Project : CTO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 7 of 14

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED	
15LGM0201	Aqueous	P. HALVERSON, JR HEBL, J. KRIEGER, T . THOMPSON	09/08/99	09/09/99

PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Nitrate as N	<0.050	mg/L	1.0	0.050	353.2	09/10/99	KW	
Sulfate	100.	mg/L	5.0	1.0	375.4	09/18/99	VN	

* 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.

10/06/99

LJO/baeajc(dw)/msm
PI10NOW1
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: WP3850-9
SDG: WP3850
Report Date: 10/5/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 9/24/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15LGM0201	AQ	9/8/99	9/9/99	9/10/99	DPD	EPA 3510	SW

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	60	%	1.0		
2-FLUOROBIPHENYL	63	%	1.0		
TERPHENYL-D14	#18	%	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: WP3850-9RE
 SDG: WP3850
 Report Date: 10/5/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 9/29/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15LGM0201	AQ	9/8/99	9/9/99	9/28/99	DS	EPA 3510	SW

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
δENZO[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	58	%	1.0		
TERPHENYL-D14	51	%	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: WP3850-9
SDG: WP3850
Report Date: 10/1/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 9/10/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15LGM0201	AQ	9/8/99	9/9/99	9/10/99	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	100	%	1.0		
1,2-DICHLOROETHANE-D4	92	%	1.0		
TOLUENE-D8	89	%	1.0		
P-BROMOFLUOROBENZENE	88	%	1.0		

Report Notes:

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

Lab Number : WP-3850-10
Report Date: 10/06/99
PO No. : N7912-P99264
Project : CIO #68

WIC#: CNC CHARLESTON

REPORT OF ANALYTICAL RESULTS

Page 8 of 14

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE RECEIVED	
15GLM0301	Aqueous	P. HALVERSON, JR HEEL, J. KRIEGER, T . THOMPSON	09/08/99	09/09/99

PARAMETER	RESULT	UNITS	DF	*PQL	METHOD	ANALYZED	BY	NOTES
Nitrate as N	<0.050	mg/L	1.0	0.050	353.2	09/10/99	KW	
Sulfate	33.	mg/L	2.0	1.0	375.4	09/18/99	VN	

* 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.

10/06/99

LJO/baeajc(dw)/msm

PI10NOW1

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: WP3850-10
 SDG: WP3850
 Report Date: 10/5/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 9/16/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15GLM0301	AQ	9/8/99	9/9/99	9/10/99	DPD	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	54	%	1.0		
2-FLUOROBIPHENYL	55	%	1.0		
TERPHENYL-D14	38	%	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: WP3850-10
SDG: WP3850
Report Date: 10/1/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 9/10/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15GLM0301	AQ	9/8/99	9/9/99	9/10/99	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	99	%	1.0		
1,1-DICHLOROETHANE-D4	93	%	1.0		
1,2-DICHLOROETHANE-D8	88	%	1.0		
P-BROMOFLUOROBENZENE	87	%	1.0		

Report Notes:

Konandini Analytical Services, Inc.
Quality Control Report

Method Blank and Laboratory Control Sample Results

Client: Tetra Tech NUS

Work Order: WP3850

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	10-Sep-99	10-Sep-99	mg/L	< 0.050	< 0.050	0.050	mg/L	1.00	0.824	82.4	80-120	
Sulfate	18-Sep-99	18-Sep-99	mg/L	< 1.0	< 1.0	1.0	mg/L	250	270	108.0	83-112	@

** 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.

@ The laboratory uses the internally established statistical 99% confidence range as the acceptance range for this LCS.

Katahdin Analytical Services, Inc.
Quality Control Report

Duplicate and Matrix Spike/Matrix Spike Duplicate Results

Client: Tetra Tech NUS
Work Order: WP3850

DUPLICATE RESULTS

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Parameter	Katahdin Sample No	Sample					Concentration or Quantity								Matrix Spike Recovery (%)		
		Measurements		Mean	Acceptance Range		Units	Sampl	Spike	Sample	Sample	Sample	Sample	Sample	Sample	Acceptance Range	RPD (%)
		Rep 1	Rep 2	Conc	RPD (%)	for RPD (%)	Only	Added	+Spike	+Spike	+Spike	+Spike	+Spike	+Spike	Range (%)	(%)	
		Units	Dup 1	Dup 2				Dup 1	Dup 2	Dup 1	Dup 2	Dup 1	Dup 2				
Nitrate - N	WP3850-13	mg/L				0-20	mg/L	<0.050	0.5	0.372			74.4	*	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.

* Matrix spike recovery is outside the laboratory's specified acceptance range indicating potential sample matrix interference and potential bias of reported value for this parameter.

00000048

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;091099

Lab Name: Katahdin Analytical Services

SDG No.: WP3850

Lab File ID: I4521

Lab Sample ID: SBLK;091099

Instrument ID: 5970-I

Date Extracted: 9/10/99

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

Date Analyzed: 09/16/99

Matrix: (soil/water) WATER

Time Analyzed: 12:05

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;091099	LCS;091099	I4522	9/16/99	12:47:00 PM
24GLM0301D	WP3850-6	I4524	9/16/99	2:11:00 PM
15GLM0301	WP3850-10	I4527	9/16/99	4:16:00 PM
24GLM0301	WP3850-11	I4528	9/16/99	4:58:00 PM
21GLM0401	WP3850-14	I4531	9/16/99	7:02:00 PM
24GLM0101	WP3850-15	I4532	9/16/99	7:44:00 PM
24GLM0201	WP3850-16	I4533	9/16/99	8:26:00 PM
24GLM0301DMS	WP3850-6MS	I4534	9/16/99	9:08:00 PM
24GLM0301DMSD	WP3850-6MSD	I4535	9/16/99	9:50:00 PM
15GLM0201D	WP3850-5	I4594	9/23/99	4:32:00 PM
21GLM0101	WP3850-12	I4597	9/23/99	6:41:00 PM
24GLM0501	WP3850-7	I4621	9/24/99	7:36:00 PM
15LGM0201	WP3850-9	I4622	9/24/99	8:18:00 PM
21GLM0601	WP3850-13	I4630	9/27/99	3:38:00 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: SBLK;091099
SDG: WP3850
Report Date: 10/5/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 9/16/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;091099	AQ	-	-	9/10/99	DPD	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	62	%	1.0		
2-FLUOROBIPHENYL	63	%	1.0		
TERPHENYL-D14	60	%	1.0		

Report Notes:

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: I4522

Sample ID: LCS;091099

Date Run: 9/16/99

Analyst: KRT

Time Injected: 12:47:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	36.3	72	70-130
ACENAPHTHENE	50	34.5	*69	70-130
ACENAPHTHYLENE	50	33.9	*68	70-130
ANTHRACENE	50	36.5	73	70-130
BENZO[A]ANTHRACENE	50	34.4	*69	70-130
BENZO[A]PYRENE	50	37.2	74	70-130
BENZO[B]FLUORANTHENE	50	37.6	75	70-130
BENZO[G,H,I]PERYLENE	50	40.8	82	70-130
BENZO[K]FLUORANTHENE	50	36.8	74	70-130
CHRYSENE	50	34.8	*70	70-130
DIBENZ[A,H]ANTHRACENE	50	40.5	81	70-130
FLUORANTHENE	50	34.8	*70	70-130
FLUORENE	50	35.0	70	70-130
INDENO[1,2,3-CD]PYRENE	50	42.9	86	70-130
NAPHTHALENE	50	37.3	75	70-130
PHENANTHRENE	50	37.0	74	70-130
PYRENE	50	31.9	*64	70-130

* Out of Limits

1

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3850-6	I4524	9/16/99	2:11:00 PM	KRT	AQ	8270_99
WP3850-6MS	I4534	9/16/99	9:08:00 PM	KRT	AQ	8270_99
WP3850-6MSD	I4535	9/16/99	9:50:00 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	94	94	65.0	67.4	69	72	60-140	3.6	30
ACENAPHTHENE	0	94	94	55.4	51.0	*59	*54	60-140	8.3	30
ACENAPHTHYLENE	0	94	94	56.3	50.8	60	*54	60-140	10	30
ANTHRACENE	0	94	94	63.2	63.8	67	68	60-140	0.94	30
BENZO[A]ANTHRACENE	0	94	94	61.4	62.8	65	67	60-140	2.2	30
BENZO[A]PYRENE	0	94	94	63.1	62.1	67	66	60-140	1.6	30
BENZO[B]FLUORANTHENE	0	94	94	67.0	64.2	71	68	60-140	4.3	30
2-METHYLNAPHTHALENE	0	94	94	51.9	48.2	*55	*51	60-140	7.4	30
BENZO[K]FLUORANTHENE	0	94	94	65.5	63.2	70	67	60-140	3.6	30
PYRENE	0	94	94	55.2	56.0	*59	60	60-140	1.4	30
DIBENZ[A,H]ANTHRACENE	0	94	94	69.9	66.4	74	71	60-140	5.1	30
FLUORANTHENE	0	94	94	67.9	60.6	72	64	60-140	11	30
FLUORENE	0	94	94	59.9	57.2	64	61	60-140	4.6	30
INDENO[1,2,3-CD]PYRENE	0	94	94	75.7	70.0	80	74	60-140	7.8	30
NAPHTHALENE	0	94	94	54.2	51.4	*58	*55	60-140	5.3	30
FLUORANTHRENE	0	94	94	65.6	65.2	70	69	60-140	0.61	30
BENZO[G,H,I]PERYLENE	0	94	94	66.2	63.9	70	68	60-140	3.5	30

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;092899

Lab Name: Katahdin Analytical Services

SDG No.: WP3850

Lab File ID: I4671

Lab Sample ID: SBLK;092899

Instrument ID: 5970-I

Date Extracted: 9/28/99

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

Date Analyzed: 09/29/99

Matrix: (soil/water) WATER

Time Analyzed: 17:54

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;092899	LCS;092899	I4672	9/29/99	6:35:00 PM
15LGM0201	WP3850-9RE	I4674	9/29/99	8:00:00 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: SBLK;092899
 SDG: WP3850
 Report Date: 10/5/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 9/29/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;092899	AQ	-	-	9/28/99	DS	EPA 3510	SW

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
1,2,3,4-BENZ[AN]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	58	%	1.0		
TERPHENYL-D14	70	%	1.0		

Report Notes:

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: 14672

Sample ID: LCS;092899

Date Run: 9/29/99

Analyst: SW

Time Injected: 6:35:00 PM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	36.2	72	70-130
ACENAPHTHENE	50	37.0	74	70-130
ACENAPHTHYLENE	50	34.7	*69	70-130
ANTHRACENE	50	35.5	71	70-130
BENZO[A]ANTHRACENE	50	34.6	*69	70-130
BENZO[A]PYRENE	50	34.7	*69	70-130
BENZO[B]FLUORANTHENE	50	36.1	72	70-130
BENZO[G,H,I]PERYLENE	50	37.8	76	70-130
BENZO[K]FLUORANTHENE	50	35.5	71	70-130
CHRYSENE	50	36.4	73	70-130
DIBENZ[A,H]ANTHRACENE	50	34.9	*70	70-130
FLUORANTHENE	50	37.8	76	70-130
FLUORENE	50	37.3	74	70-130
INDENO[1,2,3-CD]PYRENE	50	35.1	70	70-130
NAPHTHALENE	50	34.6	*69	70-130
PHENANTHRENE	50	36.0	72	70-130
PYRENE	50	37.2	74	70-130

* Out of Limits

1

0000054

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBLKF09A

Lab Name: Katahdin Analytical Services

SDG No.: WP3850

Lab File ID: F1787

Lab Sample ID: VBLKF09A

Date Analyzed: 09/09/99

Time Analyzed: 9:13

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
LCSF09A	LCSF09A	F1786	9/9/99	8:29:00 AM
15GLM0201DMS	WP3850-5MS	F1796	9/9/99	3:28:00 PM
15GLM0201DMSD	WP3850-5MSD	F1797	9/9/99	4:04:00 PM
15GLM0201D	WP3850-5	F1800	9/9/99	5:54:00 PM
24GLM0301D	WP3850-6	F1801	9/9/99	6:31:00 PM
24GLM0501	WP3850-7	F1802	9/9/99	7:07:00 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: VBLKF09A
SDG: WP3850
Report Date: 10/1/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 9/9/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF09A	AQ	-	-	9/9/99	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	99	%	1.0		
1,2-DICHLOROETHANE-D4	94	%	1.0		
TOLUENE-D8	88	%	1.0		
P-BROMOFLUOROBENZENE	87	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F1786

Sample ID: LCSF09A

Date Run: 9/9/99

Analyst: KMC

Time Injected: 8:29:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	51.6	103	60-140
BENZENE	50	44.8	90	60-140
ETHYLBENZENE	50	46.9	94	60-140
MTBE	50	47.3	95	60-140
NAPHTHALENE	50	46.7	93	60-140
TOLUENE	50	46.3	93	60-140
TOTAL XYLENES	150	138	92	60-140

* Out of Limits

1

0000058

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time Inj	Analyst	Matrix	Method
WP3850-5	F1800	9/9/99	5:54:00 PM	KMC	AQ	8260_99
WP3850-5MS	F1796	9/9/99	3:28:00 PM	KMC	AQ	8260_99
WP3850-5MSD	F1797	9/9/99	4:04:00 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	124	110	82	74	60-140	12	20
TOLUENE	0	50	50	41.9	37.3	84	75	60-140	12	20
NAPHTHALENE	0	50	50	38.8	37.0	78	74	60-140	4.7	20
MTBE	0	50	50	42.1	42.0	84	84	60-140	0.24	20
ETHYLBENZENE	0	50	50	40.7	37.1	81	74	60-140	9.2	20
BENZENE	0	50	50	37.2	35.6	74	71	60-140	4.4	20
1,2-DIBROMOETHANE	0	50	50	45.1	46.0	90	92	60-140	2.0	20

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBLKF10A

Lab Name: Katahdin Analytical Services

SDG No.: WP3850

Lab File ID: F1805

Lab Sample ID: VBLKF10A

Date Analyzed: 09/10/99

Time Analyzed: 9:39

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
LCSF10A	LCSF10A	F1804	9/10/99	8:45:00 AM
24TL00201	WP3850-8	F1806	9/10/99	10:32:00 AM
15LGM0201	WP3850-9	F1808	9/10/99	11:45:00 AM
15GLM0301	WP3850-10	F1809	9/10/99	12:22:00 PM
24GLM0301	WP3850-11	F1810	9/10/99	12:58:00 PM
21GLM0101	WP3850-12	F1811	9/10/99	1:35:00 PM
21GLM0601	WP3850-13	F1812	9/10/99	2:11:00 PM
21GLM0401	WP3850-14	F1813	9/10/99	2:48:00 PM
24GLM0101	WP3850-15	F1814	9/10/99	3:24:00 PM
24GLM0201	WP3850-16	F1815	9/10/99	4:01:00 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: VBLKF10A
SDG: WP3850
Report Date: 10/1/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 9/10/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF10A	AQ	-	-	9/10/99	KMC	5030	KMC

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	98	%	1.0		
1,2-DICHLOROETHANE-D4	91	%	1.0		
TOLUENE-D8	87	%	1.0		
P-BROMOFLUOROBENZENE	87	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F1804

Sample ID: LCSF10A

Date Run: 9/10/99

Analyst: KMC

Time Injected: 8:45:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	52.4	105	60-140
BENZENE	50	44.7	89	60-140
ETHYLBENZENE	50	48.0	96	60-140
MTBE	50	47.1	94	60-140
NAPHTHALENE	50	47.9	96	60-140
TOLUENE	50	46.8	94	60-140
TOTAL XYLENES	150	141	94	60-140

* Out of Limits

1

0000061

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBLKF11A

Lab Name: Katahdin Analytical Services

SDG No.: WP3850

Lab File ID: F1820

Lab Sample ID: VBLKF11A

Date Analyzed: 09/11/99

Time Analyzed: 10:00

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
LCSF11A	LCSF11A	F1819	9/11/99	8:56:00 AM
15LGM0201MS	WP3850-9MS	F1825	9/11/99	1:16:00 PM
15LGM0201MSD	WP3850-9MSD	F1826	9/11/99	1:52:00 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: VBLKF11A
SDG: WP3850
Report Date: 10/1/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 9/11/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKF11A	AQ	-	-	9/11/99	KMC	5030	KMC

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	101	%	1.0		
1,2-DICHLOROETHANE-D4	94	%	1.0		
LUENE-D8	86	%	1.0		
P-BROMOFLUOROBENZENE	87	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: F1819

Sample ID: LCSF11A

Date Run: 9/11/99

Analyst: JSS

Time Injected: 8:56:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	54.3	108	60-140
BENZENE	50	46.7	93	60-140
ETHYLBENZENE	50	48.3	96	60-140
MTBE	50	49.7	99	60-140
NAPHTHALENE	50	44.4	89	60-140
TOLUENE	50	48.3	96	60-140
TOTAL XYLENES	150	143	95	60-140

* Out of Limits

1

0000064

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3850-9	F1808	9/10/99	11:45:00 AM	KMC	AQ	8260_99
WP3850-9MS	F1825	9/11/99	1:16:00 PM	JSS	AQ	8260_99
WP3850-9MSD	F1826	9/11/99	1:52:00 PM	JSS	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	133	127	89	85	60-140	4.6	20
TOLUENE	0	50	50	45.6	44.0	91	88	60-140	3.6	20
NAPHTHALENE	0	50	50	41.2	41.0	82	82	60-140	0.49	20
MTBE	0	50	50	49.5	48.8	99	98	60-140	1.4	20
ETHYLBENZENE	0	50	50	45.7	43.9	91	88	60-140	4.0	20
BENZENE	0	50	50	44.6	43.1	89	86	60-140	3.4	20
1,2-DIBROMOETHANE	0	50	50	53.5	52.9	107	106	60-140	1.1	20



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

DATE: September 22, 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)- **WP3850**

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

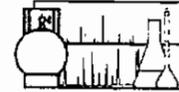
LAB ID #: **990170**

ANALYTICAL PROCEDURE:

Eight (8) 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, log-in, or analysis.



QUALITY CONTROL:

1. A laboratory blank was analyzed daily in the same manner as the samples. Methane was not detected in the blank.
2. A MS/MSD was performed on the following sample:
WP3850-15

All recoveries were within QC limits.

3. A duplicate analysis was performed on the following sample:
WP3850-13

Date Samples Received by the Laboratory: 9/10/99

Date Analysis Started: 9/14/99

C:\My Documents\katrpt2.doc

SAMPLE LOG-IN & RECEIPT CHECKLIST

Client/Proj #: Katohidiro WAP 3850

Proj Mgr: M. H. J.

Lab Pool #: 9-10-72

Inspected & Logged in by: A. M. J. off

Date Time: 9/10/99 10:00

Sample Matrix	Number of Samples	Analysis Requested	Analyze by (date)	Storage Location
<u>Hydrocarbons</u>	<u>8</u>	<u>methane</u>	<u>9/24/99</u> <u>Due 10/7</u>	<u>R1</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 10°C
- 6) Samples preserved correctly / incorrectly / none recommended not at all
- 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: 3 bottles per sample

ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____ **WP3850-9** _____

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

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990170-1

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

Lab File ID: _____ CFI_008 _____

Level: (low/med) _____ low _____

Date Received: _____ 9/10/99 _____

% Moisture: _____ NA _____

Date Analyzed: _____ 9/14/99 _____

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

Dilution Factor: _____ 1 _____

Soil Extract Volume: _____ NA _____ (μ l)Soil Aliquot Volume: _____ NA _____ (μ l)

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(μ g/L or PPMv) _____ μ g/L _____

Q

74-82-8

Methane

23

1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____ WP3850-10

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

Matrix: (soil/water) _____ water _____ Lab Sample ID: 990170-2

Sample wt / vol: _____ 32.5 ml _____ (g/ml) Lab File ID: ___ CFI_009 _____

Level: (low/med) _____ low _____ Date Received: ___ 9/10/99 _____

% Moisture: _____ NA _____ Date Analyzed: ___ 9/14/99 _____

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	8.7	

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: MB990170

Sample wt / vol: 32.5 ml (g/ml) Lab File ID: CFI_002

Level: (low/med) low Date Received: NA

% Moisture: NA Date Analyzed: 9/14/99

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
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74-82-8	Methane	5.2	U
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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: LCS990170

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

Lab File ID: ___CFI___003_____

Level: (low/med) _____ low _____

Date Received: ___NA_____

% Moisture: _____ NA _____

Date Analyzed: ___9/14/99_____

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	220	
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1
ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO. _____

Lab Name: _____ ENSR _____ Contract: _____

WP3850-15 MS

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

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990170-7 MS

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

Lab File ID: __CFI_020_____

Level: (low/med) _____ low _____

Date Received: __9/10/99_____

% Moisture: _____ NA _____

Date Analyzed: __9/14/99_____

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	210	
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ORGANICS ANALYSIS DATA SHEET

.....EPA SAMPLE NO.

Lab Name: _____ ENSR _____ Contract: _____

WP3850-15 MSD

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

Matrix: (soil/water) _____ water _____

Lab Sample ID: 990170-15 MSD

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

Lab File ID: __CFI_021_____

Level: (low/med) _____ low _____

Date Received: __9/10/99_____

% Moisture: _____ NA _____

Date Analyzed: __9/14/99_____

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	220	
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LABORATORY CONTROL SPIKE RECOVERY

Lab Name: ____ ENSR _____ Contract: _____

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

Laboratory Control Sample No: ____ LCS01 _____

COMPOUND	SPIKE ADDED ($\mu\text{g/L}$)	LCS CONCENTRATION ($\mu\text{g/L}$)	LCS % REC #	QC LIMITS REC.
Methane	205.0	219.2	107%	50 - 150

* - Values outside of QC limits.

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: ENSR

Contract: _____

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

Matrix Spike - EPA Sample NO.: WP3850-15

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC #	QC LIMITS REC.
Methane	205.0	24	211.6	92%	50-150

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Methane	205.0	221.3	96%	5.0%	50	50-150

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

Comments:



August 17, 1999

Mr. Paul Calligan
Tetra Tech NUS
1401 Oven Park Drive, Suite 102
Tallahassee, FL 32308

RE: Katahdin Lab Number: WP-3254
Project ID: CTO #68
Project Manager: Ms. Andrea J. Colby
Sample Receipt Date: July 14, 1999

Dear Mr. Calligan:

Please find enclosed the following information:

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

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

Maria Crouch
Authorized Signature

08/17/99
Date

TECHNICAL NARRATIVE

Volatile Organics Analysis

Four aqueous samples were received by the Katahdin Analytical Services, Inc. GC/MS laboratory on July 14, 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 5972-S instrument. 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 was performed on any sample 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 curve analyzed in this SDG, the average %RSD for all analytes was 14.0%, making the curve acceptable.

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 Extraction and Analysis

Three aqueous samples were received by Katahdin Analytical Services laboratory on July 14, 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 July 15, 1999. A laboratory control spike consisting of all PAH analytes spiked into organic free water, was extracted in the batch, along with a site specific MS/MSD pair on sample WP3254-2.

The initial calibration curve analyzed in this SDG had some of the target analyte %RSD values exceeding 15 %.

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 curve analyzed in this SDG, the average %RSD for all analytes was 10.1%, making the curve 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.

KATAH. ANALYTICAL SERVICES, INC.

SAMPLE RECEIPT CONDITION REPORT

Tel. (207) 874-2400

Fax (207) 775-4029

LAB (WORK ORDER) # WP 3254

PAGE: 1 OF 1

COOLER: 1 OF 1

CLIENT: Tetra Tech

COC# —

SDG# —

DATE / TIME RECEIVED: 7-14-99 0930

DELIVERED BY: FedEx

RECEIVED BY: San

LIMS ENTRY BY: AJC

LIMS REVIEW BY / PM: AJC

PROJECT: 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 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>3.5</u>	
6. SAMPLES RECEIVED AT 4°C ± 2°? (C) 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.

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

ORDER NO WP-3254

Project Manager: Andrea J. Colby

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

ORDER DATE: 07/14/99

PHONE: 850/385-9899

FAX: 850/385-9860

DUE: 13 AUG

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 12 SEP

ITEM	LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
1	WP3254-1	14GLM0101	13 JUL 1255	14 JUL	AQ
	WP3254-2	15GLM0101	13 JUL 1050		
	WP3254-3	34GLM0101	13 JUL 0858		

DETERMINATION	METHOD	QTY	PRICE	AMOUNT
Volatile Organics by 8260B	SW8260	3	75.00	225.00
Polynuclear Aromatic Hydrocarbons	EPA 8270	3	125.00	375.00

TOTALS		3	200.00	600.00
--------	--	---	--------	--------

LOG NUMBER	SAMPLE DESCRIPTION	SAMPLED DATE/TIME	RECEIVED	MATRIX
WP3254-4	34TL00201	13 JUL	14 JUL	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

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

FINAL PAGE

ICE: With Report

TOTAL ORDER AMOUNT \$675.00
This is NOT an Invoice

AJC/WEST.AJC(dw)

07-14Please contact KATAHDIN ANALYTICAL SERVICES promptly if you have any questi



KATAHDIN ANALYTICAL SERVICES

Summary of Report Notes

Report Note

Note Text

J

'J' flag denotes an estimated value less than the Laboratory's Practical Quantitation Level.



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: WP3254-2
 SDG: WP3254
 Report Date: 8/11/99
 PO No. : N7912-P99264
 Project: CTO #68
 % Solids: N/A
 Method: EPA 8270
 Date Analyzed: 8/2/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15GLM0101	AQ	7/13/99	7/14/99	7/15/99	DPD	EPA 3510	KRT

Compound	Result	Units	DF	Sample	Method
				PQL	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
ENE	<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	60	%	1.0		
2-FLUOROBIPHENYL	60	%	1.0		
TERPHENYL-D14	70	%	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: WP3254-2
SDG: WP3254
Report Date: 8/11/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 7/19/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
15GLM0101	AQ	7/13/99	7/14/99	7/19/99	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	J4	ug/L	1.0	5	5
NAPHTHALENE	30	ug/L	1.0	5	5
MTBE	<5	ug/L	1.0	5	5
TOTAL XYLENES	<5	ug/L	1.0	5	5
DIBROMOFLUOROMETHANE	117	%	1.0		
1,2-DICHLOROETHANE-D4	116	%	1.0		
TOLUENE-D8	117	%	1.0		
P-BROMOFLUOROBENZENE	105	%	1.0		

Report Notes: J

4B
SEMIVOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

SBLK;071599

Lab Name: Katahdin Analytical Services

SDG No.: WP3254

Lab File ID: Z1577

Lab Sample ID: SBLK;071599

Instrument ID: 5972-Z

Date Extracted: 7/15/99

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

Date Analyzed: 07/30/99

Matrix: (soil/water) WATER

Time Analyzed: 15:18

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;071599	LCS;071599	Z1592	8/2/99	11:15:00 AM
14GLM0101	WP3254-1	Z1597	8/2/99	3:18:00 PM
15GLM0101	WP3254-2	Z1598	8/2/99	4:06:00 PM
34GLM0101	WP3254-3	Z1599	8/2/99	4:53:00 PM
15GLM0101MS	WP3254-2MS	Z1609	8/3/99	12:13:00 PM
15GLM0101MSD	WP3254-2MSD	Z1610	8/3/99	1:00:00 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: SBLK;071599
SDG: WP3254
Report Date: 8/11/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: EPA 8270
Date Analyzed: 7/30/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
SBLK;071599	AQ	-	-	7/15/99	DPD	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	62	%	1.0		
2-FLUOROBIPHENYL	64	%	1.0		
TERPHENYL-D14	74	%	1.0		

Report Notes:

Katahdin Analytical Services
8270 LCS Recovery Sheet

Lab File: Z1592

Sample ID: LCS;071599

Date Run: 8/2/99

Analyst: KRT

Time Injected 11:15:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
2-METHYLNAPHTHALENE	50	23.2	*46	70-130
ACENAPHTHENE	50	28.9	*58	70-130
ACENAPHTHYLENE	50	27.9	*56	70-130
ANTHRACENE	50	41.4	83	70-130
BENZO[A]ANTHRACENE	50	37.5	75	70-130
BENZO[A]PYRENE	50	35.9	72	70-130
BENZO[B]FLUORANTHENE	50	35.3	70	70-130
BENZO[G,H,I]PERYLENE	50	35.0	70	70-130
BENZO[K]FLUORANTHENE	50	38.1	76	70-130
CHRYSENE	50	39.6	79	70-130
DIBENZ[A,H]ANTHRACENE	50	35.1	70	70-130
FLUORANTHENE	50	43.5	87	70-130
FLUORENE	50	33.5	*67	70-130
INDENO[1,2,3-CD]PYRENE	50	37.3	75	70-130
NAPHTHALENE	50	19.7	*39	70-130
PHENANTHRENE	50	38.3	77	70-130
PYRENE	50	33.8	*68	70-130

* Out of Limits

1

0000014

Katahdin Analytical Services

MS/MSD Report

Sample	File Name	Date Acquired	Time inj	Analyst	Matrix	Method
WP3254-2	Z1598	8/2/99	4:06:00 PM	KRT	AQ	8270_99
WP3254-2MS	Z1609	8/3/99	12:13:00 PM	KRT	AQ	8270_99
WP3254-2MSD	Z1610	8/3/99	1:00:00 PM	KRT	AQ	8270_99

Compound Name	Native (ug/L)	MS Spk	MSD Spk	MS	MSD	MS	MSD	Recovery Limits (%)	RPD (%)	RPD Limit (%)
		Amount (ug/L)	Amount (ug/L)	Result (ug/L)	Result (ug/L)	REC (%)	REC (%)			
CHRYSENE	0	50	50	76.7	78.3	*153	*156	60-140	2.1	30
ACENAPHTHENE	0	50	50	71.0	67.2	*142	134	60-140	5.5	30
ACENAPHTHYLENE	0	50	50	67.5	64.1	135	128	60-140	5.2	30
ANTHRACENE	0	50	50	79.9	83.0	*160	*166	60-140	3.8	30
BENZO[A]ANTHRACENE	0	50	50	71.3	74.1	*143	*148	60-140	3.8	30
BENZO[A]PYRENE	0	50	50	69.6	69.9	139	140	60-140	0.43	30
BENZO[B]FLUORANTHENE	0	50	50	65.0	67.0	130	134	60-140	3.0	30
2-METHYLNAPHTHALENE	0	50	50	68.4	57.6	137	115	60-140	17	30
BENZO[K]FLUORANTHENE	0	50	50	83.3	78.5	*167	*157	60-140	5.9	30
PYRENE	0	50	50	71.8	79.4	*144	*159	60-140	10	30
DIBENZ[A,H]ANTHRACENE	0	50	50	60.0	66.6	120	133	60-140	10	30
FLUORANTHENE	0	50	50	78.6	77.4	*157	*155	60-140	1.5	30
FLUORENE	0	50	50	69.6	69.7	139	139	60-140	0.14	30
INDENO[1,2,3-CD]PYRENE	0	50	50	60.1	69.5	120	139	60-140	14	30
NAPHTHALENE	0	50	50	67.9	56.7	136	113	60-140	18	30
PHENANTHRENE	0	50	50	77.1	79.4	*154	*159	60-140	2.9	30
BENZO[G,H,I]PERYLENE	0	50	50	67.6	79.0	135	*158	60-140	16	30

4A
VOLATILE ORGANICS METHOD BLANK SUMMARY

EPA SAMPLE NO.

VBLKS19A

Lab Name: Katahdin Analytical Services

SDG No.: WP3254

Lab File ID: S5474

Lab Sample ID: VBLKS19A

Date Analyzed: 07/19/99

Time Analyzed: 10:09

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

Heated Purge: (Y/N) N

Instrument ID: 5972-S

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
LCSS19A	LCSS19A	S5473	7/19/99	9:09:00 AM
14GLM0101	WP3254-1	S5475	7/19/99	11:03:00 AM
15GLM0101	WP3254-2	S5476	7/19/99	11:45:00 AM
34GLM0101	WP3254-3	S5477	7/19/99	12:27:00 PM
34TL00201	WP3254-4	S5478	7/19/99	1:10:00 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: VBLKS19A
SDG: WP3254
Report Date: 8/11/99
PO No. : N7912-P99264
Project: CTO #68
% Solids: N/A
Method: SW8260
Date Analyzed: 7/19/99

Sample Description	Matrix	Sampled Date	Rec'd Date	Ext. Date	Ext'd By	Ext. Method	Analyst
VBLKS19A	AQ	-	-	7/19/99	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	110	%	1.0		
1,2-DICHLOROETHANE-D4	106	%	1.0		
TOLUENE-D8	102	%	1.0		
P-BROMOFLUOROBENZENE	97	%	1.0		

Report Notes:

Katahdin Analytical Services
8260 LCS Recovery Sheet

Lab File: S5473

Sample ID: LCSS19A

Date Run: 7/19/99

Analyst: KMC

Time Injected 9:09:00 AM

Matrix: AQ

Compound Name	Spike Amt (ug/L)	Result (ug/L)	Rec (%)	Limits (%)
1,2-DIBROMOETHANE	50	53.2	106	60-140
BENZENE	50	53.1	106	60-140
ETHYLBENZENE	50	61.1	122	60-140
MTBE	50	53.2	106	60-140
NAPHTHALENE	50	56.3	112	60-140
TOLUENE	50	54.4	109	60-140
TOTAL XYLENES	150	189	126	60-140

* Out of Limits

1

0000018

APPENDIX D

AQUIFER CALCULATIONS

APPENDIX E

SOIL AND WATER DISPOSAL MANIFESTS

All soil cuttings and purge water were containerized,
The containers labeled, and the containers moved
to a staging area for final disposal by Charleston Naval Complex.

APPENDIX F

RBCA CALCULATIONS

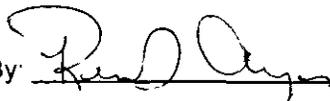
Construction Worker Dermal RBSLs

	Kow	MW	Kp	B	τ_{event}	c	b	t*	t_{event}	DAevent
			cm/hr	unitless	hr/event			hr	hr/event	
Benzene	199.5262315	78.1	0.11551543	0.392637855	2.87E-01	6.32E-01	6.03E-01	6.90E-01	1	eq 3.3
Toluene	537.0317964	92.1	0.259561335	0.958068292	3.44E-01	1.13E+00	1.31E+00	1.33E+00	1	eq 3.2
Ethylbenzene	1412.537545	106.2	0.569219802	2.256154884	4.13E-01	2.36E+00	4.39E+00	1.70E+00	1	eq 3.2
Xylene*	1584.893192	106.2	0.638675123	2.531447415	4.13E-01	2.63E+00	5.31E+00	1.72E+00	1	eq 3.2
Naphthalene	1995.262315	128.2	0.605452393	2.636638957	5.48E-01	2.73E+00	5.69E+00	2.29E+00	1	eq 3.2

	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	

* Kow and MW values for xylene, m-

Prepared By:

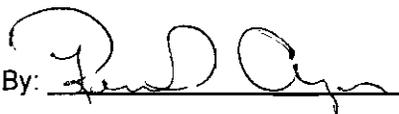


Reviewed By:



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

Prepared By: 

Reviewed By: 

Construction Worker Inhalation RBSLs

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

*No inhalation reference dose is available for xylenes, therefore, no RBSL can be calculated for xylene.

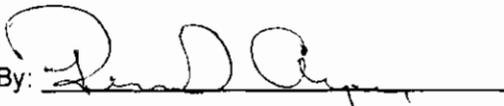
Prepared By 

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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

*No inhalation reference dose is available for xylenes; therefore, no inhalation RBSL can be calculated.

Prepared By: 

Reviewed By: 

SITE 15, QUARTERS O, ZONE B, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA
SCDHEC UST ID No. 01088

DOMENICO'S DILUTION/ATTENUATION EQUATION FOR GROUNDWATER TRANSPORT

Site-Specific Target Level Calculations for Groundwater: Potential Future Off-Site Ingestion

Parameter Descriptions:	Units	Parameter Descriptions:	Units
POE = Point of Exposure		ρ_B = Soil Bulk Density	g/cm ³
SSTL = Site-Specific Target Level	mg/L	f_{OC} = Fraction Organic Carbon in Soil	g-C/g-soil
SSTL _{SOURCE} = Hydrocarbon Concentration in Plume Source Area protective of RBSLs at POE	mg/L	α_x = Longitudinal Dispersivity = 0.1x	m
SSTL _{COMP} = Hydrocarbon Concentration at Compliance Point protective of RBSLs at POE	mg/L	α_y = Transverse Dispersivity = α_x^2	m
X_{POE} = x = Distance from Plume Source to POE (along Centerline)	m	α_z = Vertical Dispersivity = $t/20$	m
X_{COMP} = x = Distance from POE to Compliance Point (along Centerline)	m	k_{OC} = Organic Carbon Partition Coefficient	cm ³ -H ₂ O/g-C
Y = Source Width (Perpendicular to Flow Direction)	m	k_0 = Soil-Water Sorption Coefficient	cm ³ -H ₂ O/g-soil
Z = Source Depth (Perpendicular to Flow Direction In Vertical Plane)	m	V = Pore Water Velocity	m/sec
K_s = Saturated Hydraulic Conductivity	m/sec	R_L = Constituent Retardation Factor	
i = Groundwater Gradient	cm/cm	V/R_L = Maximum Transport Rate of Dissolved Constituent = $(K_s i)/(R_L)$	m/sec
θ = Porosity in Saturated Zone	cm ³ /cm ³	RBSL = Risk-Based Screening Level in Water Provided by SCDHEC (1998)	mg/L

Dilution & Attenuation without Biological Decay

Constituent	X_{POE} ft	X_{COMP} m	Y m	Z m	t sec	K_s m/sec	i m/m	θ cm ³ /cm ³	ρ_B g/cm ³	α_x m	α_y m	α_z m	f_{OC} g-C/g-soil	k_{OC} cm ³ -H ₂ O/g-C	k_0 cm ³ -H ₂ O/g-soil	V m/sec	R_L	C_{POE}/C_{SOURCE}
Naphthalene	725	220.982687	15	2	1.00E+13	1.02E-06	0.0023	0.47	1.45	22.10	7.37	1.10	8.44E-03	1543	13.02292	5.01E-08	41.177	7.542E-03

Constituent	X_{COMP} ft	X_{COMP} m	Y m	Z m	t sec	K_s m/sec	i m/m	θ cm ³ /cm ³	ρ_B g/cm ³	α_x m	α_y m	α_z m	f_{OC} g-C/g-soil	k_{OC} cm ³ -H ₂ O/g-C	k_0 cm ³ -H ₂ O/g-soil	V m/sec	R_L	C_{POE}/C_{COMP}
Naphthalene	700	213.362594	15	2	1.00E+13	1.02E-06	0.0023	0.47	1.45	21.95	7.32	1.10	8.44E-03	1543	13.02292	5.01E-08	41.177	7.864E-03

Source: South Carolina Department of Health and Environmental Control (SCDHEC) 1998. Risk-Based Corrective Action for Petroleum Releases, Bureau of Underground Storage Tank Management.

DOMENICO DILUTION/ATTENUATION MODEL WITHOUT BIOLOGICAL DECAY

$$\frac{C_x}{C_{SOURCE}} = \frac{1}{2} \operatorname{erfc} \left[\frac{\left(x - \frac{vt}{R_L} \right)}{2 \sqrt{\alpha_x \frac{vt}{R_L}}} \right] \times \operatorname{erf} \left[\frac{Y}{4 \sqrt{\alpha_y x}} \right] \times \operatorname{erf} \left[\frac{Z}{2 \sqrt{\alpha_z x}} \right]$$

Prep:

Constituent	POE RBSL mg/L	SSTL _{SOURCE} mg/L	SSTL _{COMP} mg/L
Naphthalene	0.010	1.326	1.272

Reviewed By: 