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CNC CHARLESTON
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LETTER REPORT FOR FUEL DISTRIBUTION SYSTEM (FDS) AREA 7 CNC CHARLESTON SC

10/04/1999

ENSAFE INC

C 10-12 99

ENSAFE

ENSAFE INC. ENVIRONMENTAL AND MANAGEMENT CONSULTANTS

201 North Palafox Street, Suite 200 • Pensacola, FL 32501 • Telephone 850-434-2230 • Facsimile 850-434-2288 • www.ensafe.com

NFA
.1.7, Review 2nd

RECEIVED
OCT 5 1999
Water Monitoring, Assessment & Protection Division

October 4, 1999

Mr. Paul Bristol
South Carolina Department of Health and Environmental Control
Groundwater Quality Section
Bureau of Water
2600 Bull Street
Columbia, SC 29201

RE: Fuel Distribution System, Area 7, Charleston Naval Complex, South Carolina (SCDHEC No. 01182)

Dear Mr. Bristol:

EnSafe is please to submit, on behalf of the U.S. Navy, Southern Division Naval Facilities Engineering Command, two copies of the letter report for SCDHEC petroleum site number 01182. This submittal incorporates the results of follow-on investigative activities performed in accordance with recommendations in the CAR and to address any SCDHEC comments concerning Area 7.

Should you have any questions or concerns regarding this submittal, please contact me.

Sincerely,

ENSAFE INC.

Craig R. Smith

Attachment

cc: T. Haverkost, EnSafe - Charleston
0144 File

Area 7

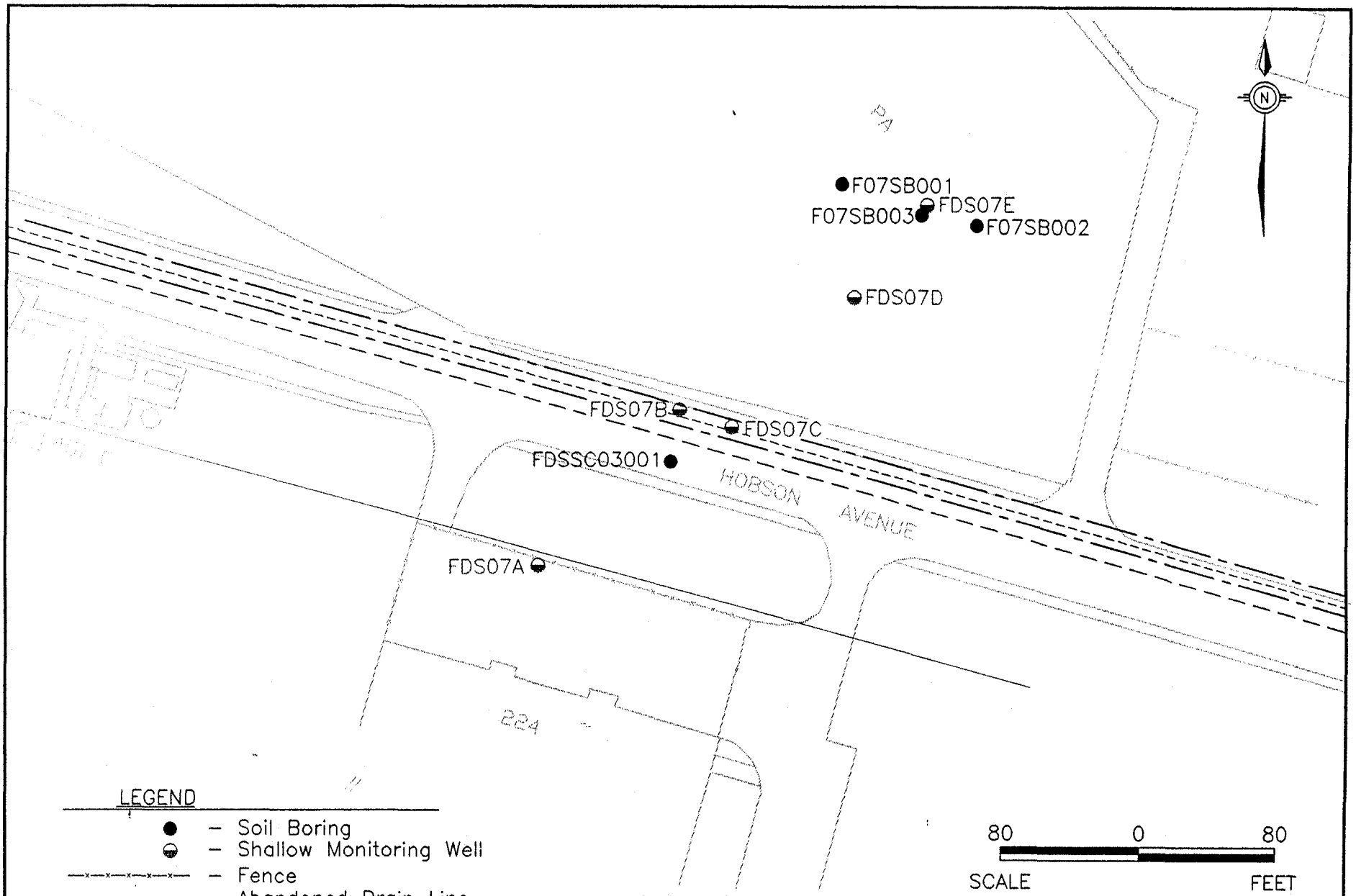
(SCDHEC No. 01182)

Background

Area 7 of the Fuel Distribution System (FDS) is associated with Phase I soil sample FDSSC03001, which exhibited total petroleum hydrocarbons-diesel range organics of 102 milligrams per kilogram (mg/kg), which prompted Phase II soil and groundwater sampling within Area 7. Phase II revealed no soil contamination attributable to the FDS. The arsenic concentration detected in soil at FDSS03001 exceeded its USEPA generic soil screening level (SSL). However, arsenic detections in Area 7 groundwater samples were all below the groundwater risk-based screening level (RBSL) and Zone G shallow groundwater background concentrations for arsenic. No free-phase petroleum product was observed in Area 7 monitoring wells. The RBSLs for total polycyclic aromatic hydrocarbons (PAHs) and four individual PAHs were exceeded in groundwater samples from well FDS07D, which was installed approximately 100 feet upgradient of the FDS pipeline corridor *(Contamination Assessment Report* [CAR], EnSafe 1998).

Follow-on Activities

The CAR recommended and South Carolina Department of Health and Environmental Control (SCDHEC) concurred that additional assessment was required at Area 7 to identify the source of the groundwater contamination detected in FDS07D. This additional assessment included collection of three surface and three subsurface soil samples at locations upgradient from FDS07D, and installation of an additional upgradient monitoring well, FDS07E. Monitoring well FDS07E was installed and developed in February 1999. During March, 1999, the three soil borings were advanced, with surface and subsurface soil samples collected for comparison to soil RBSL parameters. Water levels were remeasured in all Area 7 wells in March 1999. An additional round of groundwater samples were collected from all Area 7 wells and analyzed for RBSL semivolatile organic compounds (SVOCs) only. Figure 1 depicts the Area 7



LEGEND

- Soil Boring
- Shallow Monitoring Well
- Fence
- Abandoned Drain Line
- Diesel Line
- Fuel Line
- Sludge Line

FUEL DISTRIBUTION SYSTEM
LETTER REPORT
CHARLESTON NAVAL COMPLEX
CHARLESTON, S.C.

FIGURE 1
AREA 7
SAMPLE LOCATIONS

DWG DATE: 06/10/99 | DWG NAME: 2907R003

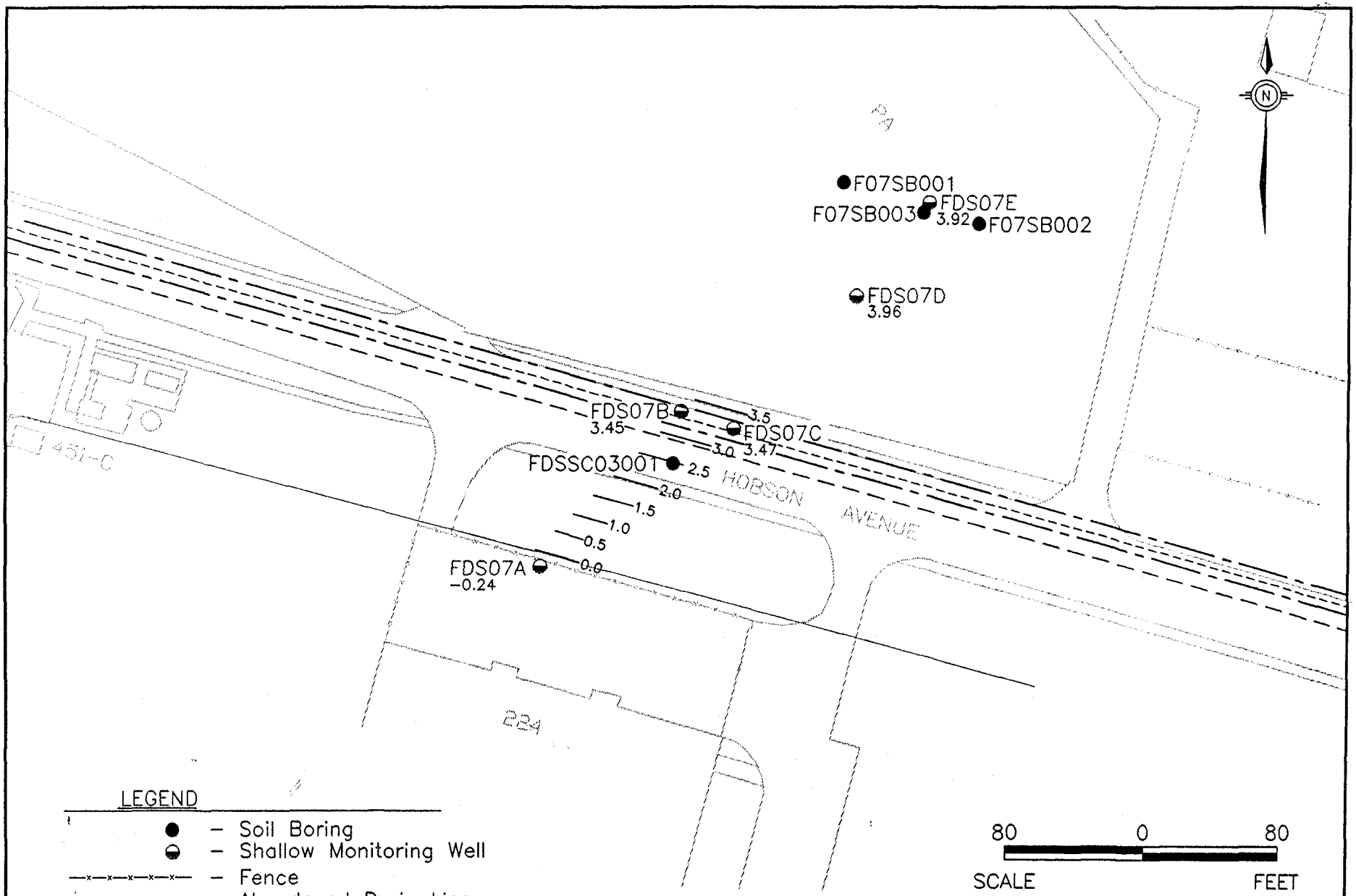
sample locations. Attachment A contains the monitoring well construction diagram and well development record for the newly installed FDS07E. The CAR contains the boring logs and development records for all previously installed Area 7 wells.

Results

Figure 2 presents the shallow groundwater low-tide potentiometric surface at Area 7 measured in March 1999. Groundwater flow is generally to the southwest which is consistent with the low-tide flow direction shown in the CAR (EnSafe 1998). The water level elevations suggest the possibility of a groundwater divide between FDS07D and FDS07E. This feature would explain the difference in flow directions between Area 7 and SWMU 6 and 7 located to the north of the site. Slug testing at FDS07E determined a horizontal hydraulic conductivity of 4.74 feet per day for the shallow aquifer at Area 7. Attachment B contains the aquifer test results for Area 7.

Table 1 summarizes the results of the post-CAR soil sampling at Area 7. No RBSL parameters were detected in any of the three surface soil samples collected during the post-CAR soil sampling at Area 7. Two volatile organic compounds (VOCs) and five PAHs were detected in subsurface soil samples; however, all subsurface detections were below their respective RBSLs.

Table 2 summarizes the results of the post-CAR groundwater sampling at Area 7. No groundwater RBSLs were exceeded at Area 7. Naphthalene was detected in well FDS07D at a concentration of 0.7 micrograms per liter (μg/L), below it's groundwater RBSL (10 μg/L). These results document a reduction in naphthalene from the previous sampling event at FDS07D, which had a naphthalene concentration of 24 μg/L. 2-methylnaphthalene was detected at FDS07B at 1.0 μg/L and FDS07C at 0.70 μg/L, below the RBSL. Total PAH concentrations were below the RBSL for all locations at Area 7. Attachment C contains the analytical data from the post-CAR sampling. The FDS CAR contains the analytical data from previous sampling at Area 7.



FUEL DISTRIBUTION SYSTEM
LETTER REPORT
CHARLESTON NAVAL COMPLEX
CHARLESTON, S.C.

FIGURE 2
AREA 7
SHALLOW GROUNDWATER
PIEZOMETRIC MAP

DWG DATE: 06/28/99 | DWG NAME: 2907R005

Table 1
Analytes Detected in Surface and Subsurface Soil
Post-CAR Sampling, Area 7
Fuel Distribution System

Parameters	Location	Surface Conc.	Subsurface Conc.	RBSL/SSL (μg/kg)	Exceeds RBSL
Volatile Organic Compounds (μg/kg)					
Ethylbenzene	F07SB001	ND	1.0	1,260/13,000	No
Xylene (total)	F07SB001	ND	3.0	42,471/148,000	No
Semivolatile Organic Compounds (μg/kg)					
Benzo(a)anthracene	F07SB001	ND	95	73,084/2,000	No
	F07SB002	ND	34		No
	F07SB003	ND	56		No
Benzo(b)fluoranthene	F07SB001	ND	95	29,097/5,000	No
	F07SB002	ND	32		No
	F07SB003	ND	74		No
Benzo(k)fluoranthene	F07SB001	ND	79	231,109/49,000	No
	F07SB002	ND	31		No
	F07SB003	ND	59		No
Chrysene	F07SB001	ND	120	12,998/160,000	No
	F07SB002	ND	40		No
	F07SB003	ND	79		No
Naphthalene	F07SB001	ND	94	210/84,000	No
	F07SB002	ND	84		No
	F07SB003	ND	110		No

Notes:

ND = Not detected.
μg/kg = Micrograms per kilograms.
RBSLs from the *South Carolina Risk-Based Corrective Action for Petroleum Releases* (SCDHEC, January 5, 1998) (RBSLs for Sandy Soil) and generic soil-to-groundwater SSLs (DAF=20) from the *Soil Screening Guidance: Technical Background Document* (USEPA, 1996) were used as reference concentrations.

Table 2
Analytes Detected in Shallow Groundwater
Post-CAR Sampling, Area 7
Fuel Distribution System

Parameters	Location	Sample Results	RBSL (μg/L)	Exceeds RBSL
Semivolatile Organic Compounds (μg/L)				
Total PAHs	FDS07B	1.0	25	No
	FDS07C	0.7		No
	FDS07D	0.7		No
Naphthalene	FDS07D	0.7	10	No
2-Methylnapthalene	FDS07B	1.0	10	No
	FDS07C	0.7		No

Notes:

μg/L = Micrograms per liter
RBSLs from the *South Carolina Risk-Based Corrective Action for Petroleum Releases* (SCDHEC, January 5, 1998).

Conclusions and Recommendations

Post-CAR sampling detected VOCs and SVOCs in subsurface soil which may have sourced the site. None of these parameters exceeded RBSLs. All post-CAR subsurface soil detections were also below their respective generic soil-to-groundwater soil screening levels (SSLs [DAF=20]) from the (*Soil Screening Guidance: Technical Background Document* [USEPA 1996]), suggesting migration to groundwater is unlikely.

Phase II groundwater results revealed that the RBSLs for total PAHs and four individual PAHs were exceeded in groundwater samples from well FDS07D, located upgradient of the FDS pipeline corridor. No RBSLs were exceeded in post-CAR groundwater sampling of Area 7 wells for RBSL SVOC parameters. These most recent results revealed a reduced naphthalene concentration detection at FDS07D, below the naphthalene RBSL. 2-methylnaphthalene was detected at wells FDS07B and FDS07C. Concentrations of this compound were also reduced from those reported in the CAR. Total PAHS were also below the RBSL, and reduced from those reported in the CAR.

Groundwater is not currently used at Charleston Naval Complex (CNC) as a source of potable or process water; a basewide potable water system provides drinking and process water to buildings at CNC. This system is to remain in operation under the current base reuse plan. In addition, the shallow aquifer for this investigation contains significant concentrations of naturally occurring chlorides and elevated total dissolved solids, which makes this water-bearing unit a questionable potable water source.

No soil RBSLs were exceeded at Area 7. In groundwater, concentrations of individual and total PAHs have declined from some exceeding RBSLs to all below RBSLs in the most recent sampling event. Because concentrations of chemicals of concern in both media are below applicable RBSLs, no further action is recommended for Area 7.

Attachment A
Monitoring Well Construction Diagram/Well Development Record

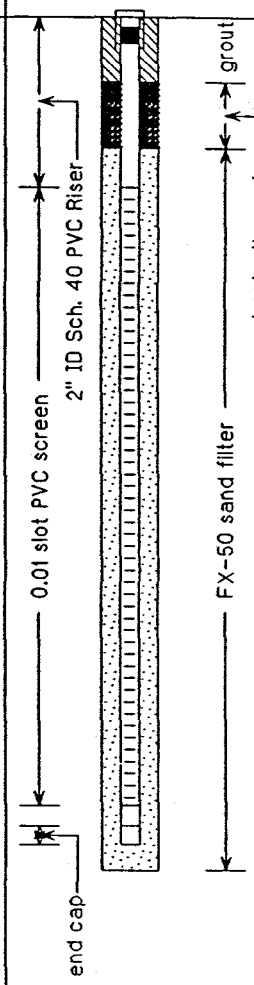
ENSAFE

Monitoring Well NBCGFDS07E

Project: *Fuel Distribution System –Charleston Naval Complex*	Coordinates: *2320716.32 E, 372544.91 N*
Location: *Charleston, SC*	Surface Elevation: *6.4 feet msl*
Started at *1430 on 02-02-99*	TOC Elevation: *6.27 feet msl*
Completed at *1600 on 02-02-99*	Depth to Groundwater: *2.82 feet TOC* Measured: *3/5/99*
Drilling Method: *4.25" ID (8.0" OD) HSA with split spoon*	Groundwater Elevation: *3.45 feet msl*
Drilling Company: *Alliance Environmental (SC Cert. # 889)*	Total Depth: *12.6 feet*
Geologist: *P. Bayley*	Well Screen: *2.6 to 12.0 feet*

DEPTH IN FEET	LITHOLOGIC SAMPLE	ANALYTICAL SAMPLE	SAMPLE NO.	OVA (ppm)	% RECOVERY	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	ELEV. (ft-msl)
								Surface conditions: Asphalt.	
							SP SM	Sand: brown; vf/f; tr silt; loose; dry.	5.4
									4.3
			1		55		GM	Gravel: black; 1 cm dia.; silty sand matrix; wet; hydrocarbon odor.	3.4
							SM		2.7
							CL	Sand: brown w/ tr orange; vf; silty; loose; wet.	2.2
5			2		80		ML CL	Clay: olive-brown w/ tr orange; sm silt; sm vf sand; stiff; plastic; wet.	1.8 / 1.4
								Clay: blue-green w/ sm brown; silty; sm vf sand; soft-firm; plastic; wet.	.7
			3		35				
			4		0		OL	Silt: dk gray-black; clayey; sticky; soft; wet.	2.6
10									
			5		95		OL	Silt: as above.	4.5 / 4.8
			6		90				6.4
15									
20									

WELL DIAGRAM



ENSAFE

CHARLESTON NAVAL COMPLEX
WELL DEVELOPMENT STATUS REPORT
ZONE G FDS

WELL DEVELOPMENT SUMMARY

Well:NBCG\FDS07E

Summary Log of well development progress.
Readings are final readings for each visit.
Volume data are cumulative from start of development.

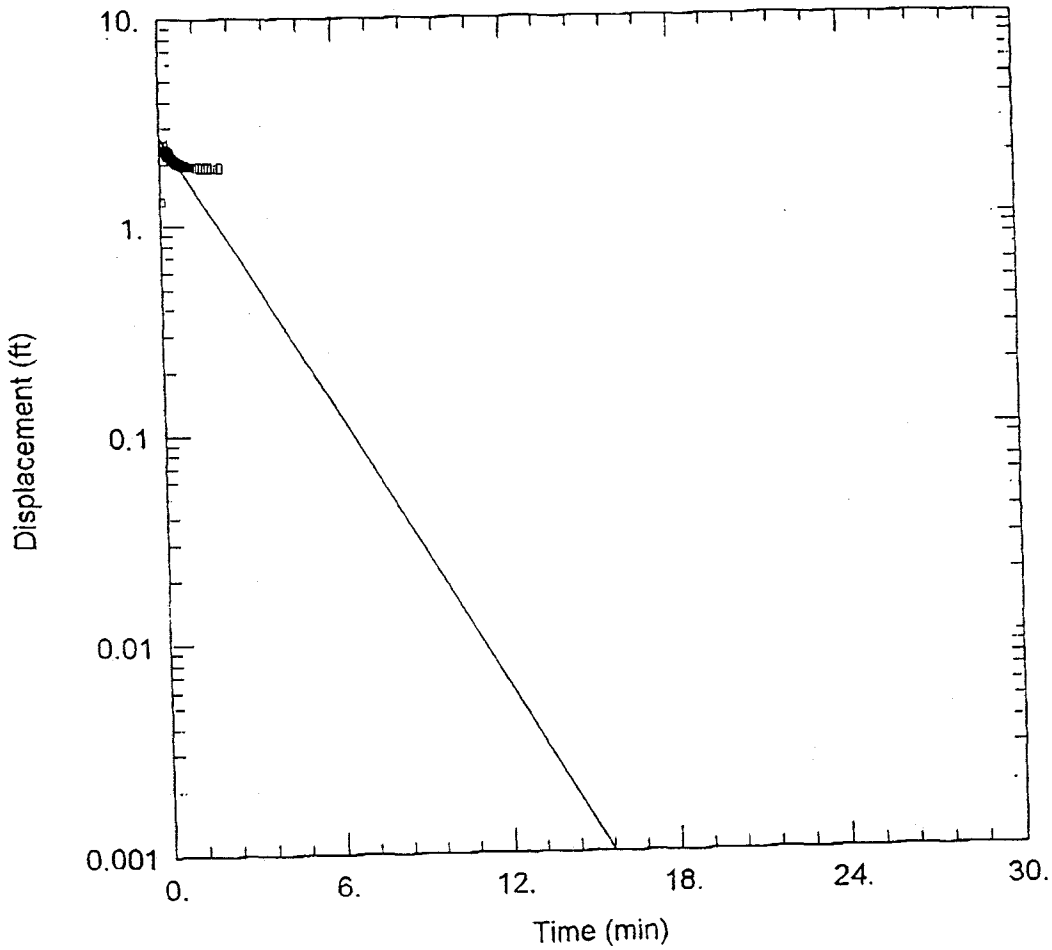
DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %
2-25-99	12	5.42	999	35.0	19.5	-
2-25-99	19	5.48	340	35.6	20.3	-
2-25-99	23	7.29	137	35.3	20.4	-
2-25-99	27	7.42	292	35.2	20.3	-
2-25-99	33	5.54	518	35.4	18.3	-
2-25-99	38	6.52	62	34.9	19.6	-
2-25-99	42	6.01	67	35.0	19.7	-
2-25-99	45	6.27	46	34.5	20.6	-
2-25-99	48	6.29	47	34.1	20.5	-
2-25-99	50	6.26	31	34.2	20.7	-
2-25-99	52	6.77	156	34.3	20.4	-
2-25-99	53.5	6.34	40	33.9	20.2	-
2-25-99	55	6.21	227	32.4	20.3	-
2-25-99	60	6.15	34	32.4	20.0	-
2-25-99	62.5	6.17	16	34.1	20.2	-

DATE	VOLUME Gallons	pH	Turb NTU	Cond mS/cm	Temp Celsius	Sal %
2-25-99	65	6.59	15	34.0	20.1	-
2-25-99	67	6.28	23	34.0	19.9	-
2-25-99	69	6.23	18	34.3	20.1	-
2-25-99	71	6.26	20	34.0	19.9	-

Well Development Completed on: 2-25-99

COMMENTS:

Attachment B
Aquifer Test Results



FDS07E INJECTION

Data Set: C:\TEMP\CHARLE~1\2-07D.AQT
Date: 10/01/99 Time: 10:44:21

PROJECT INFORMATION

Company: EnSafe
Client: SouthDiv
Project: 0144
Test Location: Charleston
Test Well: FDS07E
Test Date: 6/3/99

AQUIFER DATA

Saturated Thickness: 40. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.325 ft
Casing Radius: 0.0833 ft
Screen Length: 10. ft
Water Column Height: 4.64 ft
Wellbore Radius: 0.333 ft
Gravel Pack Porosity: 0.3

SOLUTION

Aquifer Model: Unconfined
K = 0.003288 ft/min

Data Set: C:\TEMP\CHARLE~1\2-07D.AQT
Title: FDS07E Injection
Date: 10/01/99
Time: 16:08:49

PROJECT INFORMATION

Company: EnSafe
Client: SouthDiv
Project: 0144
Location: Charleston
Test Date: 6/3/99
Test Well: FDS07E

AQUIFER DATA

Saturated Thickness: 40. ft
Anisotropy Ratio (Kz/Kr): 1.

OBSERVATION WELL DATA

Number of observation wells: 1

Observation Well No. 1: FDS07E

X Location: 0. ft
Y Location: 0. ft

No. of observations: 72

Observation Data

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.1166	2.556	0.3166	2.197	0.7	2.014
0.125	2.487	0.325	2.228	0.7166	2.011
0.1333	2.395	0.3333	2.219	0.7333	1.995
0.1416	2.449	0.35	2.197	0.75	1.979
0.15	2.446	0.3666	2.178	0.7666	1.992
0.1583	2.395	0.3833	2.168	0.7833	1.995
0.1666	2.395	0.4	2.156	0.8	1.992
0.175	2.402	0.4166	2.143	0.8166	1.992
0.1833	2.348	0.4333	2.121	0.8333	1.979
0.1916	2.37	0.45	2.134	0.85	1.979
0.2	2.367	0.4666	2.108	0.8666	1.976
0.2083	2.332	0.4833	2.102	0.8833	1.97
0.2166	2.332	0.5	2.093	0.9	1.97
0.225	2.345	0.5166	2.083	0.9166	1.966
0.2333	2.26	0.5333	2.074	0.9333	1.963
0.2416	2.263	0.55	2.067	0.95	1.96
0.25	2.329	0.5666	2.039	0.9666	1.957
0.2583	2.288	0.5833	2.058	0.9833	1.957

Time (min)	Displacement (ft)	Time (min)	Displacement (ft)	Time (min)	Displacement (ft)
0.2666	2.256	0.6	2.042	1.	1.954
0.275	2.313	0.6166	2.036	1.2	1.938
0.2833	2.216	0.6333	2.033	1.4	1.925
0.2916	2.19	0.65	2.023	1.6	1.919
0.3	2.291	0.6666	2.02	1.8	1.913
0.3083	2.244	0.6833	2.014	2.	1.91

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.003288	ft/min
y0	2.721	ft

Attachment C
Analytical Data

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SOIL SAMPLING
AREA 7

SW846-SVOA													
	SAMPLE ID ------->	F07-S-B001-01		F07-S-B001-02		F07-S-B002-01		F07-S-B002-02		F07-S-B003-01		F07-S-B003-02	
	ORIGINAL ID ----->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	LAB SAMPLE ID --->	37736.05		37736.06		37736.01		37736.02		37736.03		37736.04	
	ID FROM REPORT -->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	SAMPLE DATE ----->	03/15/99		03/15/99		03/15/99		03/15/99		03/15/99		03/15/99	
	DATE EXTRACTED -->	03/16/99		03/16/99		03/16/99		03/16/99		03/16/99		03/16/99	
	DATE ANALYZED --->	03/19/99		03/27/99		03/19/99		03/19/99		03/19/99		03/19/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL
91-20-3	Naphthalene	380.	U	94.	J	380.	U	84.	J	370.	U	110.	J
56-55-3	Benzo(a)anthracene	380.	U	95.	J	380.	U	34.	J	370.	U	56.	J
218-01-9	Chrysene	380.	U	120.	J	380.	U	40.	J	370.	U	79.	J
205-99-2	Benzo(b)fluoranthene	380.	U	95.	J	380.	U	32.	J	370.	U	74.	J
207-08-9	Benzo(k)fluoranthene	380.	U	79.	J	380.	U	31.	J	370.	U	59.	J

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SOIL SAMPLING
AREA 7

SW846-VOA											
	SAMPLE ID ------->	F07-S-B001-01		F07-S-B001-02		F07-S-B002-01		F07-S-B002-02		F07-S-B003-01	
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	LAB SAMPLE ID --->	37736.05		37736.06		37736.01		37736.02		37736.03	
	ID FROM REPORT -->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301	
	SAMPLE DATE ----->	03/15/99		03/15/99		03/15/99		03/15/99		03/15/99	
	DATE ANALYZED --->	03/19/99		03/19/99		03/19/99		03/19/99		03/19/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL
71-43-2	Benzene	6.	U	5.	U	6.	U	8.	UJ	6.	U
100-41-4	Ethylbenzene	6.	U	1.	J	6.	U	8.	UJ	6.	U
108-88-3	Toluene	6.	U	5.	U	6.	U	8.	UJ	6.	U
1330-20-7	Xylene (Total)	6.	U	3.	J	6.	U	8.	UJ	6.	U

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SAMPLING
AREA 7

SW846-SVOA

	SAMPLE ID ------->	FDS-G-W07A-03		FDS-G-W07B-03		FDS-G-W07C-03		FDS-G-W07D-03		FDS-G-W07E-01	
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	LAB SAMPLE ID --->	37648.02		37631.07		37631.08		37631.09		37648.01	
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	DATE EXTRACTED -->	03/08/99		03/06/99		03/06/99		03/06/99		03/08/99	
	DATE ANALYZED --->	03/15/99		03/10/99		03/10/99		03/10/99		03/15/99	
	MATRIX ---------->	Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	37648	VAL	37631	VAL	37631	VAL	37631	VAL	37648	VAL
91-20-3	Naphthalene	10.	U	10.	U	10.	U	0.7	J	10.	U
56-55-3	Benzo(a)anthracene	10.	U	10.	U	10.	U	10.	U	10.	U
218-01-9	Chrysene	10.	U	10.	U	10.	U	10.	U	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U	10.	U	10.	U	10.	U	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U	10.	U	10.	U	10.	U	10.	U

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SOIL SAMPLING
AREA 7

SW846-META													
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	LAB SAMPLE ID --->	37736.05		37736.06		37736.01		37736.02		37736.03		37736.04	
	ID FROM REPORT -->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	SAMPLE DATE ----->	03/15/99		03/15/99		03/15/99		03/15/99		03/15/99		03/15/99	
	DATE EXTRACTED -->	03/22/99		03/22/99		03/22/99		03/22/99		03/22/99		03/22/99	
	DATE ANALYZED --->	03/23/99		03/23/99		03/23/99		03/23/99		03/23/99		03/23/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	MG/KG		MG/KG		MG/KG		MG/KG		MG/KG		MG/KG	
CAS #	Parameter	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL
7439-97-6	Mercury (Hg)	0.03	U	0.03	U	0.03	U	0.04	U	0.03	U	0.06	
7440-38-2	Arsenic (As)	1.3	U	11.4		1.5		11.7		3.2		77.6	
7440-39-3	Barium (Ba)	11.1		35.8		18.8		31.3		13.6		58.	
7440-43-9	Cadmium (Cd)	0.06	J	0.26	J	0.03	U	0.3	J	0.12	J	0.31	J
7440-47-3	Chromium (Cr)	4.9		28.8		8.3		23.8		6.9		33.6	
7439-92-1	Lead (Pb)	2.6		93.1		4.1		85.5		3.5		102.	
7782-49-2	Selenium (Se)	0.53	U	0.51	U	0.56	J	0.58	U	2.1		0.71	
7440-22-4	Silver (Ag)	0.14	U	0.13	U	0.13	U	0.15	U	0.14	U	0.16	U

*** Validation Complete ***

01182

AREA 7

Attachment C
Analytical Data

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SOIL SAMPLING
AREA 7

SW846-SVOA													
	SAMPLE ID ------->	F07-S-B001-01		F07-S-B001-02		F07-S-B002-01		F07-S-B002-02		F07-S-B003-01		F07-S-B003-02	
	ORIGINAL ID ----->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	LAB SAMPLE ID --->	37736.05		37736.06		37736.01		37736.02		37736.03		37736.04	
	ID FROM REPORT -->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	SAMPLE DATE ----->	03/15/99		03/15/99		03/15/99		03/15/99		03/15/99		03/15/99	
	DATE EXTRACTED -->	03/16/99		03/16/99		03/16/99		03/16/99		03/16/99		03/16/99	
	DATE ANALYZED --->	03/19/99		03/27/99		03/19/99		03/19/99		03/19/99		03/19/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL
91-20-3	Naphthalene	380.	U	94.	J	380.	U	84.	J	370.	U	110.	J
56-55-3	Benzo(a)anthracene	380.	U	95.	J	380.	U	34.	J	370.	U	56.	J
218-01-9	Chrysene	380.	U	120.	J	380.	U	40.	J	370.	U	79.	J
205-99-2	Benzo(b)fluoranthene	380.	U	95.	J	380.	U	32.	J	370.	U	74.	J
207-08-9	Benzo(k)fluoranthene	380.	U	79.	J	380.	U	31.	J	370.	U	59.	J

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR GROUNDWATER SAMPLING
AREA 7

SW-SVOA											
	SAMPLE ID ------->	FDS-G-W07A-03		FDS-G-W07B-03		FDS-G-W07C-03		FDS-G-W07D-03		FDS-G-W07E-01	
	ORIGINAL ID ----->	FDSGW07A03		FDSGW07B03		FDSGW07C03		FDSGW07D03		FDSGW07E01	
	LAB SAMPLE ID --->	37648.02		37631.07		37631.08		37631.09		37648.01	
	ID FROM REPORT -->	FDSGW07A03		FDSGW07B03		FDSGW07C03		FDSGW07D03		FDSGW07E01	
	SAMPLE DATE ----->	03/05/99		03/04/99		03/04/99		03/04/99		03/05/99	
	DATE EXTRACTED -->	03/08/99		03/06/99		03/06/99		03/06/99		03/08/99	
	DATE ANALYZED --->	03/15/99		03/10/99		03/10/99		03/10/99		03/15/99	
	MATRIX ---------->	Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	37648	VAL	37631	VAL	37631	VAL	37631	VAL	37648	VAL
108-95-2	Phenol	10.	U	10.	U	10.	U	10.	U	10.	U
111-44-4	bis(2-Chloroethyl)ether	10.	U	10.	U	10.	U	10.	U	10.	U
95-57-8	2-Chlorophenol	10.	U	10.	U	10.	U	10.	U	10.	U
541-73-1	1,3-Dichlorobenzene	10.	U	10.	U	10.	U	10.	U	10.	U
106-46-7	1,4-Dichlorobenzene	10.	U	10.	U	10.	U	10.	U	10.	U
100-51-6	Benzyl alcohol	10.	U	10.	U	10.	U	10.	U	10.	U
95-50-1	1,2-Dichlorobenzene	10.	U	10.	U	10.	U	10.	U	10.	U
95-48-7	2-Methylphenol (o-Cresol)	10.	U	10.	U	10.	U	10.	U	10.	U
108-60-1	2,2'-oxybis(1-Chloropropane)	10.	U	10.	U	10.	U	10.	U	10.	U
106-44-5	4-Methylphenol (p-Cresol)	10.	U	10.	U	10.	U	10.	U	10.	U
621-64-7	N-Nitroso-di-n-propylamine	10.	U	10.	U	10.	U	10.	U	10.	U
67-72-1	Hexachloroethane	10.	U	10.	U	10.	U	10.	U	10.	U
98-95-3	Nitrobenzene	10.	U	10.	U	10.	U	10.	U	10.	U
78-59-1	Isophorone	10.	U	10.	U	10.	U	10.	U	10.	U
88-75-5	2-Nitrophenol	10.	U	10.	U	10.	U	0.7	J	10.	U
105-67-9	2,4-Dimethylphenol	10.	U	10.	U	10.	U	10.	U	10.	U
65-85-0	Benzoic acid	25.	U	1.	J	1.	J	0.8	J	6.	J
111-91-1	bis(2-Chloroethoxy)methane	10.	U	10.	U	10.	U	10.	U	10.	U
120-83-2	2,4-Dichlorophenol	10.	U	10.	U	10.	U	10.	U	10.	U
120-82-1	1,2,4-Trichlorobenzene	10.	U	10.	U	10.	U	10.	U	10.	U
91-20-3	Naphthalene	10.	U	10.	U	10.	U	0.7	J	10.	U
106-47-8	4-Chloroaniline	10.	U	10.	U	10.	U	10.	U	10.	U
87-68-3	Hexachlorobutadiene	10.	U	10.	U	10.	U	10.	U	10.	U
59-50-7	4-Chloro-3-methylphenol	10.	U	10.	U	10.	U	10.	U	10.	U
91-57-6	2-Methylnaphthalene	10.	U	1.	J	0.7	J	10.	U	10.	U
77-47-4	Hexachlorocyclopentadiene	10.	U	10.	U	10.	U	10.	U	10.	U
88-06-2	2,4,6-Trichlorophenol	10.	U	10.	U	10.	U	10.	U	10.	U
95-95-4	2,4,5-Trichlorophenol	25.	U	25.	U	25.	U	25.	U	25.	U
91-58-7	2-Chloronaphthalene	10.	U	10.	U	10.	U	10.	U	10.	U
88-74-4	2-Nitroaniline	25.	U	25.	U	25.	U	25.	U	25.	U
131-11-3	Dimethyl phthalate	10.	U	10.	U	10.	U	10.	U	10.	U
208-96-8	Acenaphthylene	10.	U	10.	U	10.	U	10.	U	10.	U
99-09-2	3-Nitroaniline	25.	U	25.	U	25.	U	25.	U	25.	U
83-32-9	Acenaphthene	10.	U	1.	J	1.	J	15.		10.	U
51-28-5	2,4-Dinitrophenol	25.	U	25.	U	25.	U	25.	U	25.	U
100-02-7	4-Nitrophenol	25.	U	25.	U	25.	U	25.	U	25.	U

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR GROUNDWATER SAMPLING
AREA 7

SW-SVOA											
	SAMPLE ID ------->	FDS-G-W07A-03		FDS-G-W07B-03		FDS-G-W07C-03		FDS-G-W07D-03		FDS-G-W07E-01	
	ORIGINAL ID ----->	FDSGW07A03		FDSGW07B03		FDSGW07C03		FDSGW07D03		FDSGW07E01	
	LAB SAMPLE ID --->	37648.02		37631.07		37631.08		37631.09		37648.01	
	ID FROM REPORT -->	FDSGW07A03		FDSGW07B03		FDSGW07C03		FDSGW07D03		FDSGW07E01	
	SAMPLE DATE ----->	03/05/99		03/04/99		03/04/99		03/04/99		03/05/99	
	DATE EXTRACTED -->	03/08/99		03/06/99		03/06/99		03/06/99		03/08/99	
	DATE ANALYZED --->	03/15/99		03/10/99		03/10/99		03/10/99		03/15/99	
	MATRIX ---------->	Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	37648	VAL	37631	VAL	37631	VAL	37631	VAL	37648	VAL
132-64-9	Dibenzofuran	10.	U	1.	J	1.	J	2.	J	10.	U
121-14-2	2,4-Dinitrotoluene	10.	U	10.	U	10.	U	10.	U	10.	U
606-20-2	2,6-Dinitrotoluene	10.	U	10.	U	10.	U	10.	U	10.	U
84-66-2	Diethylphthalate	10.	U	10.	U	10.	U	10.	U	10.	U
7005-72-3	4-Chlorophenylphenylether	10.	U	10.	U	10.	U	10.	U	10.	U
86-73-7	Fluorene	10.	U	2.	J	2.	J	5.	J	10.	U
100-01-6	4-Nitroaniline	25.	U	25.	U	25.	U	25.	U	25.	U
534-52-1	2-Methyl-4,6-Dinitrophenol	25.	U	25.	U	25.	U	25.	U	25.	U
86-30-6	N-Nitrosodiphenylamine	10.	U	10.	U	10.	U	10.	U	10.	U
101-55-3	4-Bromophenyl-phenylether	10.	U	10.	U	10.	U	10.	U	10.	U
118-74-1	Hexachlorobenzene	10.	U	10.	U	10.	U	10.	U	10.	U
87-86-5	Pentachlorophenol	25.	U	25.	U	25.	U	25.	U	25.	U
85-01-8	Phenanthrene	10.	U	1.	J	1.	J	3.	J	1.	J
120-12-7	Anthracene	10.	U	10.	U	0.6	J	1.	J	10.	U
84-74-2	Di-n-butylphthalate	10.	U	10.	U	10.	U	10.	U	10.	U
206-44-0	Fluoranthene	10.	U	10.	U	10.	U	1.	J	10.	U
129-00-0	Pyrene	10.	U	10.	U	10.	U	0.7	J	10.	U
85-68-7	Butylbenzylphthalate	10.	U	10.	U	10.	U	10.	U	10.	U
91-94-1	3,3'-Dichlorobenzidine	20.	U	10.	U	10.	U	10.	U	20.	U
56-55-3	Benzo(a)anthracene	10.	U	10.	U	10.	U	10.	U	10.	U
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	10.	U	10.	U	10.	U	10.	U	10.	U
218-01-9	Chrysene	10.	U	10.	U	10.	U	10.	U	10.	U
117-84-0	Di-n-octyl phthalate	10.	U	10.	U	10.	U	10.	U	10.	U
205-99-2	Benzo(b)fluoranthene	10.	U	10.	U	10.	U	10.	U	10.	U
207-08-9	Benzo(k)fluoranthene	10.	U	10.	U	10.	U	10.	U	10.	U
50-32-8	Benzo(a)pyrene	10.	U	10.	U	10.	U	10.	U	10.	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.	U	10.	U	10.	U	10.	U	10.	U
53-70-3	Dibenz(a,h)anthracene	10.	U	10.	U	10.	U	10.	U	10.	U
191-24-2	Benzo(g,h,i)perylene	10.	U	10.	U	10.	U	10.	U	10.	U

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SOIL SAMPLING
AREA 7

SW846-VOA											
	SAMPLE ID ------->	F07-S-B001-01		F07-S-B001-02		F07-S-B002-01		F07-S-B002-02		F07-S-B003-01	
	ORIGINAL ID ----->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301	
	LAB SAMPLE ID --->	37736.05		37736.06		37736.01		37736.02		37736.03	
	ID FROM REPORT -->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301	
	SAMPLE DATE ----->	03/15/99		03/15/99		03/15/99		03/15/99		03/15/99	
	DATE ANALYZED --->	03/19/99		03/19/99		03/19/99		03/19/99		03/19/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil	
	UNITS ----------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL
71-43-2	Benzene	6.	U	5.	U	6.	U	8.	UJ	6.	U
100-41-4	Ethylbenzene	6.	U	1.	J	6.	U	8.	UJ	6.	U
108-88-3	Toluene	6.	U	5.	U	6.	U	8.	UJ	6.	U
1330-20-7	Xylene (Total)	6.	U	3.	J	6.	U	8.	UJ	6.	U

*** Validation Complete ***

CHARLESTON CTO-0144 FUEL DISTRIBUTION
POST-CAR SOIL SAMPLING
AREA 7

SW846-META													
	SAMPLE ID ------->	F07-S-B001-01		F07-S-B001-02		F07-S-B002-01		F07-S-B002-02		F07-S-B003-01		F07-S-B003-02	
	ORIGINAL ID ----->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	LAB SAMPLE ID --->	37736.05		37736.06		37736.01		37736.02		37736.03		37736.04	
	ID FROM REPORT -->	F07SB00101		F07SB00102		F07SB00201		F07SB00202		F07SB00301		F07SB00302	
	SAMPLE DATE ----->	03/15/99		03/15/99		03/15/99		03/15/99		03/15/99		03/15/99	
	DATE EXTRACTED -->	03/22/99		03/22/99		03/22/99		03/22/99		03/22/99		03/22/99	
	DATE ANALYZED --->	03/23/99		03/23/99		03/23/99		03/23/99		03/23/99		03/23/99	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	MG/KG		MG/KG		MG/KG		MG/KG		MG/KG		MG/KG	
CAS #	Parameter	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL	37736	VAL
7439-97-6	Mercury (Hg)	0.03	U	0.03	U	0.03	U	0.04	U	0.03	U	0.06	
7440-38-2	Arsenic (As)	1.3	U	11.4		1.5		11.7		3.2		77.6	
7440-39-3	Barium (Ba)	11.1		35.8		18.8		31.3		13.6		58.	
7440-43-9	Cadmium (Cd)	0.06	J	0.26	J	0.03	U	0.3	J	0.12	J	0.31	J
7440-47-3	Chromium (Cr)	4.9		28.8		8.3		23.8		6.9		33.6	
7439-92-1	Lead (Pb)	2.6		93.1		4.1		85.5		3.5		102.	
7782-49-2	Selenium (Se)	0.53	U	0.51	U	0.56	J	0.58	U	2.1		0.71	
7440-22-4	Silver (Ag)	0.14	U	0.13	U	0.13	U	0.15	U	0.14	U	0.16	U

*** Validation Complete ***